Indiana Department of Health

State of Indiana Health Care Coalitions Hazard Vulnerability Analysis

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State of Indiana Hazard Vulnerability Assessment

Executive Summary

Hazard vulnerability analyses (HVA) identify whether a jurisdiction is at risk for various health hazards and whether they require additional preparedness to address those hazards. The data and information within an HVA report quantifies the risk of specific health hazards, the ability to respond to the risks, and gaps in health infrastructure to provide recommendations and actionable steps for improving community preparedness in response to health hazards.
This HVA identifies whether public health hazard is relevant to the health care coalition (HCC) and provides recommendations for community improvement actions within the State of Indiana. Results from this HVA, in conjunction with other assessment tools, will be used to strengthen the infrastructure of health care coalitions (HCCs) in the State of Indiana and their ability to respond to potential health hazards that could disrupt and threaten the lives of Hoosiers.

Methods

The data in this report was collected from the 10 district HCCs in Indiana. A total of 71 public health hazards were assessed to determine their applicability to Indiana. There were four distinct categories of hazards:

1) Natural hazards – 18 potential hazards
2) Technological hazards - 24 potential hazards
3) Human hazards – 19 potential hazards
4) Hazardous material - 10 potential hazards

After identifying which hazards were applicable, Indiana HCCs identified the risk factors, protective factors, and the integration factors that would contribute to the vulnerability of a community to the various hazards. The figure below outlines how final vulnerability score was calculated. The number in the parentheses following the name of the data field used to calculate each component signifies the total score possible for that data field.

Figure 1: Vulnerability Calculation

Risk Factors Calculation
Perceived Probability of Hazard (3) = Probability Score (3)
+
Human Impact (3) + Property Impact (3) + Health Impact (3) + Preparedness Impact (3) = Impact Score (12)
Probability Score (3) + Impact Score (12) /15 (risk factor score points possible) = Risk Factor Rate
Protective Factors Calculation
Coalition Capability (3) + External Capability (3) /6 (protective factor points possible) = Protective Factor Score
Total Vulnerability Score Calculation
Risk Factor Rating + Protective Factor Rating /2 (Total factors) = Final Vulnerability Rating

Below is a table summarizing the coalition rankings, risk categories, and relative risks of the top ten hazards identified by the coalition. The final risk rating shown in the final risk rating column is an average of the final risk rating of all coalitions.

Figure 2: Top 10 Hazards

Rank #	Hazard	Risk category	Final Risk Rating
1	Tornado	Natural	0.65
2	Active Shooter	Human	0.60
3	Fire Internal	Technological	0.59
4	Severe Storms	Natural	0.59
5	Patient Surge	Human	0.58
6	Ice Storm	Natural	0.57
7	Snowfall	Natural	0.57

8	Mass Casualty Incident (trauma)	Human	0.56
9	Bomb Detonation	Human	0.56
10	Chemical Exposure, External	Hazardous Material	0.55

In addition to assessing the risk and protective factors impacting Indiana, the HVA also included questions to assess the level at which the whole community has been integrated into planning and response efforts.

Whole community integration is a means by which residents, public health professionals, emergency management practitioners, organizational and community leaders, and government officials can collectively understand and assess the needs of their respective communities. In addition to calculating a final risk rating, the HVA calculated an integration factor to support a whole community preparedness approach to public health hazards. found. The following figure shows the formula used to calculate the whole community integration factor rating.

Figure 3: Integration Factor Calculation

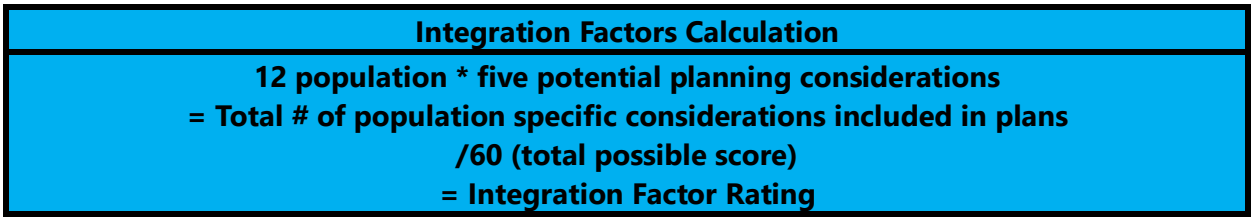
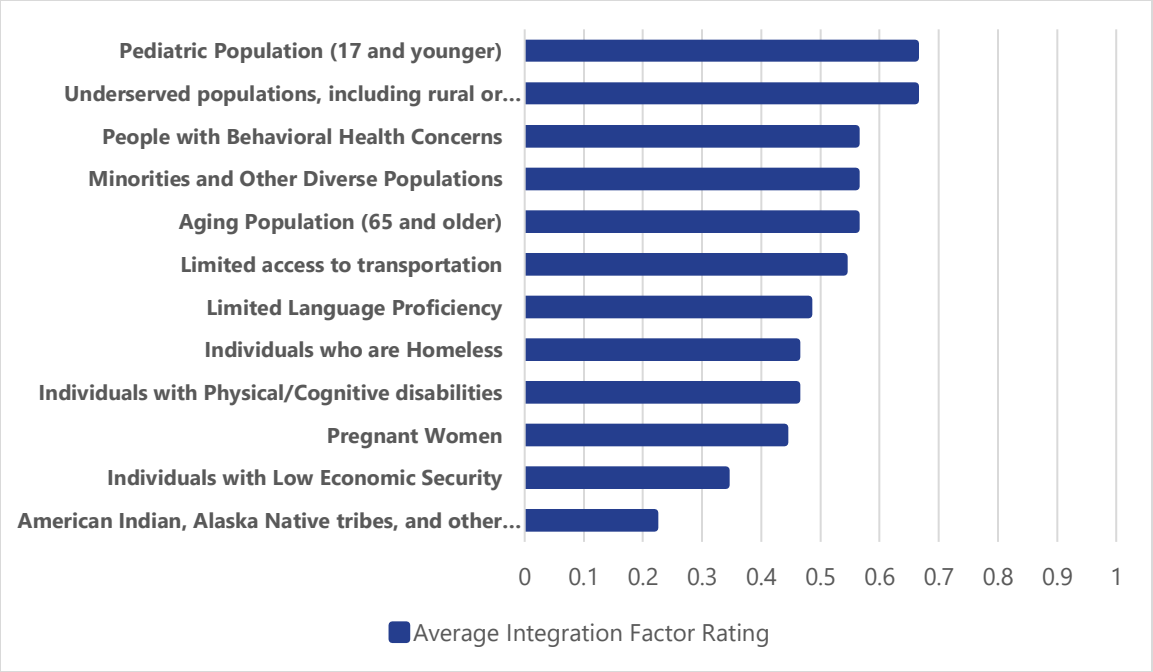


Figure 4: Average Integration Factor by Population shows the average integration factor rate for each population assessed. The rating is expressed as a number between 0 and 1, with 1 as the highest possible rating.

Figure 4: Average Integration Factor by Population


Pediatric Population (17 and younger)
Underserved populations, including rural or...
People with Behavioral Health Concerns
Minorities and Other Diverse Populations
Aging Population (65 and older)
Limited access to transportation
Limited Language Proficiency
Individuals who are Homeless
Individuals with Physical/Cognitive disabilities
Pregnant Women
Individuals with Low Economic Security
American Indian, Alaska Native tribes, and other...
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Average Integration Factor Rating

Introduction

Public health in the United States is affected by a wide range of hazards. There are four primary categories of public health hazards:

1) Natural hazards
2) Technological hazards
3) Human hazards
4) Hazardous material hazards

In 2023, IDOH requested hazard vulnerability analyses (HVAs) be performed throughout Indiana to identify the applicability of these public health hazards within each of the 10 health care coalitions (HCCs) of Indiana.

Results

The coalitions assessed 71 hazards or events. The results below are the top 10 hazards, according to the coalition's ranking across four risk categories—technological hazards, natural hazards, and human hazards. The full list of ranked hazards can be found in Appendix A. Below is a table summarizing the coalition rankings, risk categories, and relative risks of the top ten hazards identified by the coalition. The final risk rating shown in the final risk rating column is an average of the final risk rating of all coalitions.

Figure 5: Hazard Ranking

Rank #	Hazard	Risk category	Final Risk Rating
1	Tornado	Natural	0.65
2	Active Shooter	Human	0.60
3	Fire Internal	Technological	0.59
4	Severe Storms	Natural	0.59
5	Patient Surge	Human	0.58
6	Ice Storm	Natural	0.57
7	Snowfall	Natural	0.57
8	Mass Casualty Incident (trauma)	Human	0.56
9	Bomb Detonation	Human	0.56
10	Chemical Exposure, External	Hazardous Material	0.55

The following sections first explore each component of the risk assessment, then provide detailed analysis of each by hazard type.

Risk Factor Assessment

For the purposes of the HVA, "risk factor" is the chance of a given threat or hazard affecting a community. The risk factor is important to consider because communities must allocate limited resources strategically. Regardless of how communities express the risk factor associated with a specific incident, understanding the likelihood of a hazard as well as the hazards impact on various aspects of community life is a key component in understanding what may be needed to prepare and respond to that hazard. Hazards were categorized into four types: natural, technological, human, and hazardous materials.

Risk Factors Calculation

Perceived Probability of Hazard
= Probability Score

+

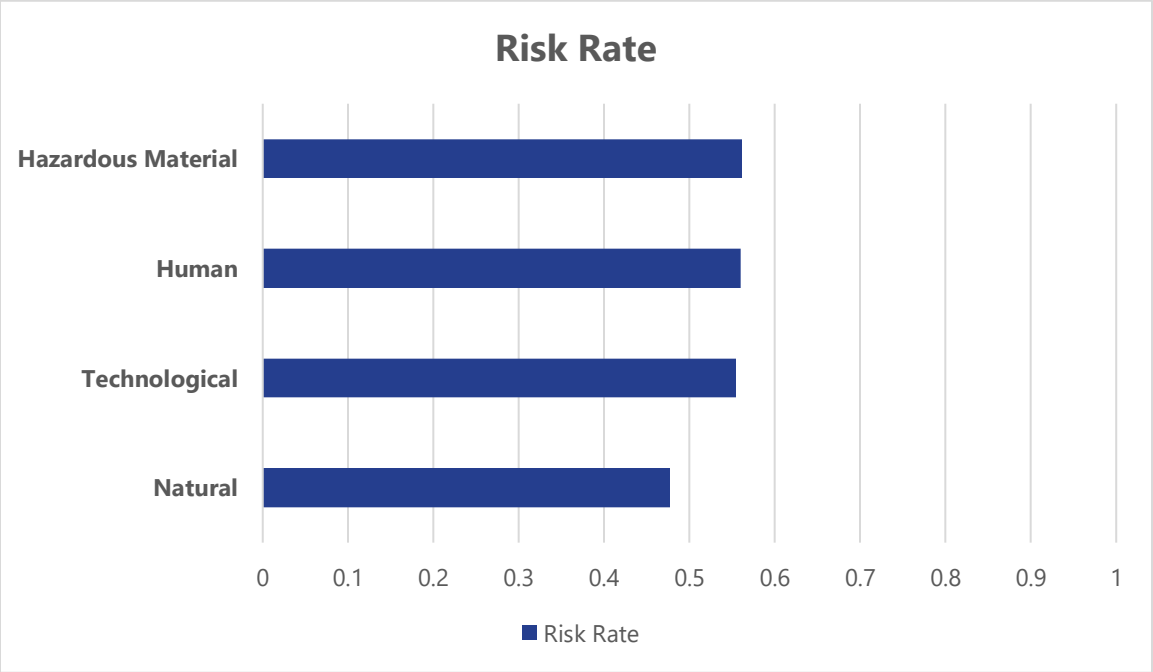
Human Impact + Property Impact + Health Impact + Preparedness Impact
= Impact Score

Probability Score + Impact Score
/15 (risk factor score points possible)
=Risk Factor Rate

Risk Factor Assessment Results

Figure 6: Risk Rating by Hazard Type shows the average risk rating of each hazard category. In Indiana Human and Hazardous Material Hazards were found to have the highest risk rating with a rating of .56.

Figure 6: Risk Rating by Hazard Type



Probability Assessment

Respondents were asked to rank the perceived probability of occurrence for each of the hazards that they indicated were applicable to their district. They were provided with the following issues to consider for the "perceived probability:"

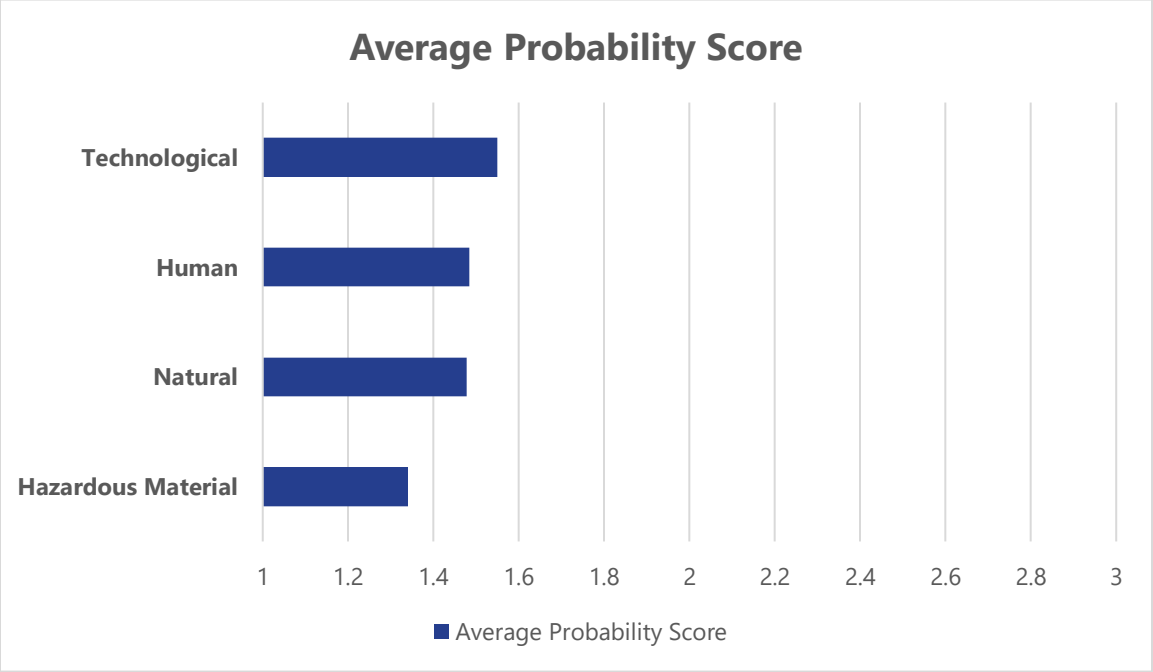
1. If your emergency operations plan has been activated in the past 10 years for the identified hazard or threat, (or) if a jurisdiction has been substantially affected by the identified hazard but the plan was not officially activated, then you would select "Highly Probable."
2. You may use known risk, historical data, local or regional partnerships, and manufacturer/vendor statistics (supply chain disruption) to rate your perceived probability.

Respondents were then asked to rate the probability of each hazard from "Not applicable" [0], to "Highly Probable." [3]

Probability Assessment Results

Figure 7: Probability Score by Hazard Type shows the average probability score by hazard type. The highest possible score for this component was 3. Technological hazards were found to have the highest average probability score of all hazard types with an average score of 1.55.

Figure 7: Probability Score by Hazard Type



Impact Assessment

To understand the risk a hazard presents to a district it is necessary to evaluate the impact of the hazard on the district. The HVA collected data from each respondent on the impact of the hazard on the following categories: human, property, healthcare, and preparedness.

Human Impact

Respondents were asked to rate the impact of each hazard on the people in the district. They were given the following issues to consider for human impact include but are not limited to:

1. Possibility of death or injury
2. Healthcare system compromised in its ability to deliver normal services
3. Potential for mass casualty incidents

Then asked to rank the human impact on a scale of Low [1] to High impact [3].

Property Impact

Respondents were asked to rate the impact of each hazard on the property in the district. They were given the following things to consider for property impact to include but are not limited to:

1. Monetary losses, physical losses and damage
2. Cost to replace
3. Cost to set up temporary replacement
4. Cost to repair
5. Cost to respond
6. Time and ability to recover, including financial reimbursements (i.e., public assistance reimbursements, presidentially declared disasters and grants)

Then asked to rank the property impact on a scale of Low [1] to High impact [3].

Healthcare Services Delivery Impact

Respondents were asked to rate the impact of each hazard on the healthcare service delivery in the district. They were given the following things to consider for impact to healthcare services delivery include but are not limited to:

1. Interruption of services
2. Staffing impacts (Inability of staff to report to work, staffing shortages, inability to maintain or hire staff
3. Impacts to accreditation requirements (CMS, HFAP, The Joint Commission)
4. Supply chain disruption
5. Impact on revenue streams

Then asked to rank the property impact on a scale of Low [1] to High impact [3].

Preparedness

Respondents were asked to rate the impact of each hazard on the preparedness in the district. They were given the following issues to consider for preparedness include but are not limited to:

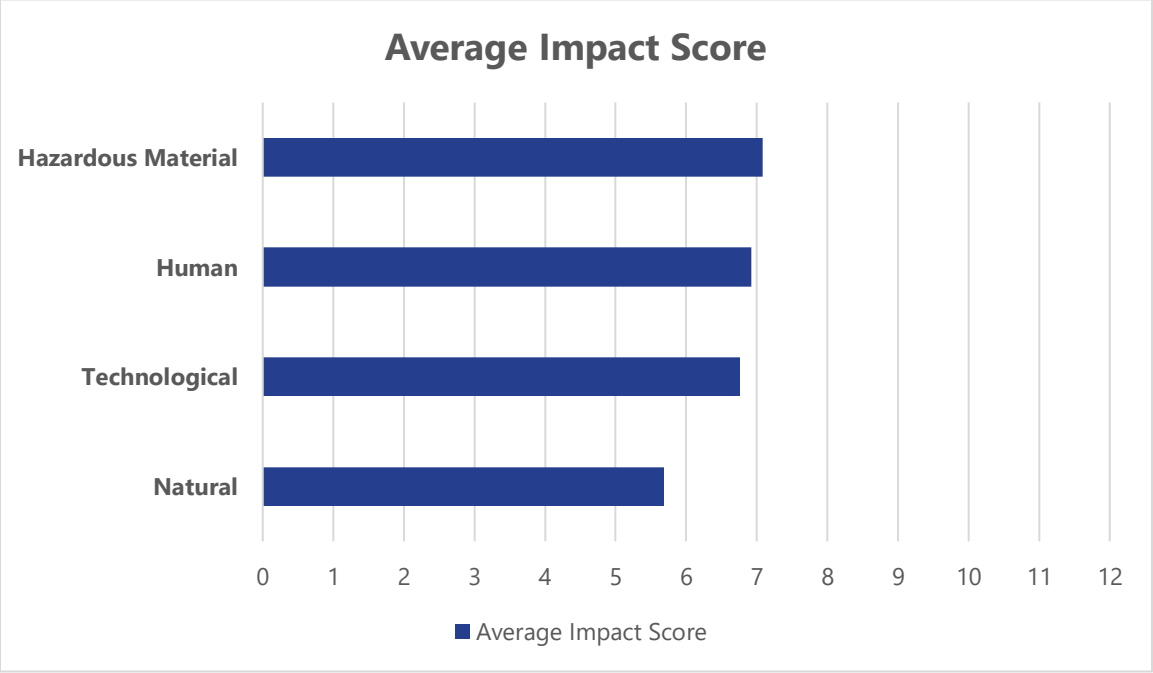
1. [Pre-planning]
2. Maintenance and upkeep of emergency operations plans, and essential inventories
3. Business continuity and continuity of operations plans
4. Testing of plans through exercises, drills, and workshops
5. National Incident Management System (NIMS) Compliance
6. Insurance
7. Participation within the healthcare coalition for shared resources, assets, mutual aid, exercises, and drills

Then asked to rank the property impact on a scale of Low [1] to High impact [3].

Impact Assessment Results

Figure 8: Impact by Hazard Type shows the average impact score of each hazard type. The highest possible impact score was 12. Hazardous Material hazards were identified as having the highest average total impact across all assessed categories with a score of 7.08.

Figure 8: Impact by Hazard Type



Protective Factors Assessment

The risk assessment data was used to calculate a protective factor rating for each of the potential hazards that could impact the health of the state.

Protective Factors Calculation
Coalition Capability + External Capability /6 (protective factor points possible) = Protective Factor Score

For the purposes of the HVA, "protective factor" are environmental attributes that are associated with positive adjustment and development throughout the course of life-threatening conditions. Protective factor characteristics are associated with a lower likelihood of negative outcomes or that reduce a risk factor's impact. Protective factors may be seen as positive countering events.

Coalition Capabilities Assessment

Respondents were asked to rate the coalition's capability of the district to respond to each hazard. They were given the following issues to consider for internal resources:

1. Types of supplies on hand/will they meet the demand?
2. The volume of supplies on hand/will they meet the demand?
3. Staff/provider availability
4. Availability of back-up systems and downtime procedures
5. Internal resources, ability to withstand disasters, and essential inventories

Then were asked to rank the capability as High [3], Moderate [2], or Low or none [1].

External Capabilities Assessment

Respondents were asked to rate the external capability of the district to respond to each hazard. They were given the following Issues to consider for external resources:

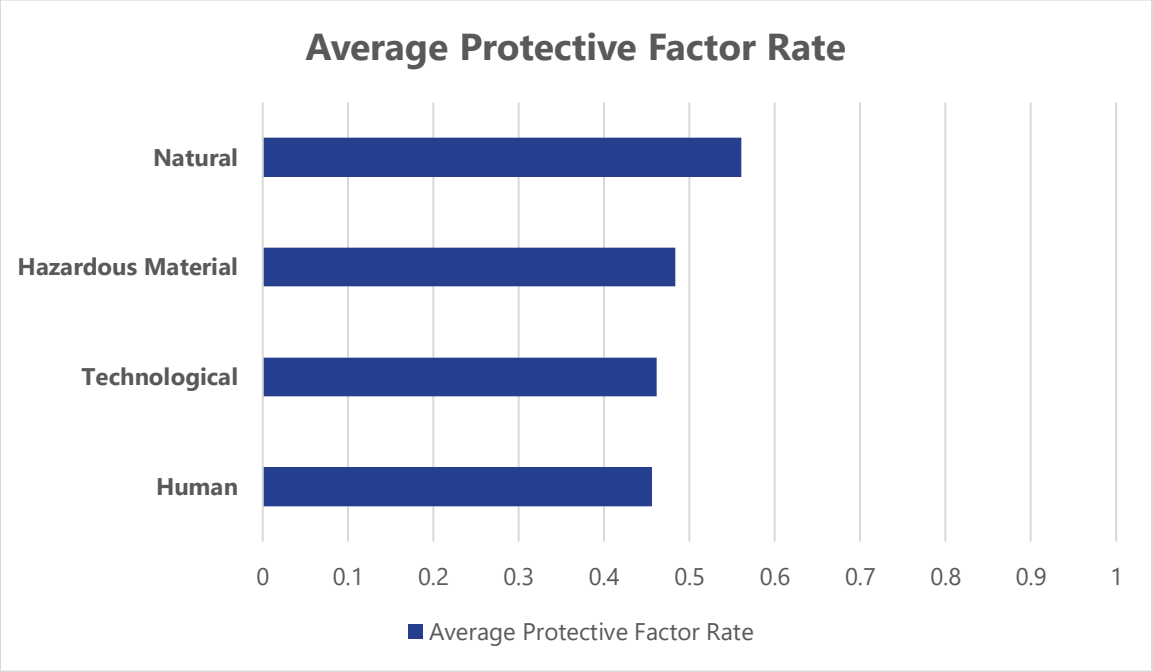
1. Types of mutual aid agreements within the healthcare coalition and community partnerships?
2. Coordination with local and state agencies
3. Coordination with healthcare coalition partners
4. Coordination with treatment specific facilities
5. Community resources
6. Training, exercises, and drills with key partner

Then were asked to rank the capability as High [3], Moderate [2], or Low or none [1].

Protective Factors Assessment Results

Figure 9: Protective Factors by Hazard Type shows the average protective factor rate by hazard type. Protective factor rate was displayed as a rate from 0 to 1 with 1 being the highest possible rate. Natural Hazards were identified as the hazard with the highest average protective factor rate with a rate of .56.

Figure 9: Protective Factors by Hazard Type



Integration Factor Assessment

Emergency managers should understand the composition, capabilities, priorities, and needs of the people they serve. Understanding a community's demographics, geography, history, and resources can help identify unique needs and inform engagements. Additionally, understanding the potential barriers that may limit or eliminate an individual's access to necessary resources, services, or successful outcomes in the wake of a disaster is key. Planning for, and the inclusive participation of, the whole community is essential to ensure an effective planning process and resulting plans.

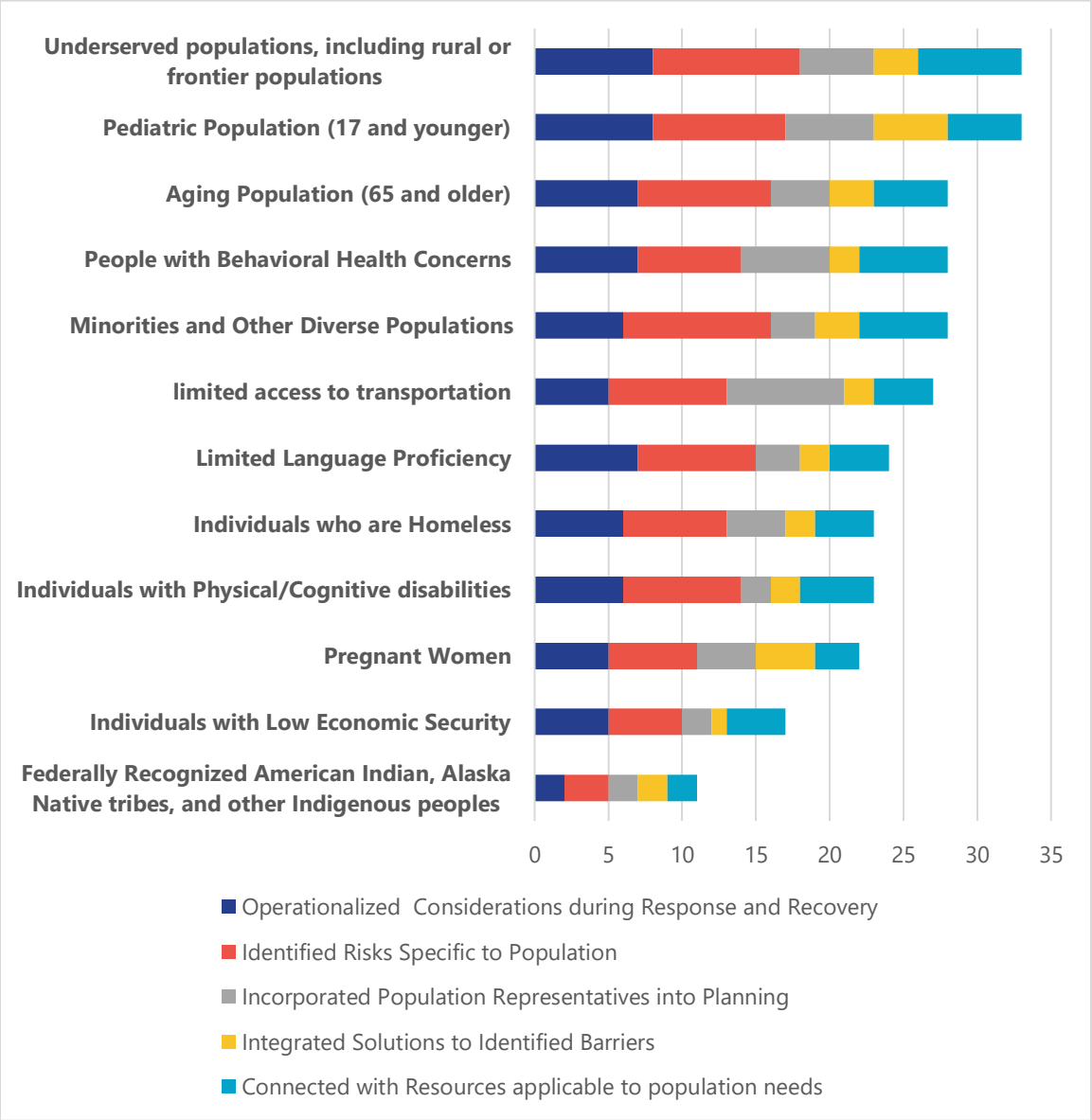
Integration factors calculation
12 population * 5 potential planning considerations = Total # of population specific considerations included in plans /60 (total possible score) = integration factor rating

HCCs were asked to indicate which population specific considerations they had integrated into their planning and preparedness efforts. Each population had five considerations recommended for inclusion in response and recovery plans. To view a complete list of the considerations that were recommended for each population see Appendix B.
The survey responses indicated that 49% of the recommended population specific considerations had been incorporated into their response and recovery plans.

Integration Fact Assessment Results

Figure 10: Integration of Population Considerations shows the total number of times that respondents indicated they had incorporated the recommended consideration for the population. A total score of 50 was possible for each of the assessed populations.

Figure 10: Integration of Population Considerations



Final Hazard Vulnerability Score

The intended use of the tool is to identify the perceived probability of specific hazards occurring. This HVA tool draws from current best practices and data regarding threats and resilience. This HVA Report is meant to help determine future hazard-specific planning, plans, training, and exercise activities that should be conducted with public health preparedness partners. The data and analysis derived from the tool is to be disseminated throughout Indiana to allow for all to contribute to improving public health and responses to public health hazards for Hoosiers.

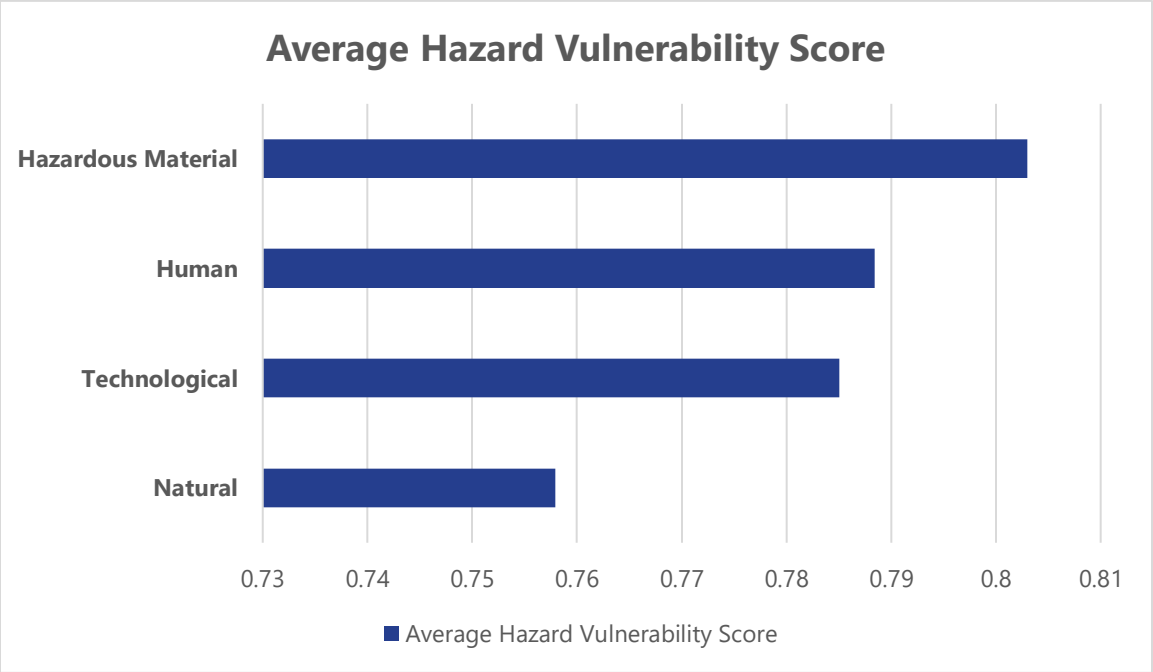
Total Risk Score Calculation
Risk Factor Rating + Protective Factor Rating /2 (Total factors) =Final Risk Rating

Results from this HVA, in conjunction with other assessment tools, will be used to improve the ability of the State of Indiana to prepare for and respond to a range of hazards which could disrupt and threaten the lives of Hoosiers. Further, this tool will quantify gaps related to the capability of health services to respond to public health hazards.

Hazard Vulnerability Assessment Results

Figure 11: Hazard Vulnerability Score by Hazard Type shows the average hazard vulnerability rate by hazard type. Hazardous Materials had the highest average hazard vulnerability rate of all hazard types.

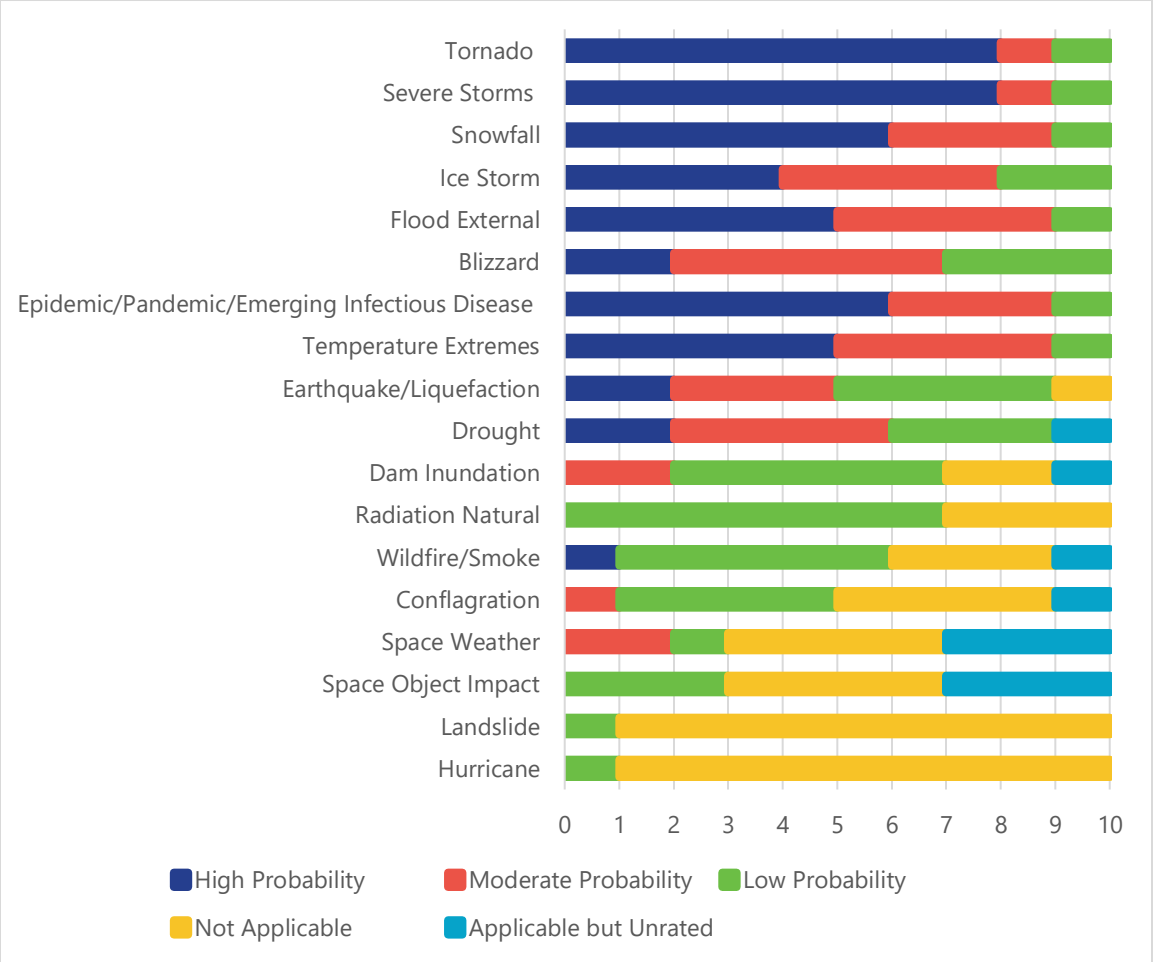
Figure 11: Hazard Vulnerability Score by Hazard Type



Natural Hazards Assessment Results

A total of 18 natural hazards were assessed through the HVA. The figure below shows the breakdown of how each district perceived the applicability and/or probability of each hazards by number of districts that selected that rating. The number of districts that rated a hazard as "highly probable" is shown in blue. Those that rated a hazard as "moderately probable" are shown in orange. The number of districts that indicated a hazard as "low probability" are shown in green. Some districts found that a hazard would be applicable to them, but they did not have enough information to rate the hazard at the time of the assessment. The number of districts that selected this response is shown in light blue. Not every hazard was perceived as applicable to all districts. The number of districts that selected a hazard as "Not applicable" are displayed in yellow.

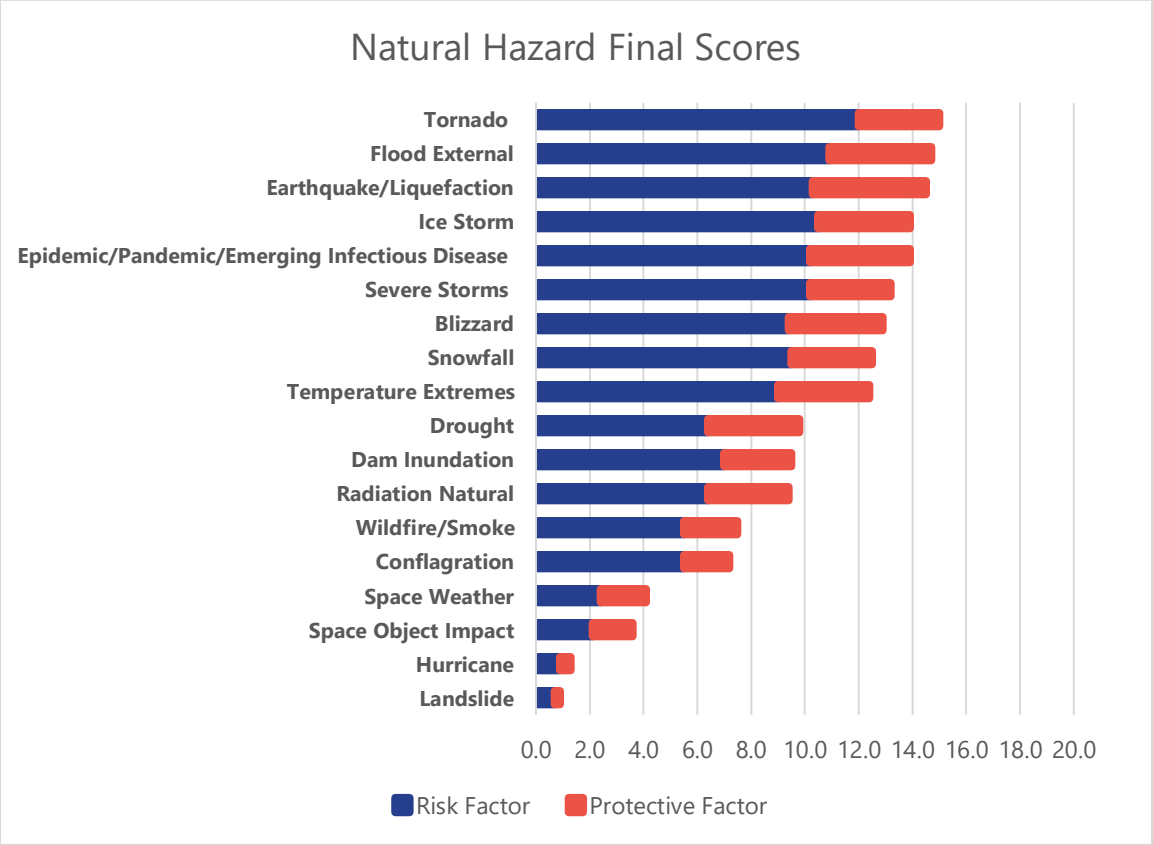
Figure 12: Applicability of Natural Hazards



Final Hazard Vulnerability Score

The final hazard vulnerability score combines the risk and protective factor score of each hazard to determine the vulnerability of the state to the hazard. Each of these scores is representative of the factors that would contribute to the overall vulnerability of the state to the assessed hazards. The average response from all districts was calculated to determine the score for the state. Figure 13: Natural Hazards Final Hazard Vulnerability Scores shows the average score for each natural hazard assessed. A total score of 21 was possible for each hazard assessed.

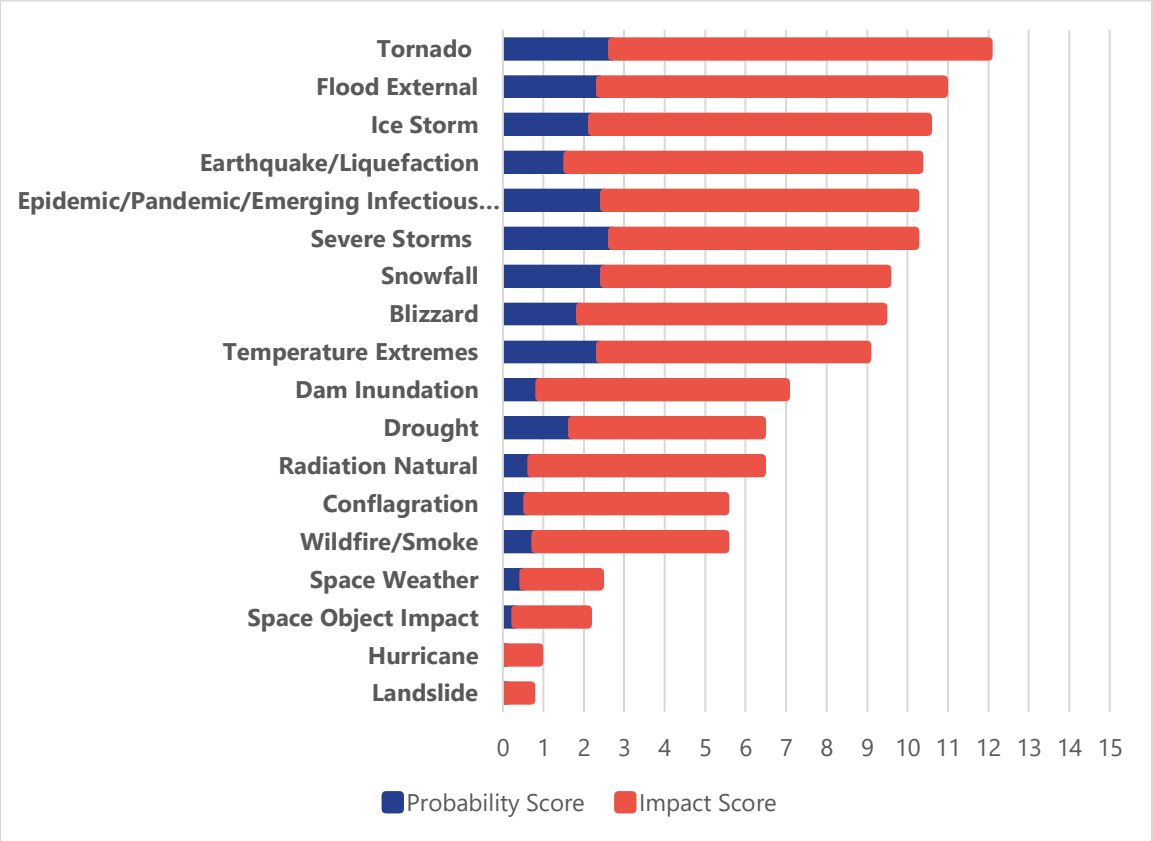
Figure 13: Natural Hazards Final Hazard Vulnerability Scores



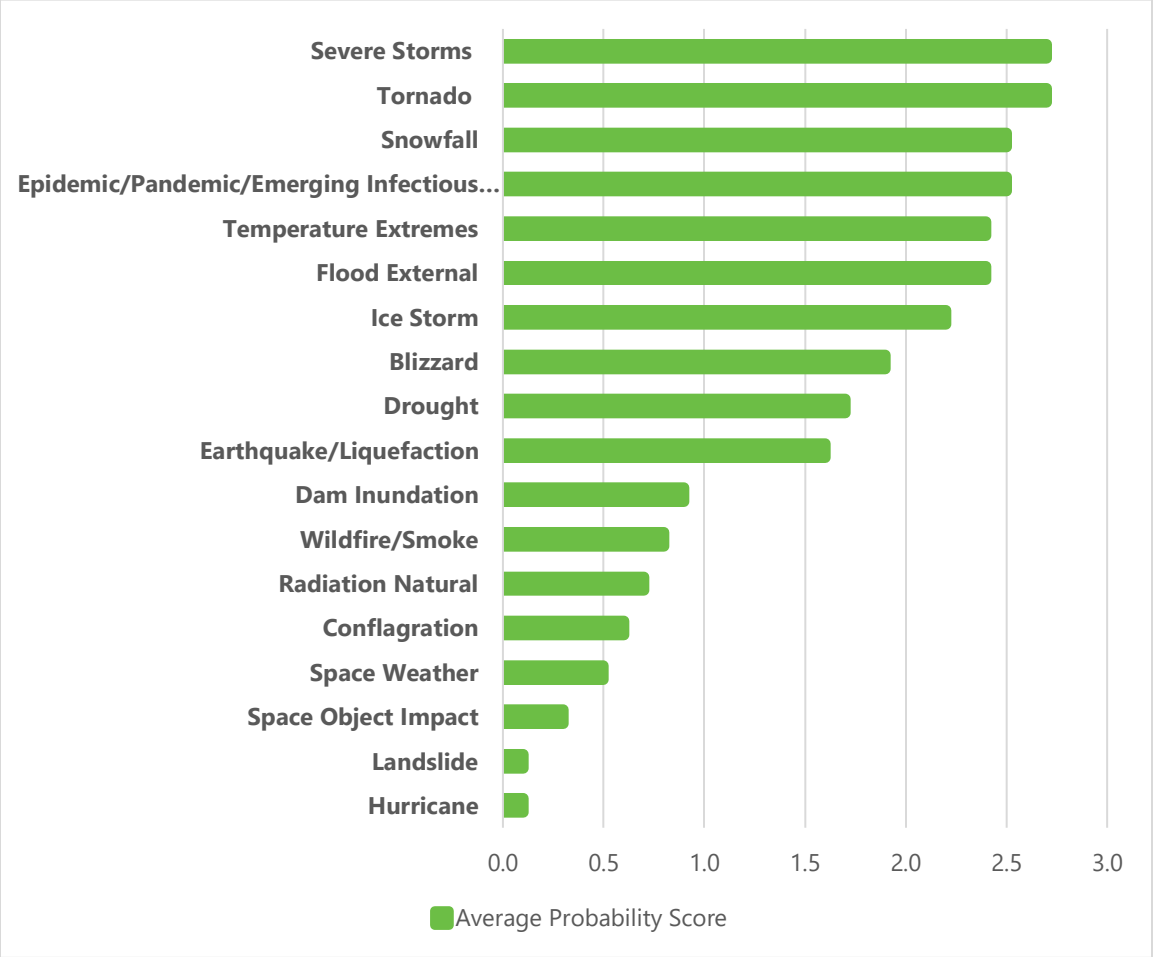
Risk Factor Score

A total risk factor scores of 15 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the natural hazards in order of which hazard presents the largest risk to the state.

Figure 14: Natural Hazards Risk Factor Scores



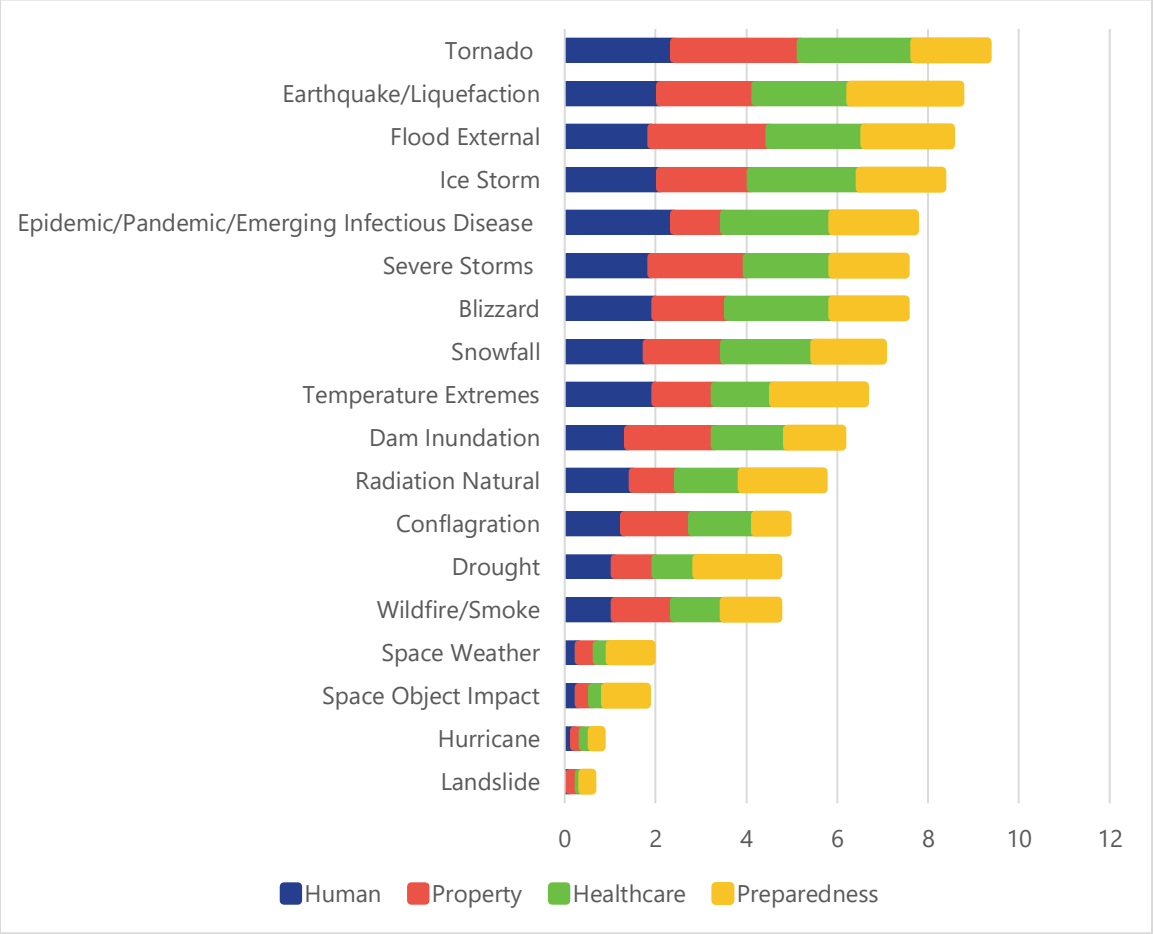
15: Natural Hazards Perceived Probability Scores



Impact Score

A total impact score of 12 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the natural hazards in order of which hazard was perceived to have the most impact on the health of the state.

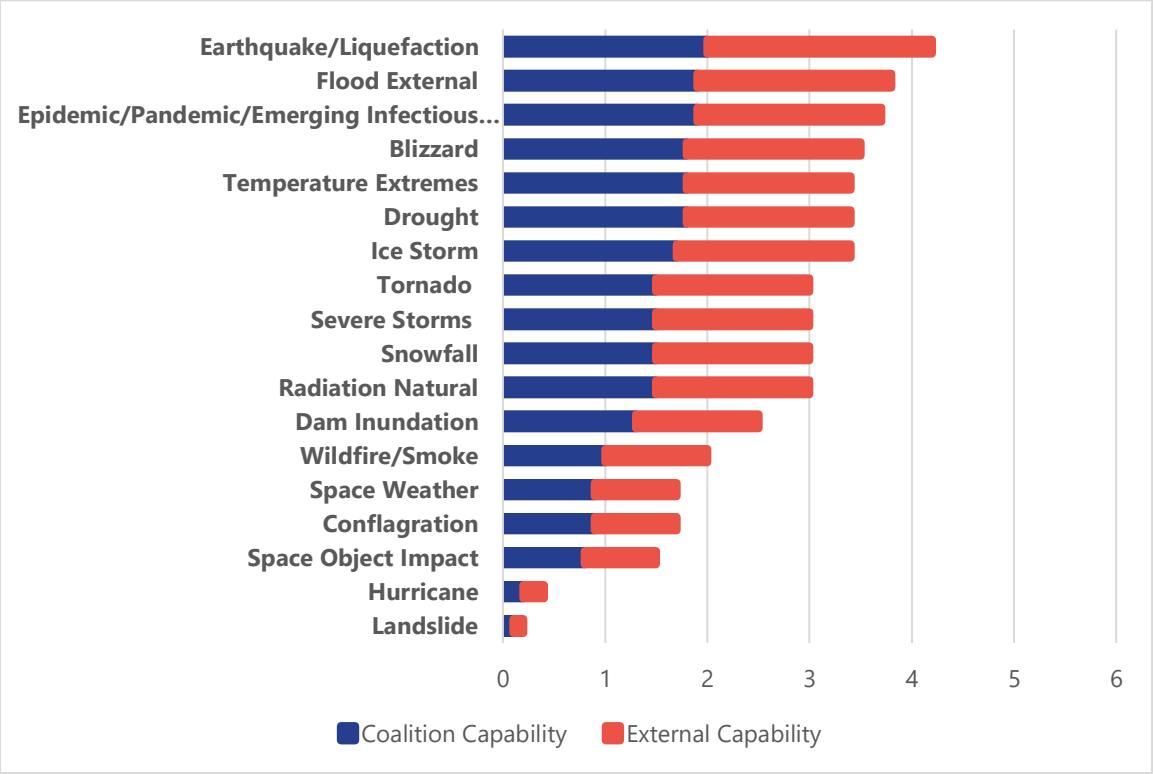
Figure 16: Natural Hazards Impact Scores



Protective Factor Score

A total protective factor score of 6 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the natural hazards in order of which hazard was perceived to have the highest protective factors in the state.

Figure 17: Natural Hazards Protective Factors Score

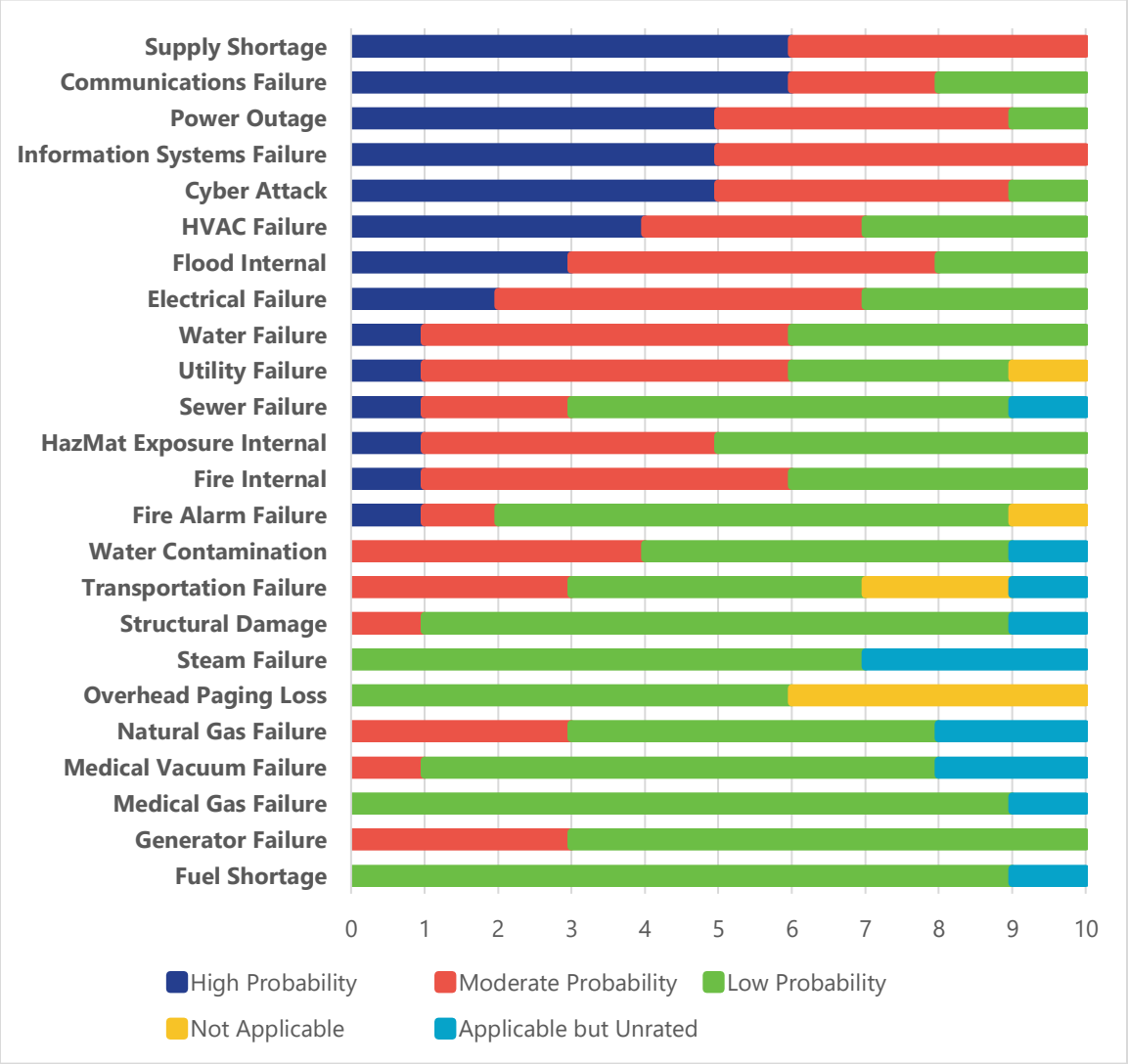


Technological Hazards Assessment Results

A total of 24 Technological Hazards were assessed through the HVA. The figure below shows the breakdown of how each district perceived the applicability and/or probability of each hazard by number of districts that selected that rating.

The number of districts that rated a hazard as “highly probable” is shown in blue. Those that rated a hazard as “moderately probable” are shown in orange. The number of districts that indicated a hazard as “low probability” are shown in green. Some districts found that a hazard would be applicable to them, but they did not have enough information to rate the hazard at the time of the assessment. The number of districts that selected this response is shown in light blue. Not every hazard was perceived as applicable to all districts. The number of districts that selected a hazard as “not applicable” are displayed in yellow.

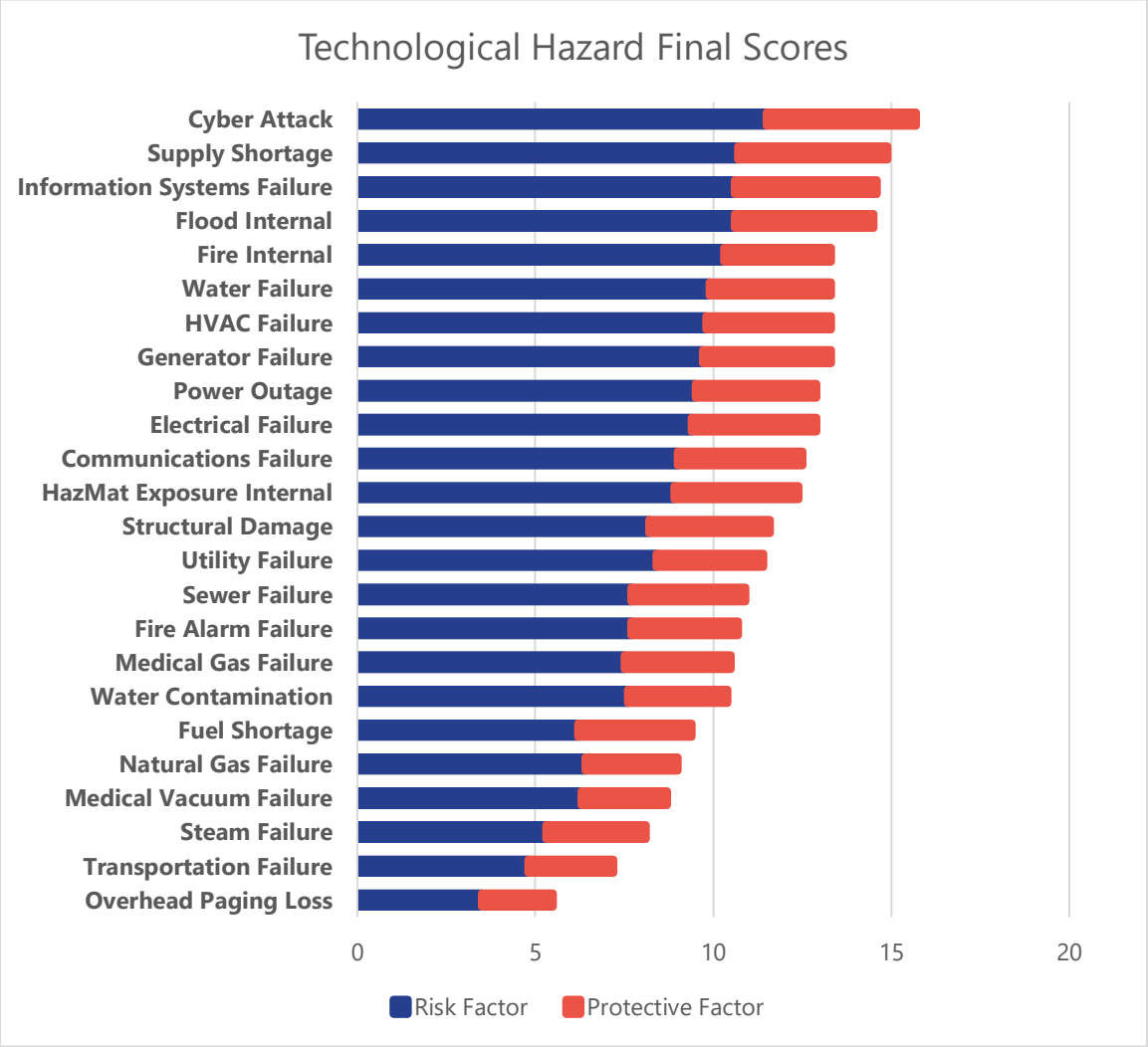
Figure 18: Applicability of Technological Hazards



Final Hazard Vulnerability Score

A total hazard vulnerability score of 21 was possible for each applicable hazard. To find the score for the state the average of all district responses was calculated. The figure below shows the technological hazards in order of which hazard was perceived to have the highest risk in the state.

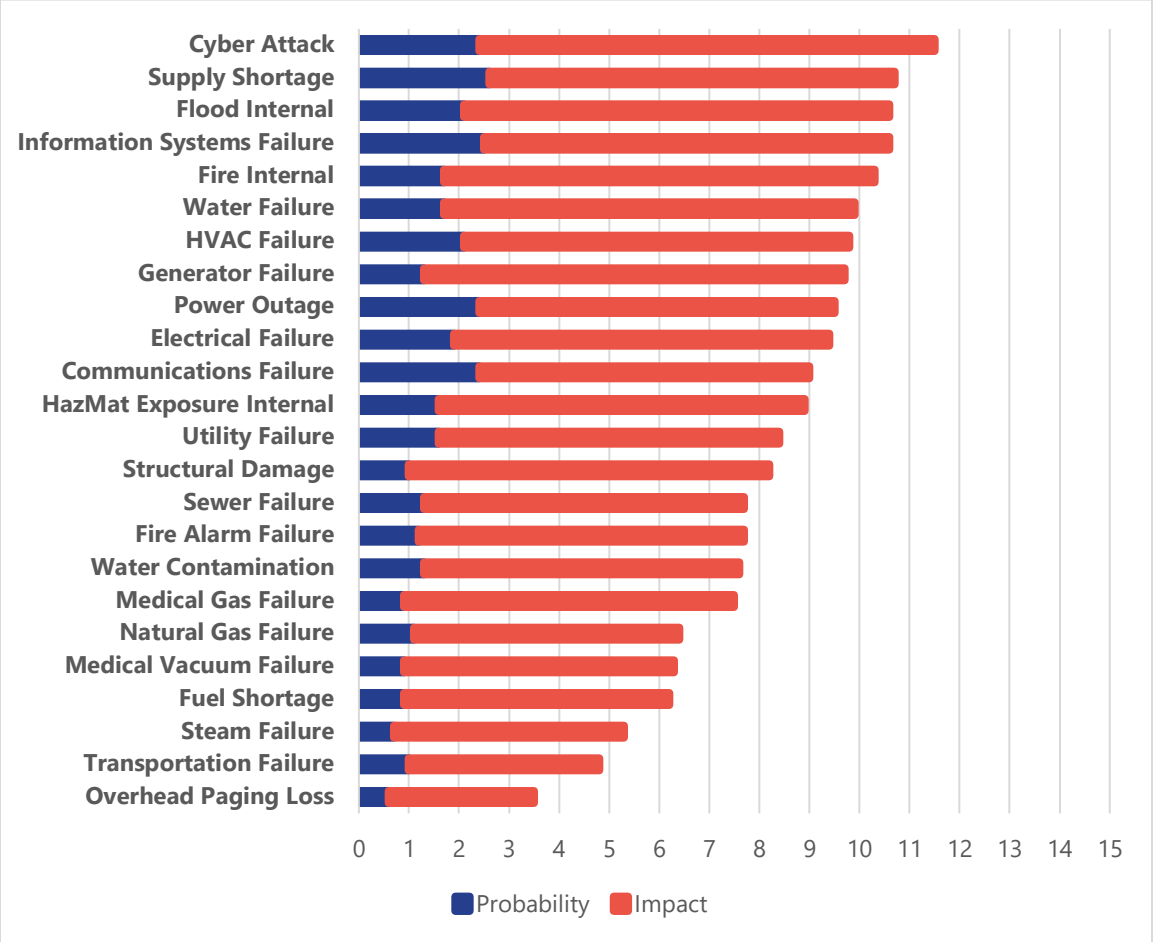
Figure 19: Technological Hazards Final Hazard Vulnerability Scores



Risk Factor Score

A total risk factor score of 15 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the technological hazards in order of which hazard presents the highest risk to the state.

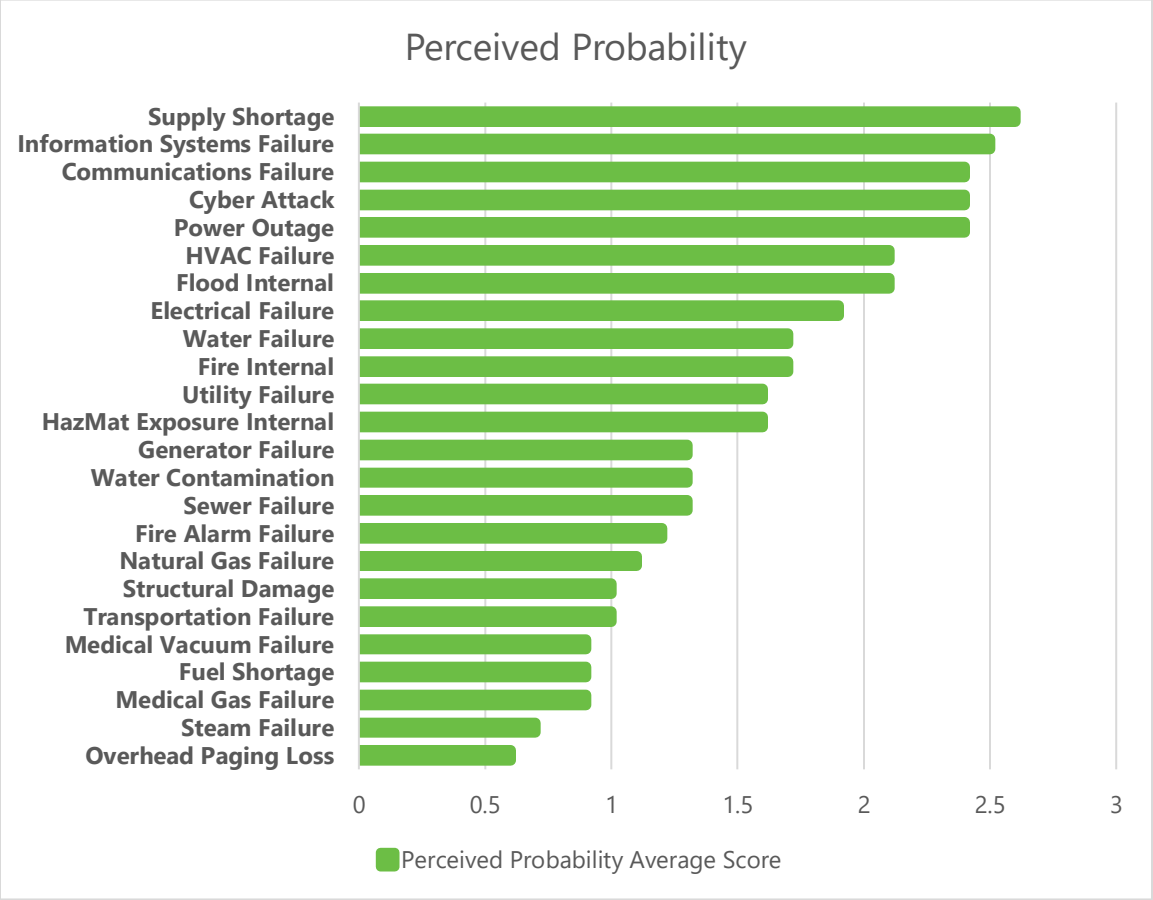
Figure 20: Technological Hazards Risk Factor Scores



Probability Score

A total probability score of 3 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the technological hazards in order of which hazard was perceived to be most likely to occur.

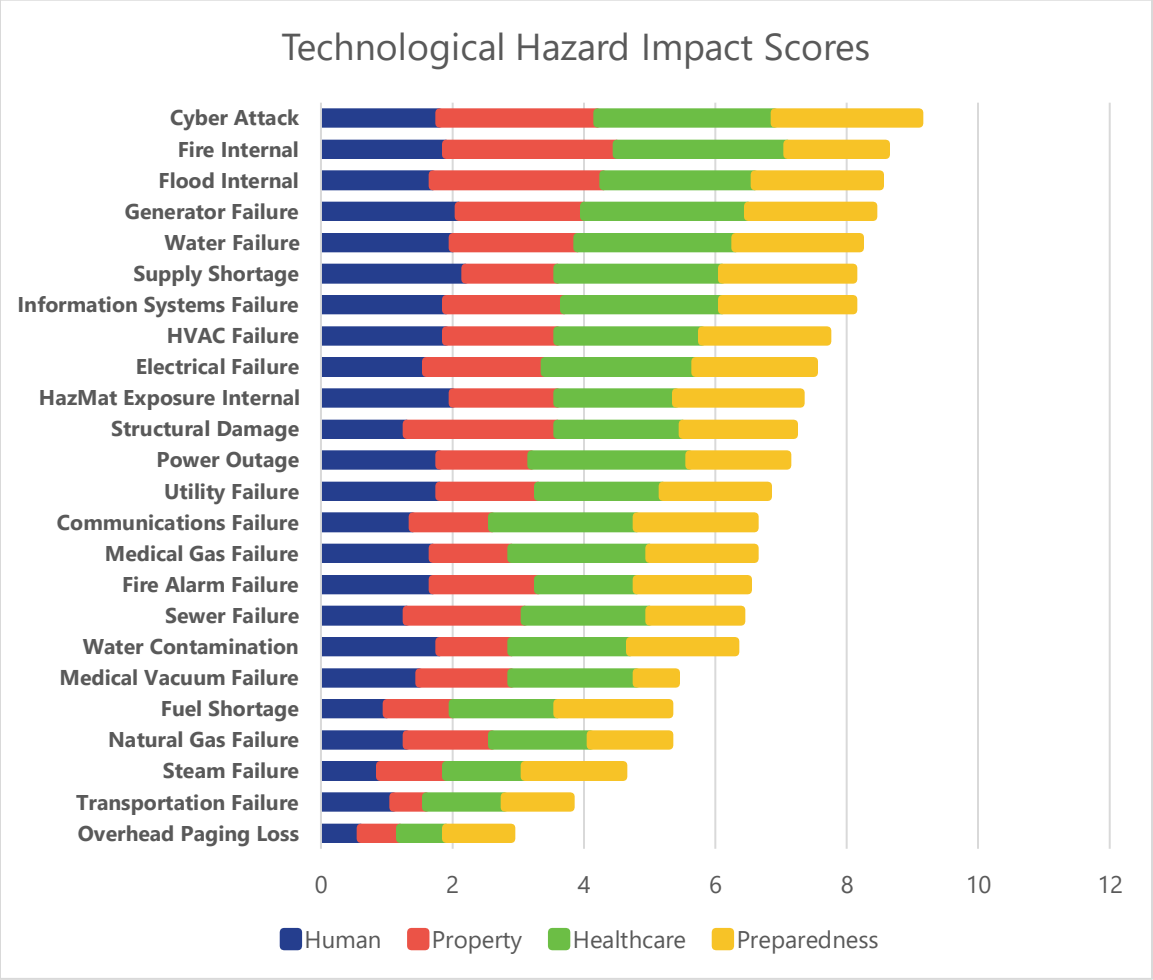
Figure 21: Technological Hazards Perceived Probability Scores



Impact Score

A total impact score of 12 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the technological hazards in order of which hazard was perceived to have the most impact on the health of the state.

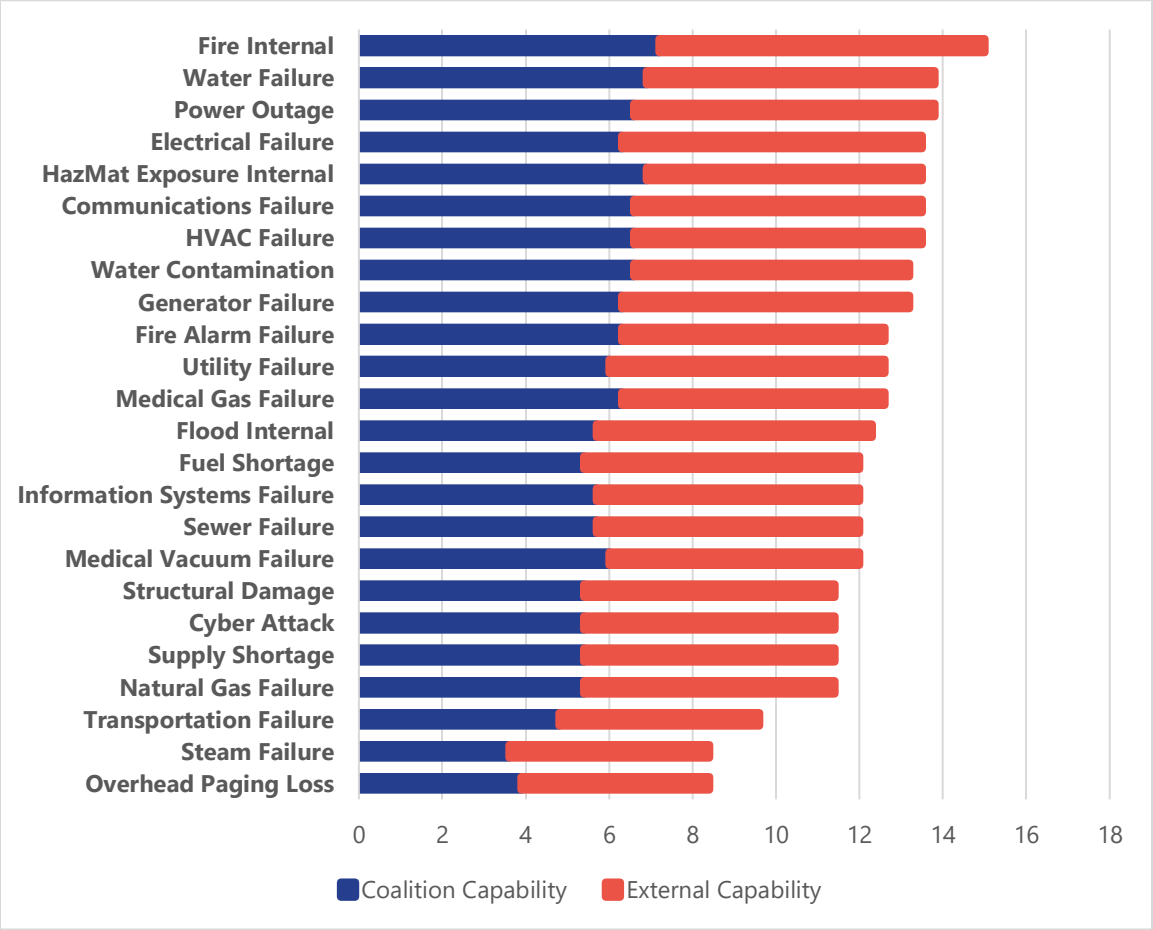
Figure 22: Technological Hazards Impact Scores



Protective Factor Score

A total protective factor score of 6 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the technological hazards in order of which hazard was perceived to have the highest protective factors in the state.

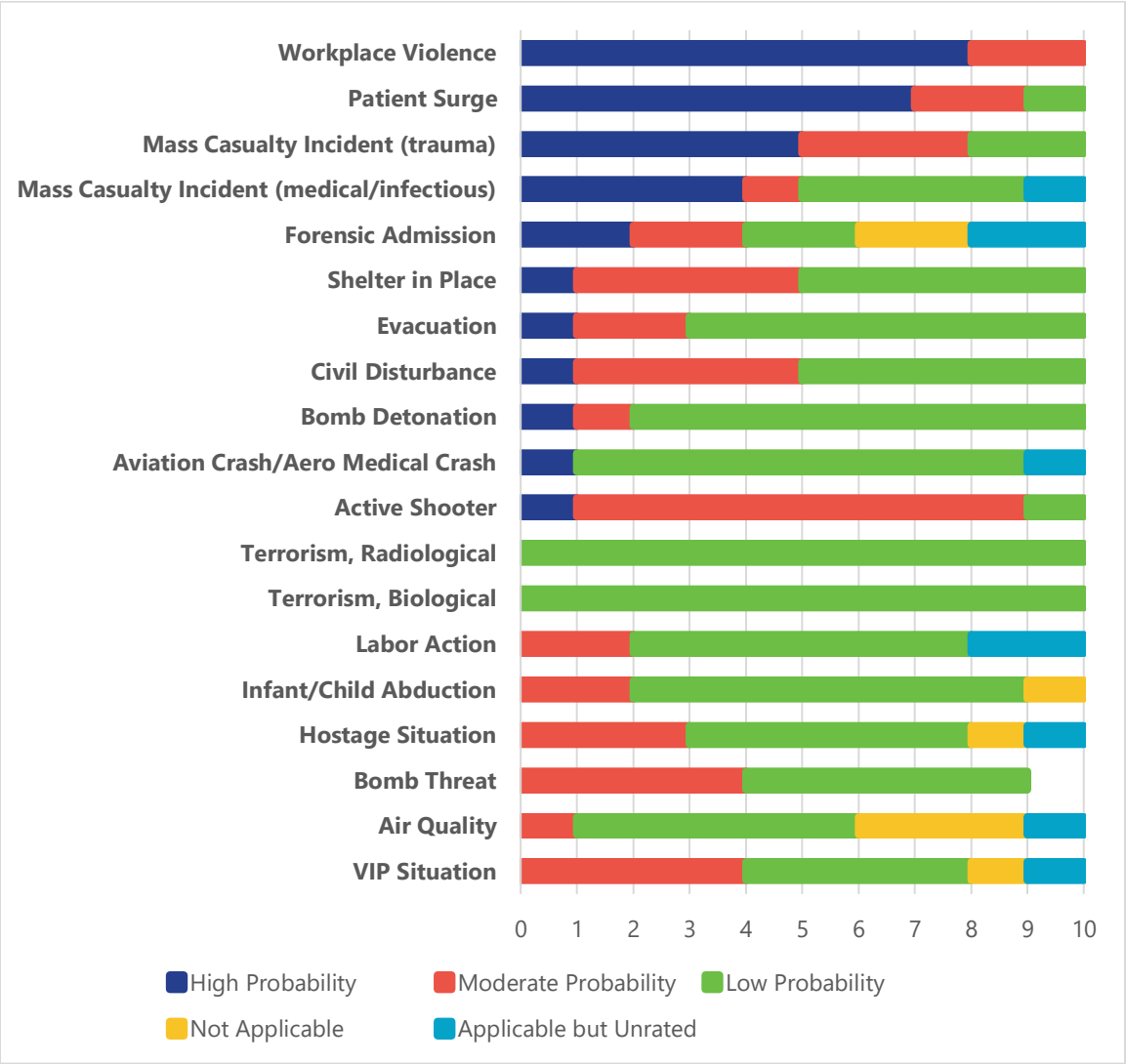
Figure 23: Technological Hazards Protective Factors Score



Human Hazards Assessment Results

A total of 19 human hazards were assessed through the HVA. The figure below shows the breakdown of how each district perceived the applicability and/or probability of each hazards by number of districts that selected that rating. The number of districts that rated a hazard as "highly probable" is shown in blue. Those that rated a hazard as "moderately probable" are shown in orange. The number of districts that indicated a hazard as "low probability" are shown in green. Some districts found that a hazard would be applicable to them, but they did not have enough information to rate the hazard at the time of the assessment. The districts that selected this response is shown in light blue. Not every hazard was perceived as applicable to all districts. The number of districts that selected a hazard as "not applicable" are displayed in yellow.

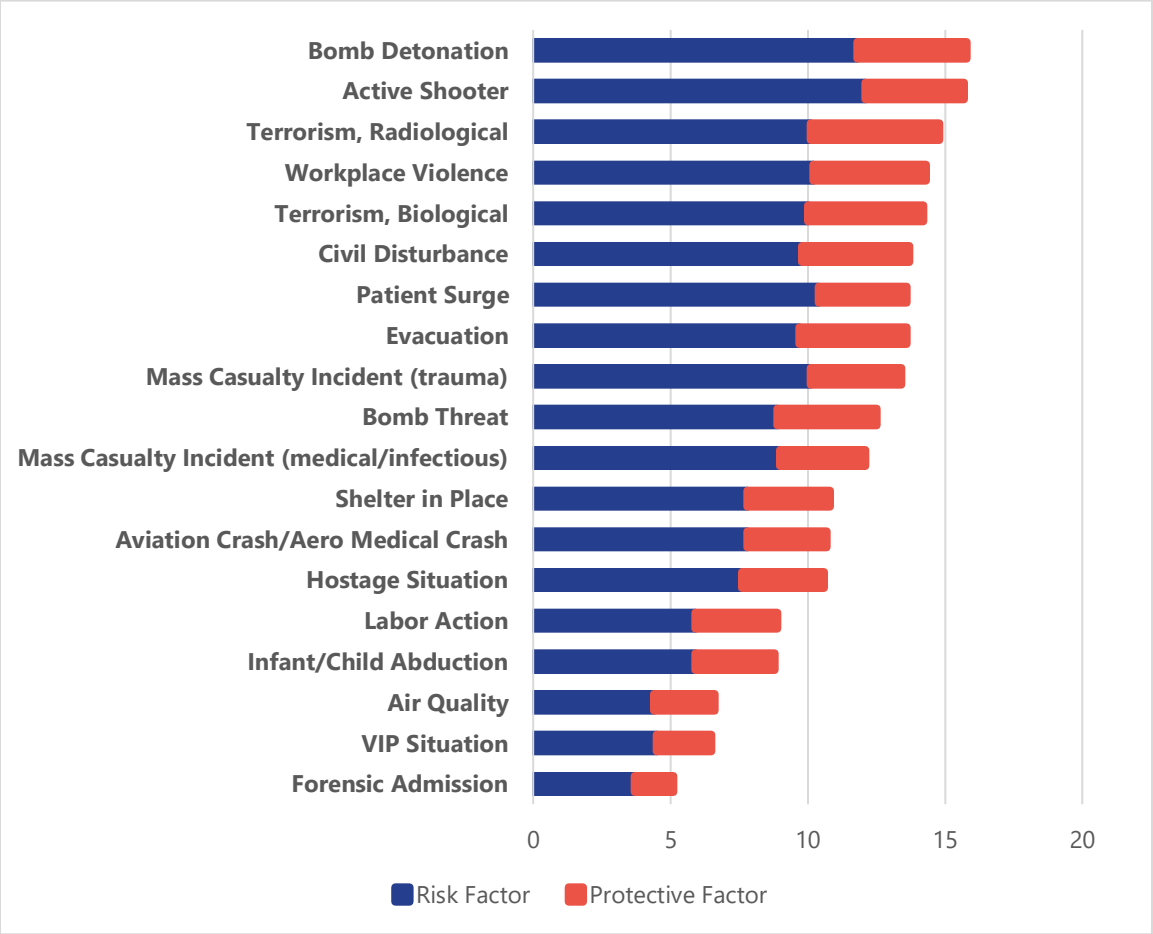
Figure 24: Applicability of Human Hazards



Final Hazard Vulnerability Score

A total hazard vulnerability score of 21 was possible for each applicable hazard. To find the score for the state the average of all district responses was calculated. The figure below shows the technological hazards in order of which hazard was perceived to have the highest risk in the state.

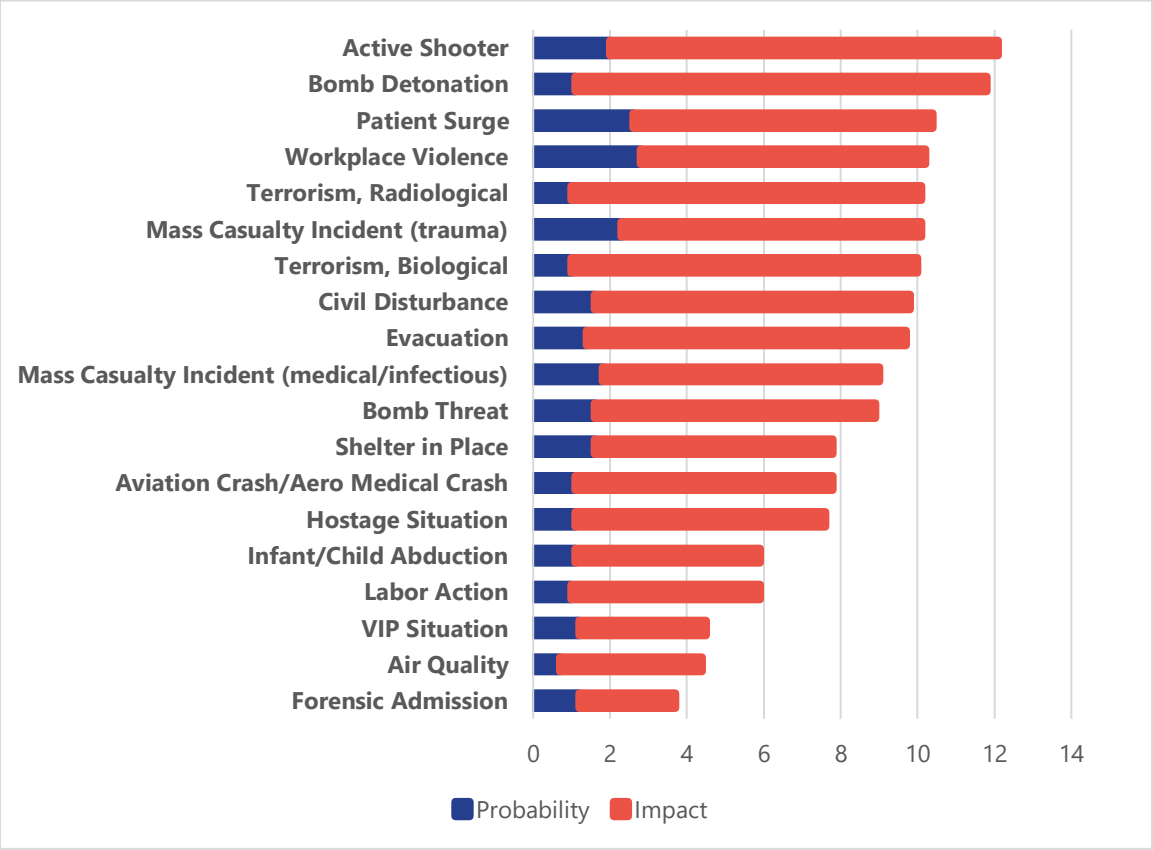
Figure 25: Human Hazards Final Hazard Vulnerability Scores



Risk Factor Score

A total risk factor score of 15 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the human hazards in order of which hazard presents the highest risk to the state.

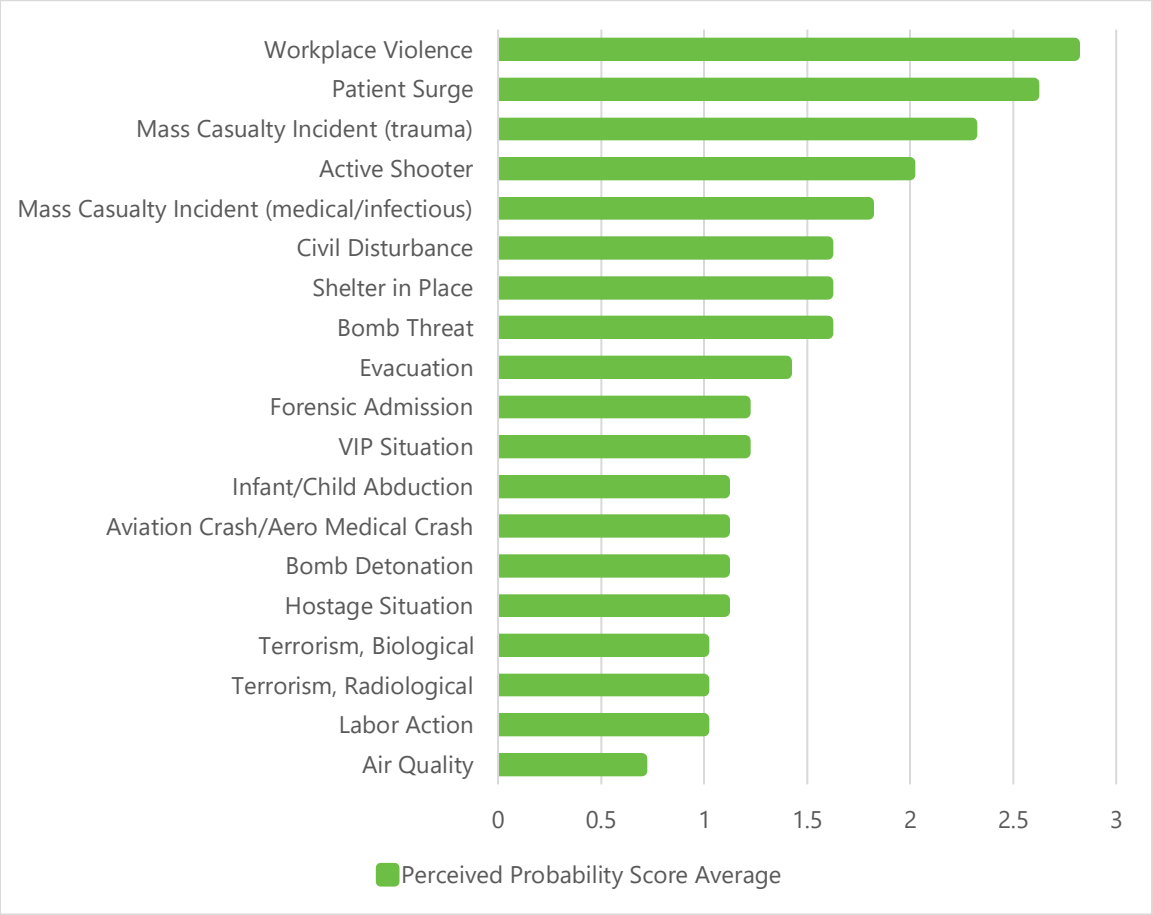
Figure 26: Human Hazards Risk Factor Scores



Probability Score

A total probability score of 3 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the human hazards in order of which hazard was perceived to be most likely to occur.

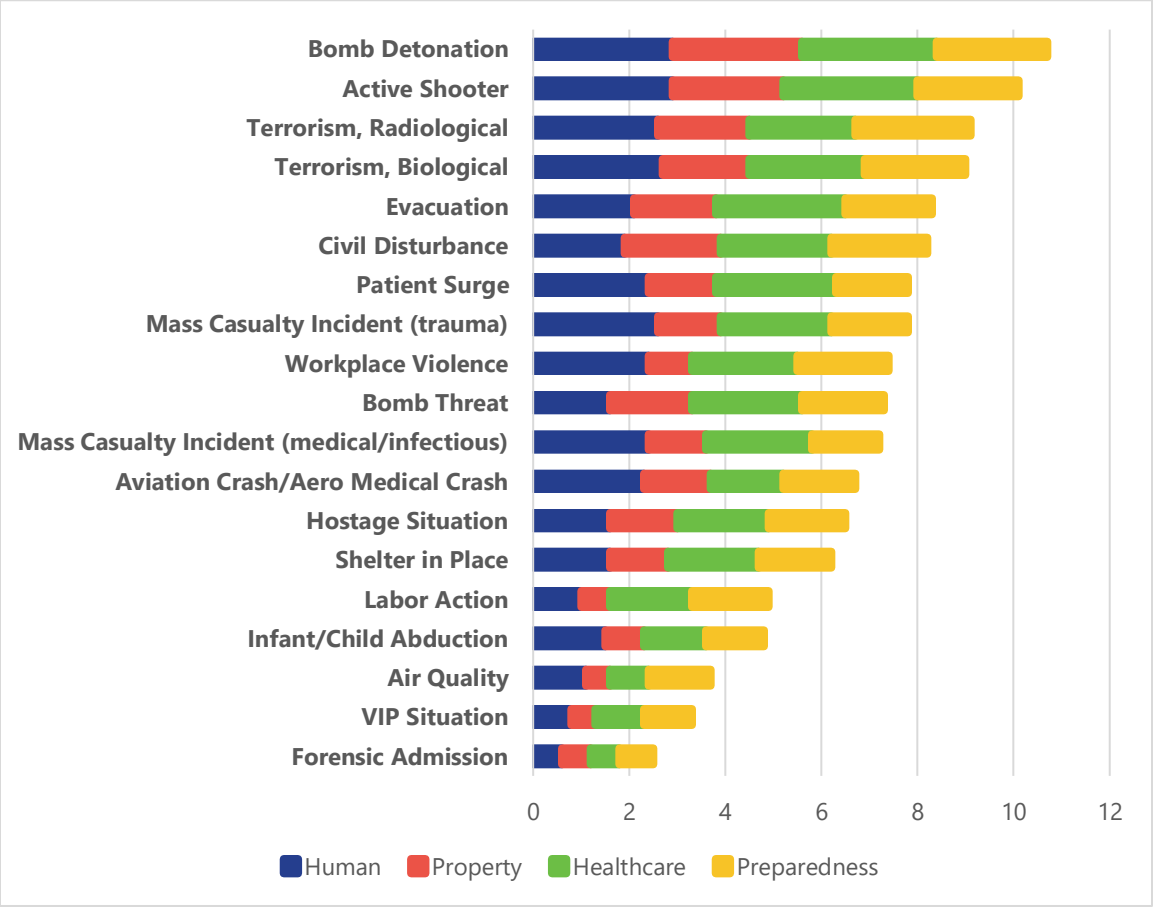
Figure 27: Human Hazards Perceived Probability Scores



Impact Score

A total impact score of 12 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the human hazards in order of which hazard was perceived to have the most impact on the health of the state.

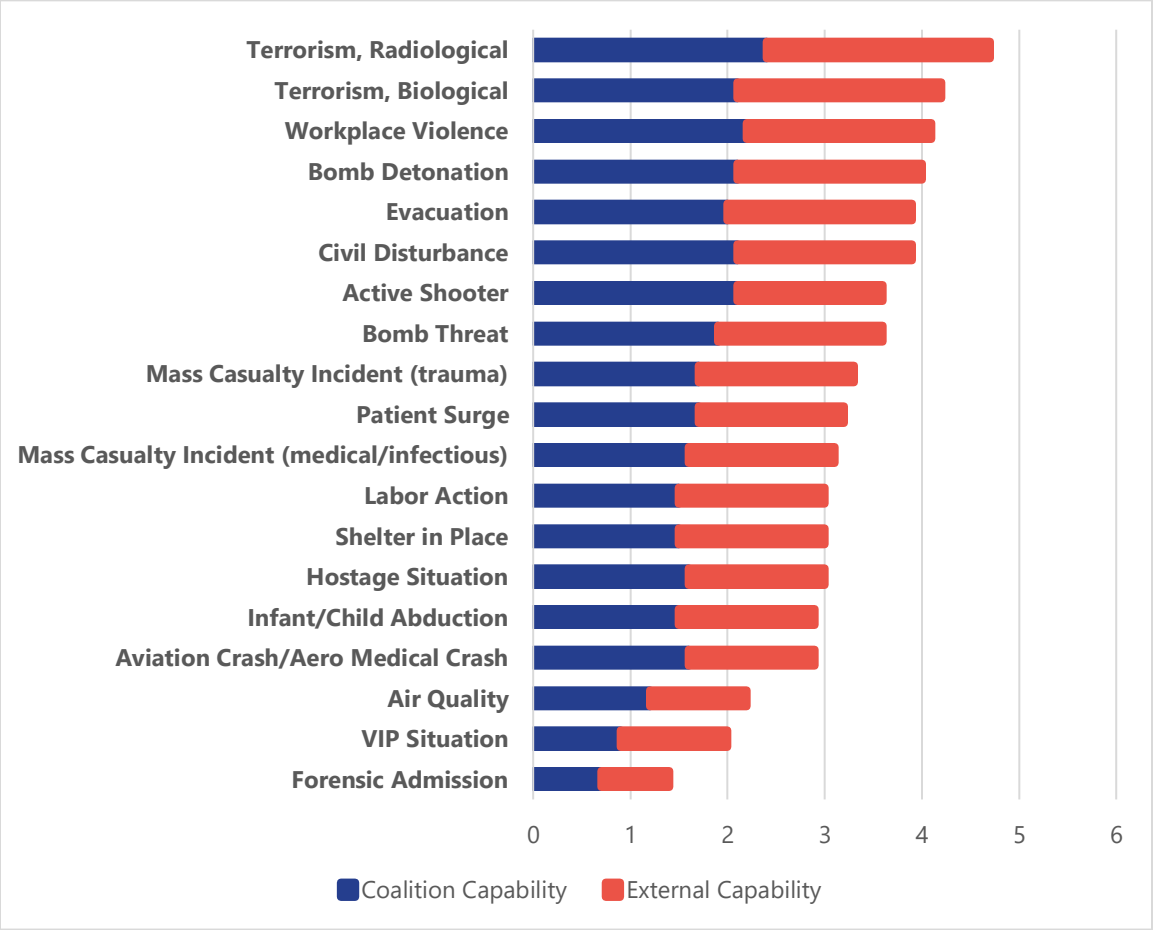
Figure 28: Human Hazards Impact Scores



Protective Factor Score

A total protective factor score of 6 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the human hazards in order of which hazard was perceived to have the highest protective factors in the state.

Figure 29: Human Hazards Protective Factor Scores

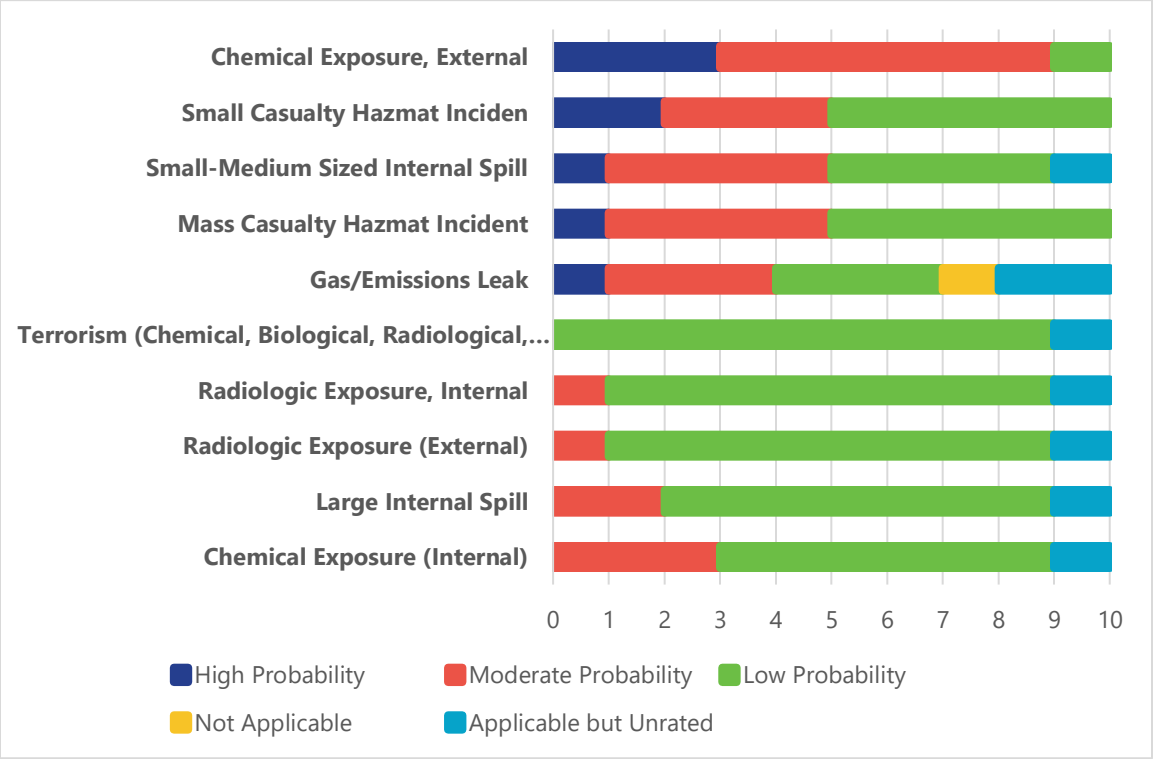


Hazardous Material Assessment Results

A total of 10 hazardous material hazards were assessed through the HVA. The figure below shows the breakdown of how each district perceived the applicability and/or probability of each hazard by number of districts that selected that rating. The number of districts that rated a hazard as “highly probable” is shown in blue. Those that rated a hazard as “moderately probable” are shown in orange. The number of districts that indicated a hazard as “low probability” are shown in green. Some districts found that a hazard would be applicable to them, but they did not have enough information to rate the hazard at the time of the assessment. The number of districts that selected this response is shown in light blue. Not every

hazard was perceived as applicable to all districts. The # of districts that selected a hazard as "Not applicable" are displayed in yellow.

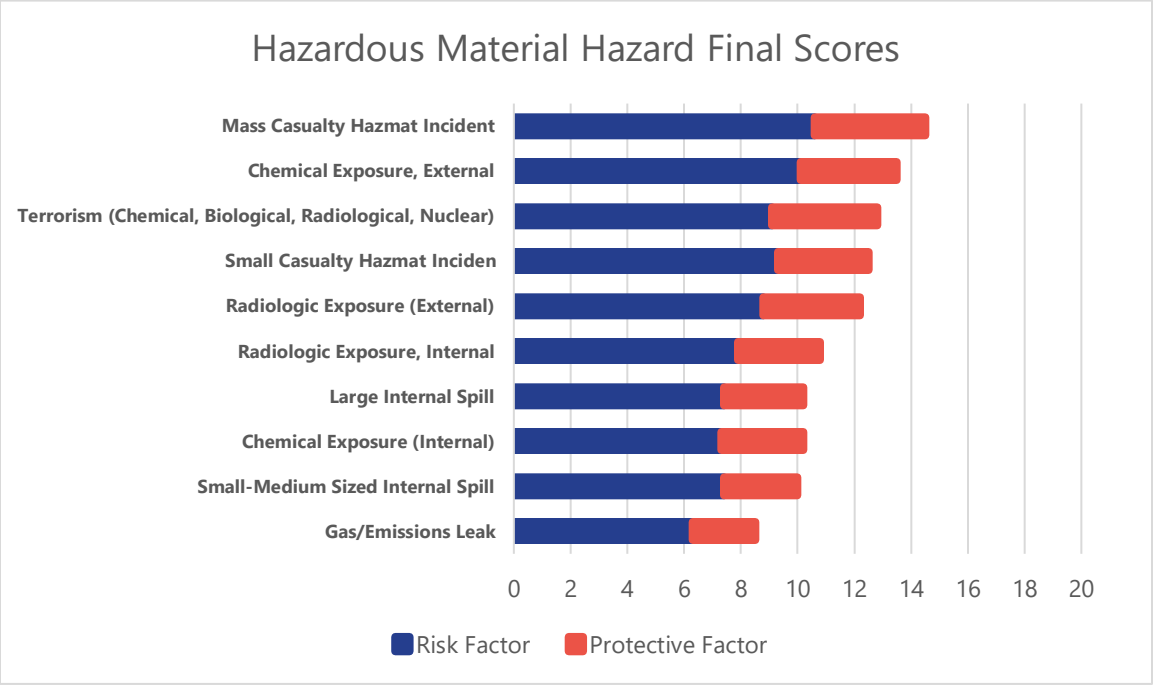
Figure 30: Applicability of Hazardous Material Hazards



Final Hazard Vulnerability Score

A total hazard vulnerability score of 21 was possible for each applicable hazard. To find the score for the state the average of all district responses was calculated. The figure below shows the technological hazards in order of which hazard was perceived to have the highest risk in the state.

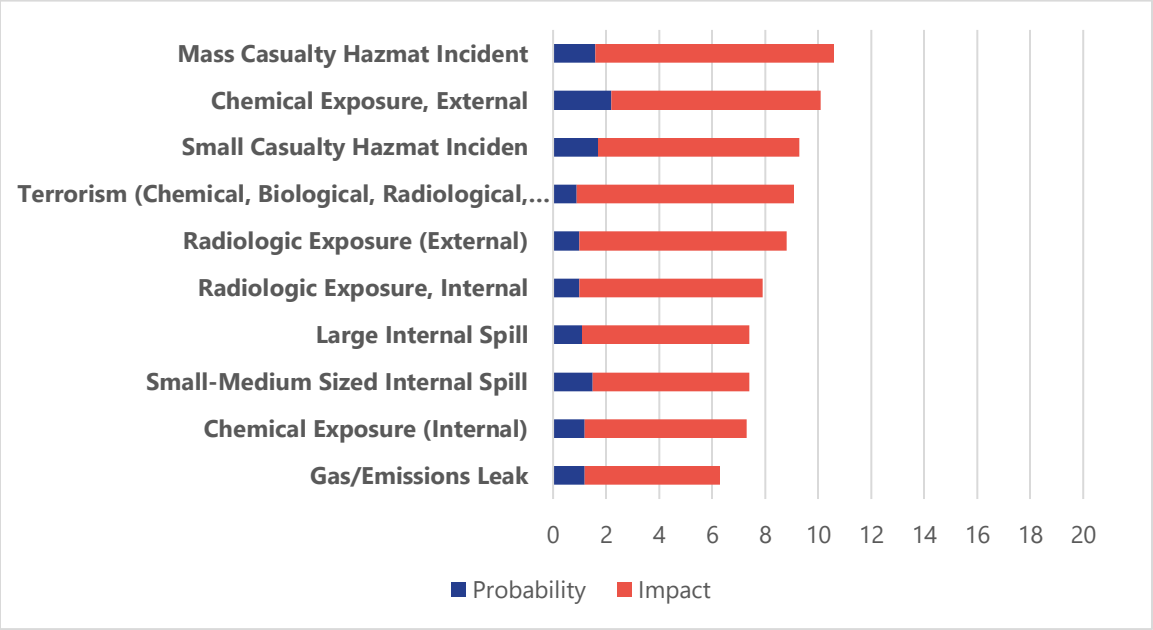
Figure 31: Hazardous Materials Final Hazard Vulnerability Scores



Risk Factor Score

A total risk factor score of 15 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the hazardous material hazards in order of which hazard presents the highest risk to the state.

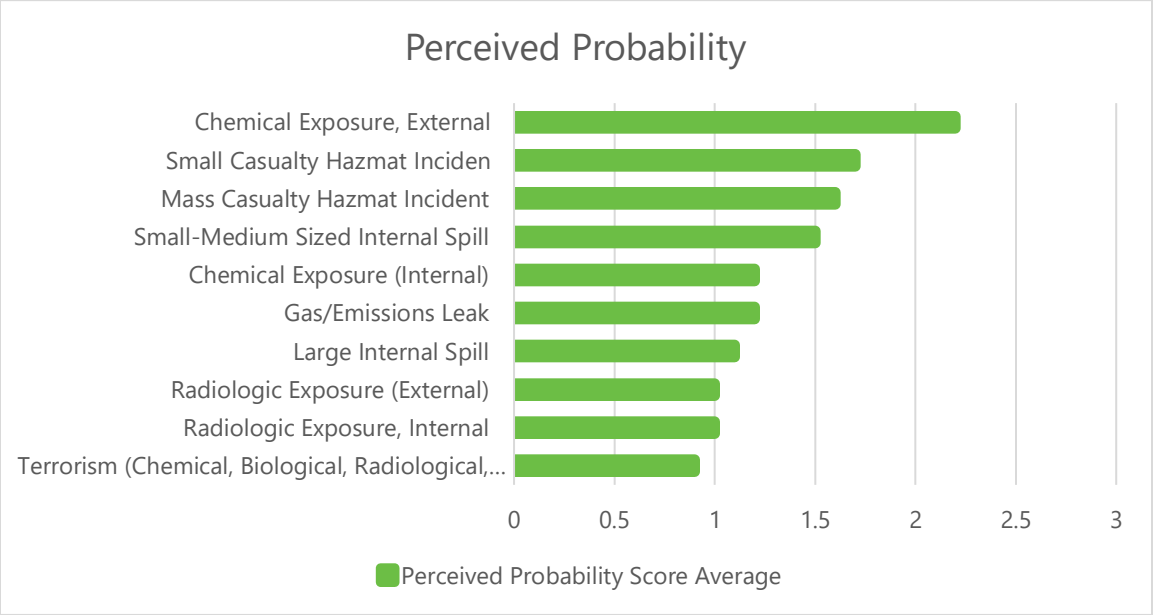
Figure 32: Hazardous Material Hazards Risk Factor Scores



Probability Score

A total probability score of 3 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the hazardous material hazards in order of which hazard was perceived to be most likely to occur.

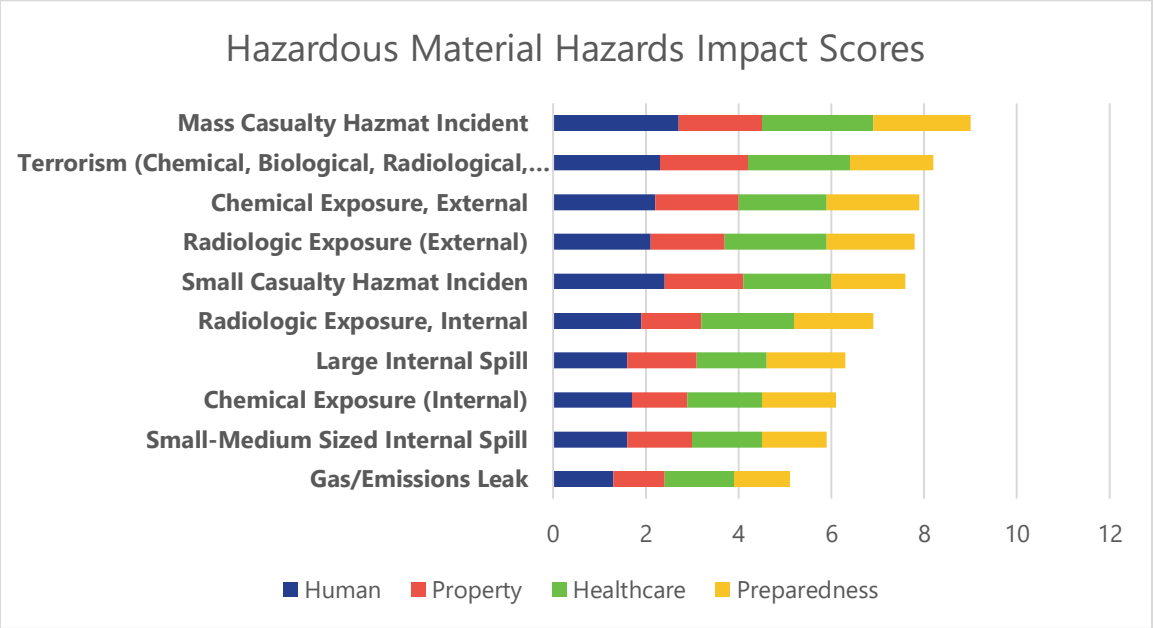
Figure 33: Hazardous Materials Perceived Probability Scores



Impact Score

A total impact score of 12 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the hazardous material hazards in order of which hazard was perceived to have the most impact on the health of the state.

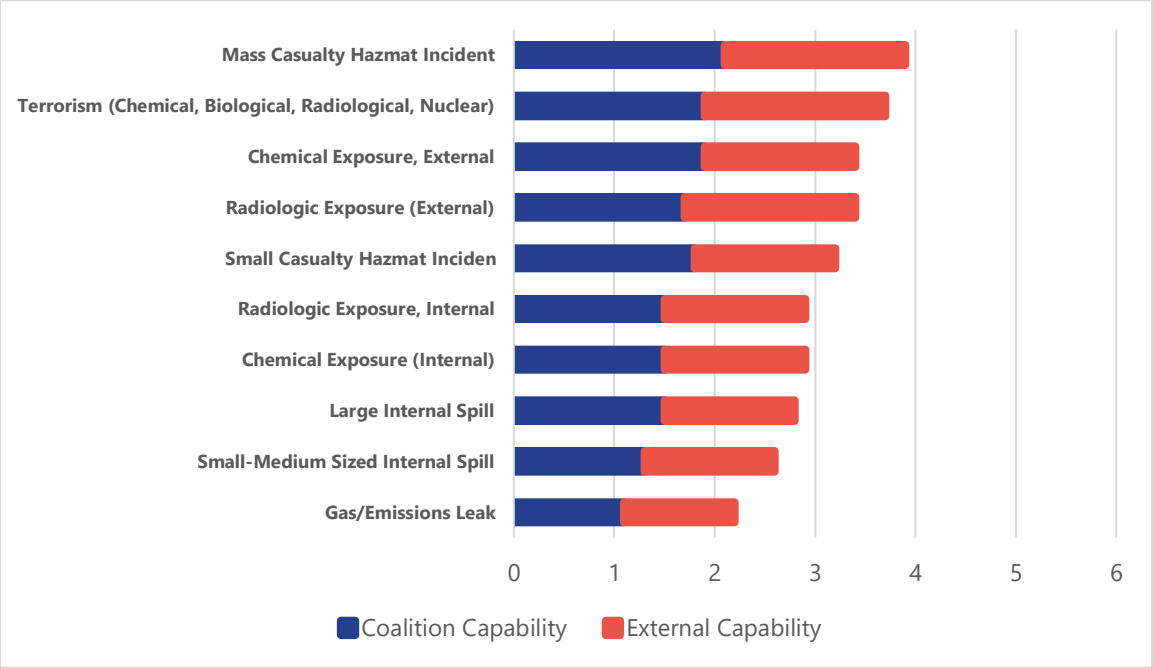
Figure 34: Hazardous Material Hazard Impact Scores



Protective Factor Score

A total protective factor score of 6 was possible for each hazard assessed. To find the score for the state the average of all district responses was calculated. The figure below shows the hazardous material hazards in order of which hazard was perceived to have the highest protective factors in the state.

Figure 35: Hazardous Material Hazards Protective Factor Scores



Use Cases

Locals can utilize the identified hazards and gaps in this report to guide integrated preparedness planning efforts. Including the prioritization of planning, training, and exercise efforts for their jurisdiction.

The information and data in this report can be used for the following:

1. Inform the multiyear integrated preparedness plan for your jurisdiction
2. Plan for and conduct discussion-based and operation-based exercises outlined in the PHEP exercise framework
3. Identify impacted communities and implement actions to understand how public health emergency response plans and exercises can be developed or updated to address unique preparedness, response, and recovery needs of the communities.
4. Ensure preparedness plans and exercises incorporate community of focus needs and priorities identified

5. Ensure that all local jurisdictions can identify threats and hazards with public health implications, communicate risks to the public, and request additional assistance when emergencies exceed local capacity
6. Ensure that no segment of the population or area of the jurisdiction is unduly disadvantaged in the event of a hazard
7. Maintain up to date plans to address potential staff shortages during periods of medical surge
8. Pursue methods for maintaining access to vital supplies during emergencies that may disrupt the supply chain
9. Explore alternative approaches for involving a wide range of participants in planning, preparedness, and response activities
10. Facilitate ongoing discussions with local government officials, utility companies, telecommunication companies, and transportation officials to plan for how to bolster the resilience of key services in the event of a hazard

Appendix A

Table of the final hazard vulnerability score of all assessed hazards.

Rank #	Hazard	Hazard Type	Hazard Vulnerability Rate
1	Tornado	Natural	0.65
2	Active Shooter	Human	0.60
3	Fire Internal	Technological	0.59
4	Severe Storms	Natural	0.59
5	Patient Surge	Human	0.58
6	Ice Storm	Natural	0.57
7	Snowfall	Natural	0.57
8	Mass Casualty Incident (trauma)	Human	0.56
9	Bomb Detonation	Human	0.56
10	Chemical Exposure, External	Hazardous Material	0.55
11	Flood External	Natural	0.55
12	Water Failure	Technological	0.55
13	Small Casualty Hazmat Incident	Hazardous Material	0.54
14	Conflagration	Natural	0.54
15	Mass Casualty Incident (medical/infectious)	Human	0.54
16	HVAC Failure	Technological	0.54
17	Cyber Attack	Technological	0.53
18	Power Outage	Technological	0.53
19	Epidemic/Pandemic/Emerging Infectious Disease	Natural	0.53
20	Small-Medium Sized Internal Spill	Hazardous Material	0.53
21	Utility Failure	Technological	0.53
22	Flood Internal	Technological	0.53
23	Mass Casualty Hazmat Incident	Hazardous Material	0.53
24	Gas/Emissions Leak	Hazardous Material	0.53
25	Dam Inundation	Natural	0.53
26	Generator Failure	Technological	0.52
27	Electrical Failure	Technological	0.52
28	Blizzard	Natural	0.52
29	Radiologic Exposure, Internal	Hazardous Material	0.52
30	Information Systems Failure	Technological	0.52
31	Water Contamination	Technological	0.52
32	Aviation Crash/Aero Medical Crash	Human	0.52
33	Temperature Extremes	Natural	0.52
34	Wildfire/Smoke	Natural	0.52

35	Large Internal Spill	Hazardous Material	0.51
36	Medical Vacuum Failure	Technological	0.51
37	Radiologic Exposure (External)	Hazardous Material	0.51
38	Shelter in Place	Human	0.51
39	Communications Failure	Technological	0.51
40	Landslide	Natural	0.51
41	Fire Alarm Failure	Technological	0.51
42	Forensic Admission	Human	0.51
43	Supply Shortage	Technological	0.51
44	HazMat Exposure Internal	Technological	0.51
45	Hostage Situation	Human	0.50
46	Chemical Exposure (Internal)	Hazardous Material	0.50
47	Civil Disturbance	Human	0.50
48	Medical Gas Failure	Technological	0.50
49	Evacuation	Human	0.50
50	Workplace Violence	Natural	0.50
51	Bomb Threat	Human	0.50
52	Natural Gas Failure	Technological	0.50
53	Hurricane	Natural	0.50
54	Terrorism (Chemical, Biological, Radiological, Nuclear)	Hazardous Material	0.50
55	Earthquake/Liquefaction	Natural	0.49
56	Sewer Failure	Technological	0.49
57	Structural Damage	Technological	0.49
58	VIP Situation	Human	0.48
59	Terrorism, Biological	Human	0.48
60	Radiation Natural	Natural	0.46
61	Air Quality	Human	0.46
62	Transportation Failure	Technological	0.46
63	Infant/Child Abduction	Human	0.46
64	Overhead Paging Loss	Technological	0.45
65	Labor Action	Human	0.45
66	Space Object Impact	Natural	0.45
67	Terrorism, Radiological	Human	0.45
68	Steam Failure	Technological	0.44
69	Fuel Shortage	Technological	0.44
70	Space Weather	Natural	0.44
71	Drought	Natural	0.43

Appendix B

The ability to implement a whole community approach to public health emergency response and recovery depends on the integration of considerations specific to the lived experience of all populations within a jurisdiction. The following table provides a detailed description of the recommendations for each population that were included in the HVA assessment.

Operationalized Considerations during Response and Recovery	
Population	**Recommendation**
Limited access to transportation	Ensured emergency response and recovery services (including shelters, POD locations, local response partners) are near public transportation options
Federally recognized American Indian, Alaska Native tribes, and other indigenous peoples	Ensured that emergency shelters respect tribal and cultural practices and are equipped to address the unique needs of these other Indigenous peoples: communities.
Individuals with low economic security	Ensured that emergency shelters are accessible at no cost
Pregnant women	Ensured that emergency response and recovery (including shelters, POD locations, local response partners) have access to prenatal care, including healthcare providers who can attend to pregnancy-related needs and emergencies
Individuals with physical/cognitive disabilities	Ensured that emergency response and recovery (including shelters, POD locations, local response partners) are fully accessible and Americans with Disabilities Act (ADA) compliant.
Individuals experiencing homelessness	Ensured that emergency shelters are accessible, provide necessities, and have no barriers to access.
Limited language proficiency	Ensured that all emergency communications are available in multiple languages spoken by

	the local community and section 508 IPT gov compliant.
Minority populations	Ensured that emergency response and recovery services (including shelters, POD locations, response partners) are culturally sensitive and equipped to address the unique health needs of minority populations.
People with behavioral health concerns	Ensured that emergency response and recovery services (including shelters, POD locations, local partners) have access to behavioral and mental health professionals and crisis intervention services
Aging population (65 and older)	Ensured that emergency response and recovery services (including shelters, POD locations, local response partners) are equipped to support possible needs of this population, including mobility aids, medical supplies, and comfortable sleeping arrangements.
Pediatric population (17 and younger)	Ensured that emergency shelters have child-friendly spaces and necessary supplies such as diapers, formula, and age-appropriate food
Underserved populations, including rural or frontier populations	Ensured that emergency response and recovery service locations (including shelters, POD locations, local response partners) are accessible and equipped with resources that cater to the unique needs of rural or frontier populations.
Identified Risks Specific to Population	
Population	**Recommendation**
Limited access to transportation	Identified common causes of lack of transportation such as limited economic resources, disabilities that impede one's ability to provide one's own transportation, and lack of public transportation options.

Federally recognized American Indian, Alaska Native tribes, and other indigenous peoples	Identified common barriers such as limited access to healthcare, geographic isolation, and cultural differences that may impede access to emergency services and resources.
Individuals with low economic security	Identified common economic barriers, such as a lack of disposable income, job insecurity, and the high cost of living, that may impede access to emergency services and resources
Pregnant women	Identified common barriers such as the need for specialized medical care, nutritional requirements, and safe, comfortable environments that may impede access to emergency services and resources.
Individuals with physical/cognitive disabilities	Identified common barriers such as mobility challenges, sensory impairments, and cognitive limitations that may impede access to emergency services and resources
Individuals experiencing homelessness	Identified common barriers such as lack of stable housing, limited financial resources, and lack of access to healthcare that may impede these populations' access to emergency services and resources.
Limited language proficiency	Identified common language barriers that could impede understanding and accessing emergency services and resources.
Minority populations	Identified common barriers such as healthcare disparities, language barriers, and cultural mistrust that may impede access to emergency services and resources
People with behavioral health concerns	Identified common barriers such as stigma, lack of behavioral and mental health resources, and the need for continuous medication and therapy that may impede access to emergency services and resources.
Aging population (65 and older)	Identified common barriers such as chronic health conditions, mobility issues, and social

	isolation that may impede older adults' access to emergency services and resources.
Pediatric population (17 and younger)	Identified common barriers such as the need for pediatric medical care, child-specific psychological support, and safe environments that cater to children's needs during emergencies
Underserved populations, including rural or frontier populations	Identified common barriers such as geographic isolation, limited healthcare infrastructure, and a lack of reliable communication channels that may impede access to emergency services and resources.
Incorporated Population Representatives into Planning	
Population	**Recommendation**
Limited access to transportation	Identified alternative transportation options to aid these populations in accessing transportation to shelters/other response locations with assistance of population representative.
Federally recognized American Indian, Alaska Native tribes, and other indigenous peoples	Supported the inclusion of members of the tribal nation in community planning and decision making by ensuring their input is heard and fostering relationships with regional Tribal Emergency Management groups that work with Tribal Community Members to educate them about new emergency risks, support their creation of personalized disaster plans, and connect them to medical and transportation resources during a disaster
Individuals with low economic security	Developed financial assistance programs and resources to help this population access necessary emergency services and supplies with representatives of the population.
Pregnant women	Developed partnerships with obstetricians, midwives, and healthcare organizations to

	provide support and services to pregnant women during emergencies.
Individuals with physical/cognitive disabilities	Included the disability community in emergency planning to support preparedness and recovery 831 actions that consider full structural accessibility and the needs of people with a wide range of disability-related needs.
Individuals experiencing homelessness	Developed partnerships with local shelters, food banks, and social service organizations to provide comprehensive support to low-income and homeless populations during emergencies
Limited language proficiency	Engaged community members in discussions and planning. Make these activities accessible by providing interpreters and/or translated materials.
Minority populations	Included community liaisons from your community's underserved communities who can serve as a conduit for needs and concerns that should be addressed in your response and recovery plans.
People with behavioral health concerns	Included mental and behavioral health professionals into planning and response efforts to capture their expertise regarding scope of services offered by various providers, possible eligibility determination requirements, and level of need determination protocols.
Aging population (65 and older)	Empower older adults to assess their physical, medical, and support needs and create strategies with their caregivers and support networks to prepare for disasters by engaging them in conversations about their experiences, knowledge, and concerns. Provide resources like worksheets and

	checklists to create digital and print copies of their needs to share with first responders
Pediatric population (17 and younger)	Incorporated reunification procedures for children with parents and caregivers with input from population representatives.
Underserved populations, including rural or frontier populations	Provided opportunities for rural communities to lead disaster preparedness efforts, leveraging local knowledge and networks to develop and implement plans that reflect the community's specific needs and capacities.
Integrated Solutions to Identified Barriers	
Population	**Recommendation**
Limited access to transportation	Included solutions to the common causes of lack of transportation and incorporated means to operationalize these solutions throughout the emergency response/recovery incident phases
Federally recognized American Indian, Alaska Native tribes, and other indigenous peoples	Included solutions to address the specific needs and barriers faced by American Indian and Alaska Native tribes and operationalized these solutions throughout the emergency response and recovery phases.
Individuals with low economic security	Included solutions to address economic barriers and operationalized these solutions throughout the emergency response and recovery phases.
Pregnant women	Included solutions to address the specific needs of pregnant women and operationalized these solutions throughout the emergency response and recovery phases
Individuals with physical/cognitive disabilities	Included solutions to address the specific needs of individuals with physical or cognitive disabilities and operationalized these solutions throughout the emergency response and recovery phases

Individuals experiencing homelessness	Included solutions to address the specific needs and barriers faced by low-income and homeless individuals and operationalized these solutions throughout the emergency response and recovery phases.
Limited language proficiency	Included solutions to address language barriers and incorporated means to operationalize these solutions throughout the emergency response and recovery phases.
Minority populations	Included solutions to address the specific health needs and barriers faced by minority populations and operationalized these solutions throughout the emergency response and recovery phases.
People with behavioral health concerns	Included solutions to address the specific needs of individuals with behavioral and mental health concerns and operationalized these solutions throughout the emergency response and recovery phases.
Aging population (65 and older)	Included solutions to address the unique needs of older adults and incorporated means to operationalize these solutions throughout the emergency response and recovery phases.
Pediatric population (17 and younger)	Included solutions to address the unique needs of children and incorporated means to operationalize these solutions throughout the emergency response and recovery phases.
Underserved populations, including rural or frontier populations	Included solutions to address the specific challenges underserved populations face and operationalized these solutions throughout the emergency response and recovery phases.
Connected with Resources applicable to population needs	
Population	**Recommendation**

Limited access to transportation	Connected with local, state, and federal resources that could be leveraged to address the needs of this population in response and recovery incident phases.
Federally recognized American Indian, Alaska Native tribes, and other indigenous peoples	Connected with tribal, local, state, and federal resources that could provide specialized support and aid to federally recognized American Indian and Alaska Native tribes during response and recovery phases.
Individuals with low economic security	Connected with local, state, and federal resources that could provide financial support and aid to this population during response and recovery phases.
Pregnant women	Connected with local, state, and federal resources that could provide specialized support and aid to pregnant women during response and recovery phases.
Individuals with physical/cognitive disabilities	Connected with local, state, and federal resources that could provide support and aid tailored to the needs of individuals with physical or cognitive disabilities during response and recovery phases.
Individuals experiencing homelessness	Connected with local, state, and federal resources that could provide financial support, temporary housing, and other aid to low-income and homeless populations during response and recovery phases
Limited language proficiency	Connected with local, state, and federal resources that could provide linguistic support and aid to this population during response and recovery phases.
Minority populations	Connected with local, state, and federal resources that could provide specialized support and aid to minority populations during response and recovery phases

People with behavioral health concerns	Connected with local, state, and federal resources that could provide mental health support and aid to individuals with behavioral health concerns during response and recovery phases.
Aging population (65 and older)	Connected with local, state, and federal resources that could provide specialized support and aid tailored to the older adult population during response and recovery phases.
Pediatric population (17 and younger)	Connected with local, state, and federal resources that could provide specialized support and aid tailored to the pediatric population during response and recovery phases
Underserved populations, including rural or frontier populations	Connected with local, state, and federal resources that could provide specialized support and aid to underserved populations, including rural or frontier areas, during response and recovery phases.

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