Jurisdictional Risk Assessment for the State of New Jersey

2025

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Introduction

The Centers for Disease Control and Prevention (CDC) requires recipients of the Public Health Emergency Preparedness (PHEP) grants to conduct a comprehensive risk assessment or an equivalent process once every five years in order to identify and prioritize public health risks and threats within respective jurisdictions.   The most recent risk or hazard vulnerability assessment was completed in 2017 -with the subsequent assessment scheduled for 2022. However, due to the COVID-19 response, the 2022 assessment was not conducted. As the New Jersey Department of Health (NJDOH) works on the current risk assessment, it continues to utilize a modified version of the Pennsylvania Public Health Risk assessment Tool (PHRAT)

Originally developed by Drexel University, the PHRAT model provides a systemic evidence-based framework for identifying and prioritizing potential public health emergencies based on factors such as probability, population impact, public health response capability, and healthcare system vulnerability. This adapted version was previously implemented in both 2012 and 2017 assessments, has been refined to reflect current public health threats, jurisdiction-specific vulnerabilities, and emerging infectious disease risks

Subject matter experts across various disciplines who represent this jurisdiction were consulted throughout this process. This was made possible by the contributive efforts of the New Jersey Office of Emergency Medical Services, Disaster Terrorism Branch, Office of the Medical Examiner, State Healthcare Coalitions, Office of Healthcare Quality and Informatics, Office of Aging and Minority -Health as well as engagement from our local health partners.

This risk assessment focused on ten different hazards: Severe Weather, Pandemic, Power Failure, Emerging Infectious Disease, Mass Gathering, Foodborne Illness, Terrorism (Chemical, Biological, Radiological, Nuclear, Explosive), Active Shooter, Cybersecurity Attack, and Hazmat. These hazards were chosen based on internal NJDOH conversations and historical risk assessment data.

Based on the results gathered from the PHRAT, the top two hazards requiring the most attention for future planning are severe weather and power failure. This is a shift from the historical top two in 2012 which were pandemic at number one and terrorism (CBRNE) at number two and the 2017 update being the same with the rankings just reversing their order to terrorism (CBRNE) at one -and then pandemic at two.

The landscape of the State of New Jersey is very different across regions and counties. The state is made up of rural, suburban, major urban, and coastline communities all being uniquely impacted. Risk rankings may have varied drastically between regions due to this reason.

The Pennsylvania PHRAT defines the probability of an incident as the likelihood that a hazard or threat will affect the jurisdiction within a system lifecycle of 100 years. One hundred years was selected as the system lifecycle because many pandemics and serious public health threats would be excluded from an analysis that used a shorter lifecycle.

Many responses from local partners and Cities Readiness Initiative (CRI)s came in expressing additional concerns for unlisted hazards that were not considered within the top ten and that would impose great impact upon the State. Approximately 25% of participants contributed additional hazard recommendations.

*Figure 1. **Breakdown of Analysis used in PHRAT***
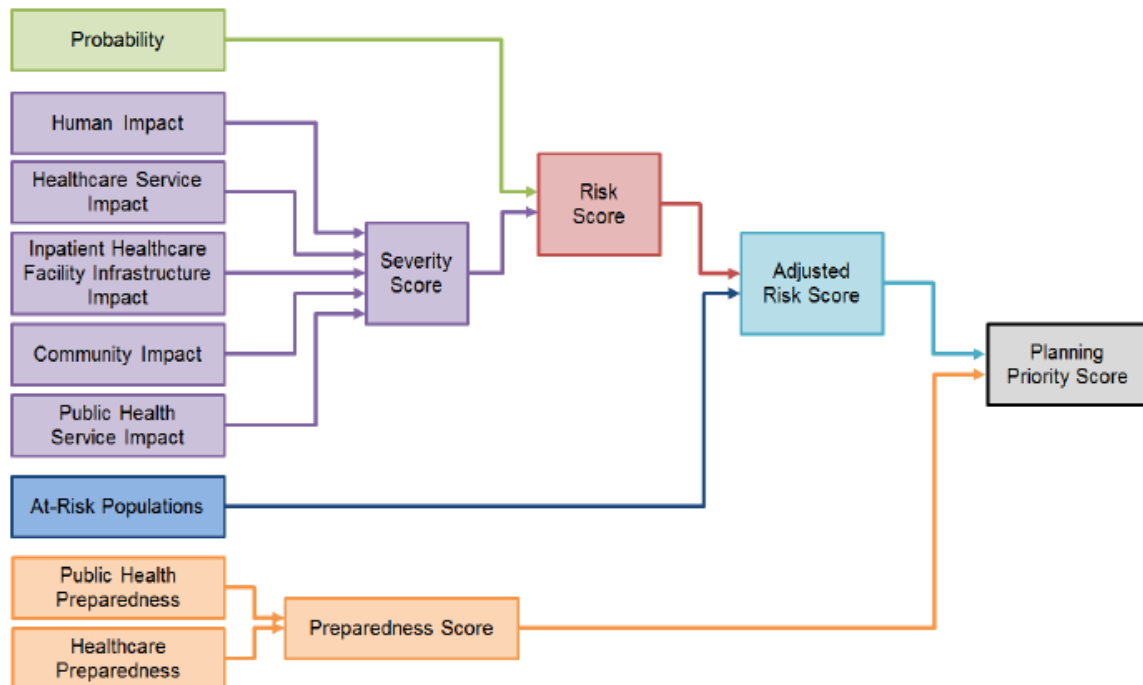
Methods

While many risk assessment tools prioritize analyzing the probability and severity of disasters, the PHRAT uses this data and additionally incorporates exploring health focused impacts such as physical and mental health consequences, interruptions to operations of community and health services, short- and long-term effects, as well as vulnerabilities especially those of at-risk populations. The tool also generates a planning priority score for each risk assessed. This is intended to assist planners in determining when and where to dedicate planning efforts. The score is made up of impact severity, at-risk populations requiring additional accommodations, and the most current level of the jurisdiction's preparedness.

While it is valuable that the tool focuses on at-risk populations and individualized planning for each one, New Jersey has historically found that this may not be the most effective model given that it is the most densely populated state. No specific population can realistically be omitted or held to a higher standard of additional considerations when it comes to emergency preparedness planning to ensure the most equitable and accessible care for citizens. This section of the tool was modified and utilized more so to call attention to how each risk could lead to more strain on resources though keeping equal planning considerations in mind.

Development of Drexel's Tool for the Public Health Risk Assessment

Existing HVAs and Risk Assessment Tools

Several tools contributed to the development of the Drexel PHRAT. The Hazard Risk Assessment Instrument (HRAI) created by UCLA's Center for Public Health and Disasters (UCLA, 2006) provided the major framework for this tool. The UCLA HRAI defines risk as "the expectation of loss" (UCLA, 2006). The UCLA risk assessment relies upon a determination of the propensity of things to be damaged (vulnerability) and an assessment of the community resources that will diminish impact, or:

$$Risk = Hazard \times (Vulnerability - Resources)$$

In this equation, "Hazard" refers to the likelihood of a hazard occurring. The UCLA HRAI assesses vulnerability and resources by measuring baseline community conditions and resources and comparing those baseline levels to the conditions expected in the event of a disaster. This equation can also be expressed as:

$$Risk = Probability \times Severity$$

The Drexel PHRAT also factors additional planning requirements for at-risk populations into its calculation of risk to produce an "adjusted risk" for each hazard.

Additionally, the Kaiser Permanente Hazard Vulnerability Assessment Tool serves as an effective way of capturing more health focused data and the state's healthcare regions assess the local hazards annually using this format.

The tool requires input of baseline data pertinent to calculating various risk scores. This consists of data unique to your state made up of health resources, demographics, mortality, hospital admissions, medical personnel, EMS transports, and more. The baseline data also consists of capability scoring from both PHEP and HPP guidelines. Data collected from the last 5 years from the Coalition Assessment Tool (CAT) and Capability Planning Guides (CPG) provided this information. The PHRAT emphasizes utilizing the current status of the fifteen PHEP capabilities as well as the eight healthcare or HPP capabilities to accurately assess the level of preparedness in the jurisdiction. These are filled out annually in coordination with health partners.

To assist in determining impacts that each hazard will have on the jurisdiction, community characteristics focusing on the state's population and its features and pointing out the largest city population and largest college campus population were identified. Due to their population densities, these are ideal areas to focus hazard impact scenarios on due to their vulnerability to having the most repercussions to an event.

Each hazard has a separate module to breakdown in depth figures for different impacts, risks, and probabilities. Once the application receives the relevant baseline data as well as impact rankings, the scores will automatically be calculated. Depending on which hazard is being analyzed, there is the possibility that certain sections will not be filled out. For example, an active shooter scenario may not have much impact on the water supply. Additionally, gathering all of these scores ultimately contribute to the levels of planning scores: access for at-risk populations, capability for healthcare and public health readiness.

Prior to 2012 when the New Jersey Department of Health still was the New Jersey Department of Health and Senior Services, the department collaborated with the NJ Office of Emergency Management and NJ Office of Homeland Security and Preparedness to maximize community sector engagement with stakeholders. This also included external partner input for mental health services. Aside from datasets configured from various Department of Health offices, regional and healthcare HVAs were reviewed and considered. Per the Drexel PHRAT, data was collected with a 100-year timeframe as the standard.

Top Risks Identified for 2012-2017 (includes planning priority scores)

2012 Hazard	Statewide Planning Priority Scores	2017 Hazard	Statewide Planning Priority Scores
Pandemic	18.81	Terrorism (CBRNE)	12.24
Terrorism (CBRNE)	18.28	Pandemic	8.68
Severe Weather (excluding flooding)	12.68	Flooding	8.01
Flooding	11.94	Hazmat (accidental release involving population evacuation)	7.75
Power Outages	8.60	Nuclear Facility Offsite Release	7.75
Nuclear Facility Offsite Release	8.43	Weather (excluding flooding)	7.31
Hazmat (accidental release involving population evacuation)	8.43	Power Outages	6.00
Foodborne Outbreak	4.57	Foodborne Outbreak	2.83

Hazards were tailored to the environment of what occurred within 2012-2017 such as hurricanes and flooding events that occurred as a result of that had tremendous impact to the state which qualified flooding as its own unique category. Whereas that has shifted for the new PHEP 5-year goals. Between these years, NJ also had a lot more regions impacted by the potential release from nuclear plants.

Previously, the same eight (8) hazards were assessed by NJDOH at a state capacity level for the last two HVAs. While many of these hazards did remain the same for the state's next five-year planning period, New Jersey recognizes that there are additional hazards that may be worth exploring given the responses the state has activated for since the last assessment was completed and additionally keeping the FIFA 2025 Club World Cup and World Cup games in 2026 that the state has been planning and preparing for. With this in mind, this assessment focuses on:

- Severe Weather
- Pandemic
- Mass Gatherings
- Emerging Infectious Disease
- Foodborne Illness
- Terrorism (CBRNE)
- Cybersecurity Attack
- Hazardous Materials
- Power Outage/Failure
- Active Shooter

Historically, the state conducted in person workshops with partners to complete the risk assessment. NJDOH felt it was best to take an electronic approach to acquiring CRI and local partner input. A survey was created prompting the respondent to rank each hazard on a probability scale. There was also space for additional input to be written suggesting other hazards that should be considered as potentially posing great impact.

Probability

The probability of each hazard is assigned a score between zero and four, based on the following scoring scale. The system lifecycle used is 100 years.

- 0 = Improbable The probability of the occurrence is zero
- 1 = Remote   The hazard is not likely to occur in the system lifecycle, but it is possible
- 2 = Occasional   The hazard is likely to occur at least once in the system lifecycle
- 3 = Probable   The hazard is likely to occur several times in the system lifecycle
- 4 = Frequent   The hazard is likely to occur cyclically or annually in the system lifecycle

Severity

The Severity Score is calculated by assessing the impact that a hazard incident would have on the jurisdiction within four domains: Human Health Impact, Healthcare Service Impact, Community Impact, and Public Health Service Impact. Each hazard's impact in these domains generates a score derived from an assessment of specific metrics. Some of these metrics include: mortality and EMS transports (Human Impact), Emergency Department (ED) services and hospital beds (Healthcare Service Impact), and surveillance and health communication (Public Health Service Impact).

The severity metrics for each of the four domains are based on the system used in the UCLA Hazard Risk Assessment Instrument though there are some modifications. The PHRAT aims to capture disaster impacts in addition to injuries sustained due to the hazard, such as other mental illnesses and mental health consequences. The PHRAT also assesses the impact of disasters on the services that public health agencies provide: surveillance, public information and communications, laboratory services, etc. Because many public health emergencies produce increased demand for services as opposed to an interruption of decrements as well as surge needs. The PHRAT incorporates additional metrics for community impact that have significant public health consequences such as environmental contamination, disruption of sanitation and sewage systems, and business continuity. Disasters with long term durations are assigned higher severity scores. An additional point is added to the severity score for incidents surpassing two weeks of impacts.

The State of New Jersey has the highest population density of any state within the country. The state has more miles of roadway per capita than any other state. Many counties within the state are very rural in comparison to the rest of the state.

Assessing the Needs of At-Risk Populations – At-Risk Populations

The Population Size Score is assigned based on the size of the population using the following scale:

- 0 = Population represents 0% of the total population
- 1 = Population represents more than 0% but less than 5% of the total population
- 2 = Population represents at least 5% but less than 10% of the total population
- 3 = Population represents at least 10% but less than 15% of the total population
- 4 = Population represents at least 15% of the total population

This data contributed to calculating the at-risk populations score for each hazard. The at-risk populations analyzed within New Jersey included:

- Hearing Impaired
- Visually Impaired
- Cognitive Disability
- Ambulatory Disability
- English (classified as those who speak English less than "very well"
- Poverty (population for whom poverty status is determined)
- Children (under 18 years of age)
- Elderly (65 and older)

Historically, the population in the PHRAT labeled "Chronic" was collected and taken into consideration. From the previous years, NJDOH utilized a combination of NJ asthma and diabetes data to configure this number. NJDOH has opted to omit this area.

Determining Planning Priority

The final score or indicator generated for each hazard is the Planning Priority Indicator. This score allows planners to identify hazards that may require additional preparedness efforts on the part of the jurisdiction, especially relative to the degree of risk posed by that hazard. It is defined as the ratio of Adjusted Risk Score and the Preparedness Score for a given hazard.

Planning Priority Indicator = Adjusted Risk Score ÷ Preparedness Score

Planning Priority Indicators can be ranked, producing a Planning Priority Score

Results

Following the healthcare region model of the state, the averages of the rankings for each hazard were taken and placed into the tables as shown in Appendix B. The results vary reasonably from the state's average and some lower ranked hazards are more weighted than others based on which region is being focused on.

Graph 1. **Overall Top Five Hazard Weighted Probability and Severity**

WEIGHTED AVERAGE STATEWIDE HAZARD PROBABILITY AND SEVERITY

Severe Weather

Power Failure

Emerging Infectious Disease

Mass Gathering

Cybersecurity Attack

SEVERITY

PROBABILITY
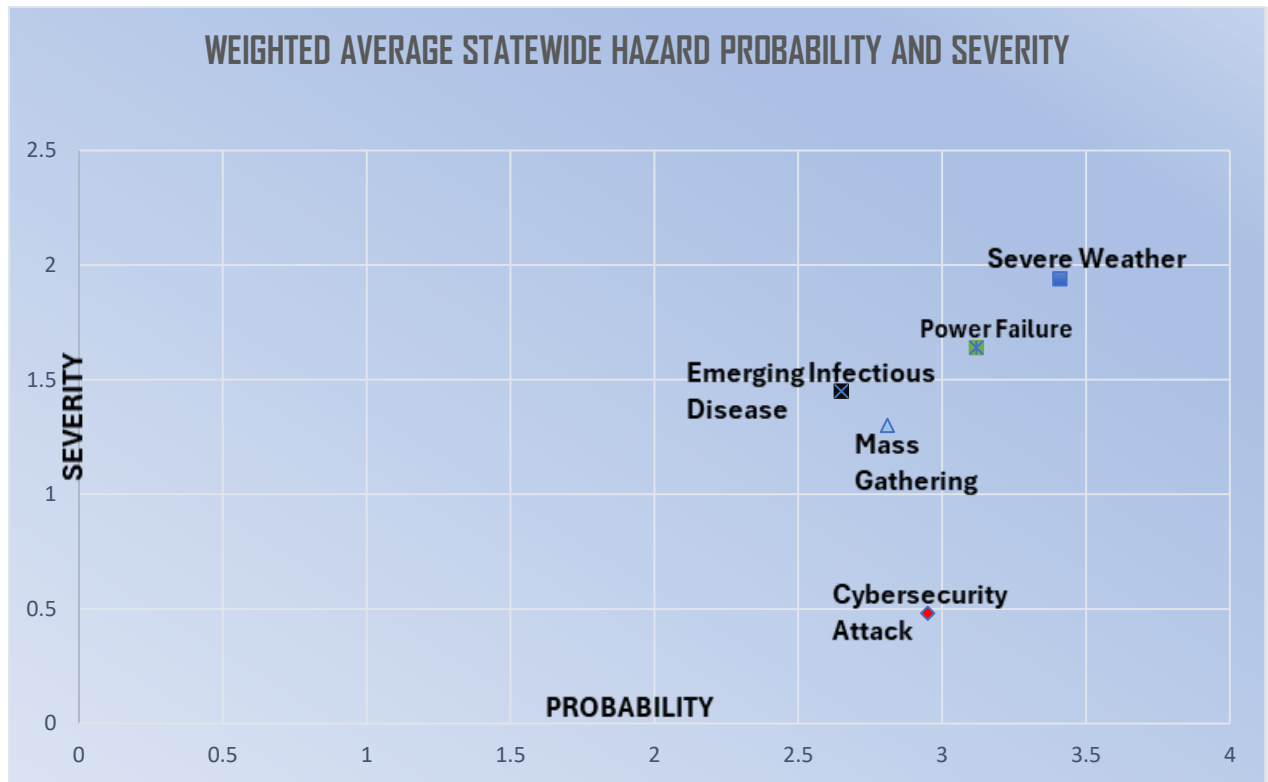
Planning Priority

The weighted averages of the Planning Priority Indicators for the State of New Jersey are illustrated in Table 1, listed in order of Planning Priority Score.

Table 1. **Hazards in order of Planning Priority Score** – *Weighted Averages for the State of New Jersey MSA for the top five ranked by relevant state stakeholders*

Ranking Order	Hazard	Planning Priority Ranking
1	Severe Weather (including flooding, tornadoes, and earthquakes)	31.42
2	Power Outage/Failure	17.8
3	Emerging Infectious Disease	17.54
4	Mass Gathering	10.1
5	Cybersecurity Attack	4.6

Table 2. **Statewide Scoring Results** – *Below shows the PHRAT model scoring for the top five risks as ranked by relevant state stakeholders*

Hazard	Probability Score	Severity Score	Risk Score	At Risk Population Score	Adjusted Risk Score	Preparedness Score	Planning Priority Score
Severe Weather	3.41	1.94	48.59	2.72	81.65	2.6	31.42
Power Outage/Failure	3.12	1.64	30.67	2.17	47.28	2.66	17.8
Emerging Infectious Disease	2.81	1.3	32.4	1.94	48.14	2.74	17.54
Mass Gathering	2.65	1.45	18.09	1.89	26.63	2.64	10.1
Cybersecurity Attack	2.95	0.48	9.04	1.33	12.05	2.59	4.6

*Table 3. **Statewide Probability Scoring Results** – Below lists the probability as ranked at a state averaged level for all ten assessed hazards*

Ranking Order	Hazard	Probability Ranking
1	Severe Weather (including flooding, tornadoes, and earthquakes)	3.41
2	Power Outage/Failure	3.12
3	Cybersecurity Attack	2.95
4	Emerging Infectious Disease	2.81
5	Mass Gathering	2.65
6	Pandemic	2.42
7	Foodborne Illness	2.37
8	Hazmat	2.29
9	Terrorism	2.13
10	Active Shooter	2.12

Discussion

While the assessment team did prioritize a list of 10 hazards to be closely analyzed, respondents were asked to suggest and discuss additional hazards that should be specially considered for the jurisdiction's planning efforts. These included but are not limited to:

- Wildfires and Smoke
- Drought and Water Emergencies
- Healthcare Sector Supply Chain Shortages
- Workplace Violence
- Workforce Surge Capacity
- Lack of Housing and Low Funds for Warming and Cooling Shelters
- Transportation Accidents (Air/Rail/Maritime Disasters)
- Mass Transit Terrorism Attacks
- Lithium Battery Disposal
- Tsunami and Tidal Waves; and
- Evacuation of Shoreline Communities

Many of these risks are encapsulated within the top 10 while others are completely different. Some hazards are entirely unique to certain counties. For example, Cape May called attention to only having two routes of evacuation should their community have an emergency requiring so. Our Northern and Southern regions are increasingly concerned about the emphasis and encouragement on more public transit or railroad travel and the vulnerability for a terrorist attack which is crucial to consider with the World Cup in our near future. Newark has concerns about transportation accidents and having another major metropolitan area on its borders as well as their ports.

Another concern that came up during local level discussions fall within the lines of response capabilities to emerging infectious disease. The southern region of the state expressed not having sufficient access to vaccines and other interventions to assist in a local Hepatitis A exposure response. In order to best serve their community in a quick manner, this county communicated with partners throughout the entire state to retrieve the materials necessary. This will be increasingly valuable to consider with the potential for an uptick in infectious disease outbreaks that may occur throughout the 2025 Club World Cup and 2026 World Cup being hosted within our state for two years welcoming in many visitors from outside of the United States.

This assessment will primarily be utilized as a tool to monitor and guide planning efforts throughout this five-year period. It will likely be updated annually especially as any major events occur to best represent the current standing of the state's needs.

Conclusions

It is apparent that most of these top five rated hazards are to be prioritized within the five-year planning period to properly prepare for the mass gathering events outside of the routine summer peak volume expected within the shoreline communities due to FIFA related events. With the anticipation of an uptick in international travelers, there will need for additional surveillance efforts for the potential spread of communicable infectious diseases. With the exponential growth of the summer tourist population and possible watch parties and mass gatherings, foodborne illnesses and extreme weather heat related injury are all likely to be factors we need to plan for as a state when considering public health and healthcare facility capabilities. Reflecting back to local and county level discussions, taking a closer look at medical countermeasures and reevaluating stockpiles and resource sharing will be critical to ensure sufficient support.

Given that the state contains rural and coastline communities, severe weather has always been a major planning priority. However, within the last few years there have been more unique weather responses compared to our historical record such as more tornadoes, earthquakes, and severe wildfires which can lead to long last effects of smoke and hazardous air quality. As always, New Jersey maintains hurricanes high on the radar during the season as past storms have caused catastrophic damage to the state and stress to its citizens. Regarding mass gatherings, it can also be expected that there is concern for there being a threat for terrorism attacks.

Keeping in play all these scores provided by data and decision making from subject matter experts as well as local and regional representation will aid in effective preparedness and response readiness capabilities. New Jersey will utilize this tool as a means to map out future intentions and continue to take advantage of access to historical data and after-action reports to reflect on what works and what needs to be further developed. Funding towards programs that foster overall state partnership and collaboration and the ability to maintain a robust and growing workforce that maintains the link between the fountain of knowledge many of the

long-term public health workforce provides to the future young professionals of health, will ensure the success of safety for the jurisdiction.

APPENDIX A: Data Collection Tools Utilized

Microsoft Forms Answer Collection *– This was distributed to all local county and municipality level public health, EMS, and healthcare facility partners*

New Jersey Jurisdictional Risk Assessment

Please provide a rating of the probability that each listed hazard would occur within your population/county.
Each risk is assessed within the likelihood of it occurring within 100 years. Please refer to the scale below when selecting your rating for each risk.

1=Improbable 2=Remote 3=Occasional 4=Probable 5=Frequent
A more detailed definitions and scale guide is included within the email you received. If you have any questions or concerns, please reach out to Daijah Sek at
daijah.sek@doh.nj.gov.
Thank you for your valued input.

⋮⋮⋮

1. Please select your county below *

Select your answer ⌄

2. Please select your organization type *

Select your answer ⌄

3. Pandemic *

An actual pandemic outbreak that has been declared by CDC and/or WHO

| 1 | 2 | 3 | 4 | 5 |

4. Terrorism *

Any chemical, biological, radiological, nuclear, or explosive incident done as a deliberate event

| 1 | 2 | 3 | 4 | 5 |

![N J Health - New Jersey Department of Health]

Definition Tool Sheet – *This was distributed along with the above link for the survey to participating partners*

Definitions:

NJDOH Jurisdictional Risk Assessment Tool

Hazards

Pandemic	An actual pandemic outbreak that has been declared by CDC and/or WHO
Terrorism	Any chemical, biological, radiological, nuclear, or explosive incident done as a deliberate event
Severe Weather	All potential types of severe weather including but not limited to: flooding, tornadoes, earthquakes, hurricane, nor'easter, severe thunderstorm, heat wave, drought, severe winter weather, etc.
Hazmat	Release of a hazardous material that requires resident evacuation
Active Shooter	An event in which one or more individuals actively engaged in killing or attempting to kill people in a populated area. (defined by the FBI)
Mass Gathering	A planned or spontaneous event where the number of people attending could strain the planning and response resources of the community or country hosting the event.
Power Outage/Failure	Widespread power failure
Cybersecurity Attack	Any intentional effort to steal, expose, alter, disable, or destroy data, applications, or other assets through unauthorized access to a network, computer system, or digital device.
Emerging Infectious Disease	New and re-emerging disease that has the potential to spread within a population of people not at a pandemic level.
Foodborne Illness Outbreak	Widespread, or potential for widespread, outbreak stemming from a foodborne infectious disease

Probability Scale – Likelihood over 100-year period

Improbable (1)	The probability of the occurrence of the hazard is zero
Remote (2)	The hazard is not likely to occur over 100 years but is possible
Occasional (3)	The hazard is likely to occur at least once in 100 years
Probable (4)	The hazard is likely to occur several times over 100 years
Frequent (5)	The hazard is likely to occur cyclically or annually over 100 years

Response Metrics

County Level Response Breakdown – All Counties within the State of New Jersey Participated and Represented

1. Please select your county below

County	Count
Atlantic	6
Bergen	6
Burlington	4
Camden	5
Cape May	4
Cumberland	3
Essex	2
Gloucester	1
Hudson	2
Hunterdon	4
Mercer	8
Middlesex	8
Monmouth	8
Morris	5
Ocean	2
Passaic	7
Salem	1
Somerset	4
Sussex	1
Union	4
Warren	1

Breakdown of Organization Type of Survey Participants

2. Please select your organization type

| Organization Type	Count
Acute Care	17
LINCS Agency	20
Local Public Health Agency	10
Long Term Care Facility	8
Federally Qualified Health Center	1
Office of Emergency Management	7
Home Care and Hospice	5
Behavioral/Mental Health Facility	0
Emergency Medical Services	11
Other	7
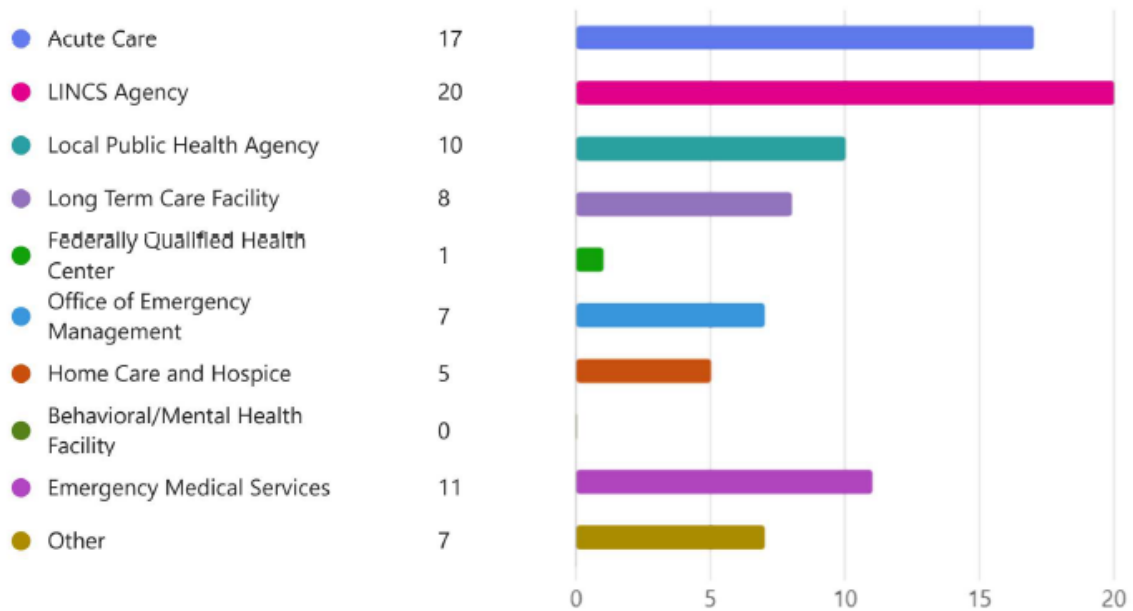
APPENDIX B: Regional Results for Probability Rankings

Map of New Jersey's Public Health Regions – Regions recognized current as of 2025

NEW JERSEY HEALTHCARE &
PUBLIC HEALTH COALITIONS MAP
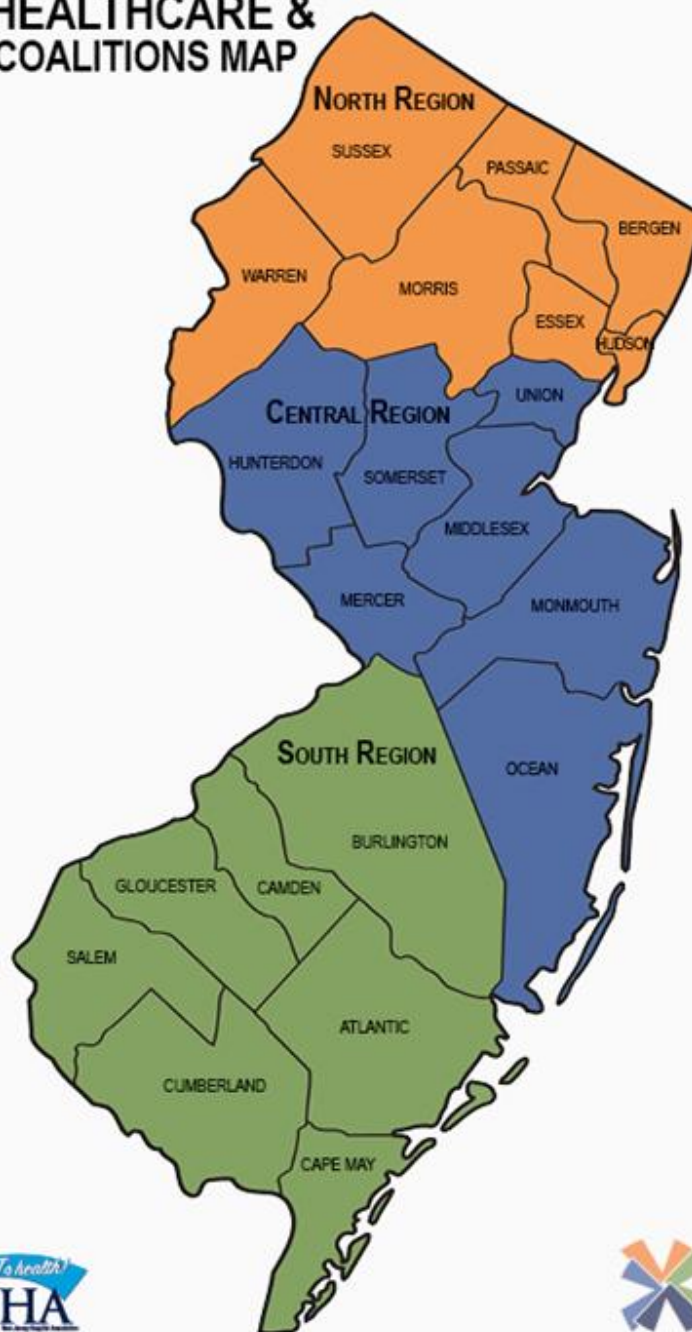
Breakdown of Probability Ranking by New Jersey's Public Health Regions –

North Region includes: Warren, Sussex, Passaic, Morris, Bergen, Essex, Hudson

North Region Risks	Probability Ranking
Severe Weather	3
Foodborne Illness	2.91
Emerging Infectious Disease	2.83
Power Outage/Failure	2.83
Cybersecurity Attack	2.75
Pandemic	2.58
Mass Gathering	2.5
Active Shooter	2.37
Hazmat	2.33
Terrorism	2.29

Central Region includes: Hunterdon, Somerset, Union, Mercer, Middlesex, Monmouth, Ocean

Central Region Risks	Ranking
Severe Weather	3.55
Power Outage/Failure	3.23
Cybersecurity Attack	3.05
Mass Gathering	2.68
Emerging Infectious Disease	2.63
Foodborne Illness	2.47
Hazmat	2.34
Pandemic	2.28
Terrorism	2.07
Active Shooter	1.89

South Region Includes: Burlington, Camden, Gloucester, Salem, Cumberland, Atlantic, Cape May

South Region Risks	Ranking
Severe Weather	3.58
Power Outage/Failure	3.2
Emerging Infectious Disease	3.08
Cybersecurity Attack	3
Mass Gathering	2.75
Pandemic	2.45
Foodborne Illness	2.29
Active Shooter	2.2
Hazmat	2.16

Terrorism	2.04