UNC CENTER FOR THE BUSINESS OF HEALTH

Pandemic Preparedness Infrastructure: An Action Plan for North Carolina

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Pandemic Preparedness Infrastructure: An Action Plan for North Carolina

Executive Summary

The coronavirus pandemic of 2020 exemplifies a worst-case scenario for federal, state, and local disaster preparedness planning and illustrates some of the United States' fundamental public health infrastructure flaws. While stay-at-home orders and economic shutdowns initially depressed disease spread, they harmed businesses and organizations, threatened individuals' livelihoods, and negatively impacted community well-being. National standards for COVID-19 management tools and protocols were not available when needed, and state, local, and federal guidance differed, and often conflicted, in ways that confused the public and created economic uncertainty.

Though the coronavirus uniquely impacted and changed the world in 2020, experts acknowledge that disease outbreaks have increased in frequency and magnitude* over two decades. For this reason, we recommend state and federal governments learn from this pandemic and develop stronger preparedness infrastructure(s) for the "never again scenario." Government officials must prioritize public health preparedness in the same way the federal government prioritizes national defense, cyber security, and natural disaster planning.

As such, the state of North Carolina requires a long-term, comprehensive strategy for developing and maintaining the foundational infrastructure required to prepare for future pandemics. Looking forward, state officials must address one key question: How can North Carolina prevent an economic shutdown during a public health crisis while keeping all residents healthy and safe?

This action plan is designed to help public officials formulate a pandemic preparedness and response infrastructure in the state of North Carolina. We leverage a proven disaster preparedness framework and provide evidence-based recommendations to support strategic planning. Our framework includes the following phases:

1. Threat Awareness (TA)
2. Prevention and Protection (PP)
3. Surveillance and Detection (SD)
4. Response and Recovery (RR)

We developed our recommendations by studying federal, state, local, and even international COVID-19 pandemic responses through July 2020, and identified key stakeholders, benefits, and supporting evidence. Each chapter also provides insights and questions for consideration to help healthcare leaders and state officials identify success stories, best practices, and develop strategies to implement a robust pandemic response infrastructure.

While we all continue to focus on the COVID-19 pandemic and response, public officials across the country must also prepare for future public health crises. In addition to this action plan, we identify a number of recovery playbooks that provide clear steps and strategies for disaster preparedness and recovery. Though this work is difficult, our public officials have a moral and economic obligation to study this crisis, identify points of failure and interdependencies, and go back to the drawing board to ensure we are better prepared next time.

* All sources and evidence used in forming the recommendations and this action plan as a whole are provided using hyperlinks within the body of the document.

Chapter 1: Threat Awareness

This chapter focuses on obtaining and communicating critical information for a future infectious disease threat. Threat Awareness, which includes identifying, monitoring, and communicating potential threats, is an essential part of any security infrastructure. The recommendations provided below revolve around three themes:

- Compiling research and timely, accurate information to build consensus across subject matter experts and key stakeholders.
- Communicating clear and consistent information to the public to raise overall awareness.
- Promoting compliance with health risk mitigation requirements by identifying health-promoting behaviors and maintaining a culture of accountability.

The U.S. COVID-19 pandemic response lacked straightforward and reliable messaging from federal, state, and local leaders, even as the threat to American lives and livelihoods was identified and assessed. We provide the following recommendations to help stakeholders prepare strategies to ensure effective communications during future public health crises.

Recommendations

1. Coordinate threat monitoring across key federal, state, and local agencies to create clear lines of communication and authority among public officials.

Federal agencies, local government officials, health system leaders, and key community stakeholders should coordinate and monitor threat information through a centralized portal to promote collaboration and build consensus. This will allow communities to integrate all relevant sources of information (e.g., federal agency reports and guidance, community-specific information, business sources, etc.) into the public health response. Table 1 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 1. Primary Stakeholders, Benefits, and Supporting Evidence, TA Rec. 1

Topic	Description
Primary Stakeholders	• Governor & State Executive Branch (Response Coordinator) • North Carolina Department of Health and Human Services (DHHS) • Local/Municipal Leaders
Benefit	A centralized state portal will expand real-time access to critical information across key stakeholders. This will help response leaders quickly integrate updates and emerging research findings into response actions. Additionally, by providing a repository of reliable information, response leaders can establish fact patterns, reduce panic or uncertainty, and combat disinformation.
Evidence	• Brookings, Reopening America, Chapter 19 "How AI and emerging technologies help and hurt us," discusses the importance of data tracking/management on decision-making. Additionally, the article describes artificial intelligence and other technologies that can help combat disinformation. The chapter also links to a Johns Hopkins Data portal that maps COVID-19 case and death rates as well as other necessary pandemic response information.

2. Communicate risk and mitigation information to the public consistently through trusted sources. Information should be easy to understand, repetitive in nature, and data driven.

Evidence-based, clear communication to the public is an essential component of disaster response. Educational institutions and local governments should coordinate with state and local officials to develop general and targeted outreach campaigns to share important, time-sensitive information with the public. Officials should also include information on specific risks and risk mitigation tactics. We provide additional information on risk profiles in Chapter 3.

Officials should deploy messaging on traditional media outlets (e.g. television, newspaper, radio) while also leveraging social media and private communications channels (e.g., direct messaging from providers to patients, messages from employers to employees). State government and health officials should pursue partnerships with private companies to create a website and smartphone application to communicate information to the general public. Table 2 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 2. Primary Stakeholders, Benefits, and Supporting Evidence, TA Rec. 2

Topic	Description
Primary Stakeholders	• NC DHHS (Lead) • Private Industry
Benefit	Experts and state officials can provide communications and engage with the public to promote compliance. The public will be empowered to make better decisions for themselves based on clear recommendations that are formed on risk profile information and mitigation strategies for communities and individuals.
Evidence	• The Association of State and Health Officials (ASTHO) released a guide on critical information for COVID-19, which was developed using risk communication tools. This guide provides guidance and methods for successfully communicating risk information to the general public. • Officials must use compelling information delivery techniques for clear communications when sharing recommendations and proper risk mitigation strategies to the public. • A team at UNC Hussman School of Journalism and Media has been advising NC DHHS Secretary Dr. Mandy Cohen on proper communications techniques, which are referred to as "evidence-based health messages." • The Massachusetts Institute of Technology analyzed the risk associated with various types of businesses re-opening amid the COVID-19 pandemic. NC DHHS can conduct similar analyses to assess risks to the general public during future crises.

3. Organize a plan to hold regularly scheduled physical or virtual town hall meetings and/or press briefings to provide status updates to the public.

Public officials should hold consistent, in-person and virtual town hall meetings and/or press briefings to share critical information with the public for threat awareness. Response leaders should also consider facilitating smaller, targeted sessions with religious or civic groups to dispel incorrect information and build consensus. Table 3 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 3. Primary Stakeholders, Benefits, and Supporting Evidence, TA Rec. 3

Topic	Description
Primary Stakeholders	• Governor and State Executive Branch (Lead) • NC DHHS • Local Community Leaders

Benefit	By hosting predictable, large and small group press conferences and/or town halls, response leaders can facilitate positive public engagement and bi-directional communication that builds public trust and community solidarity. These activities, particularly within faith or religious settings or smaller communities, allow residents to ask questions and obtain objective information while feeling heard and/or cared for. This type of coalition building will amplify public health interventions and increase adherence to public health guidance/interventions.
Evidence	A study in the Journal of Public Relations Research found that in times of emergency or crisis, individuals felt better prepared to handle a situation when information was provided by reliable or trusted sources and through relatable messaging.

Key Questions for Consideration: Threat Awareness

1. **Coordinate threat monitoring across key federal, state, and local agencies to create clear lines of communication and authority among public officials.**
   - How should public officials identify and combat disinformation during uncertain times, while also encouraging individuals to utilize social and traditional media to monitor real-time public-health updates and obtain public health knowledge?
   - How will organizers of a portal vet and verify information?
   - Who will have access to the portal?

2. **Communicate risk and mitigation information to the public consistently through trusted sources. Information should be easy to understand, repetitive in nature, and data driven.**
   - Who (public-private partnership) will lead development of an app and communication strategy for the general public?
   - Can access be increased to those without Smartphones and/or internet?
   - What is the best way to coordinate health systems with the local government to synchronize communications?
   - What is the best strategy for patient education on proper health guidelines?
   - How can officials best establish closing and re-opening strategies for businesses based on transmission and other risks while mitigating frequent changes and confusion for businesses?

3. **Organize a plan to hold regularly scheduled physical or virtual town hall meetings and/or press briefings to provide status updates to the public.**
   - How do government officials gain the support and endorsement of community leaders and organizations, such as faith or religious groups, to communicate specific health risk mitigation strategies and guidelines?

Additional Information

We provide additional resources to support further investigation below:

1. CDC, People Who Are at Increased Risk for Severe Illness: The CDC provides information on two increased risk groups: older adults and those with underlying medical conditions.
2. Stay Home MN Campaign: Minnesota state officials developed an extensive marketing campaign to inform and persuade residents to stay home. This type of marketing strategy can be used in other states.
3. CDC, Considerations for Communities of Faith: The CDC provided information and suggestions for communities of faith, including recommendations for cleaning and social distancing.

Chapter 2: Prevention & Protection

This chapter focuses on strategies that can prevent and protect North Carolinians from future public health threats and diseases that may lead to serious complications and death or strain vital health system resources. Prevention refers to suppressing the spread of a disease and inhibiting its impact(s) on the general public. The term protection refers to measures that ensure continued health and well-being among the public such as, but not limited to, providing medical supplies to support hospital-based treatment. This chapter discusses strategies that will support future planning and response efforts that enable communities to quickly provide resources or scale health system capacity, including:

- Creating public-private partnerships to ensure necessary access to crucial medical supplies and resources.
- Obtaining critical personal protective equipment (PPE) to protect patients and healthcare workers.
- Addressing economic implications of public health crises, such as unemployment and aid programs.

Proper strategic planning prior to a potential crisis can help communities and organizations prevent the spread of a disease and protect residents' health and well-being.

Recommendations

1. Establish public-private partnerships to acquire and maintain critical medical supplies (PPE, ventilators, testing kits, vaccines, etc.) at the state level.

States should place a high priority on obtaining critical medical supplies to support testing and treating large numbers of critically ill patients. Government officials should develop public-private partnerships to assist with manufacturing and maintaining critical supplies and equipment for healthcare workers. Organizations with relevant competencies can be designated for specific aspects of manufacturing, managing supply chains, and/or distributing key supplies to local governments, health systems, and others. Table 4 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 4. Primary Stakeholders, Benefits, and Supporting Evidence, PP Rec. 1

Topic	Description
Primary Stakeholders	• NC DHHS (Lead) • Private Industry • Health Systems
Benefit	Provides health systems with required physical assets and resources to manage and treat an unexpected influx of patients with an infectious disease. Additionally, these partnerships can create a revenue stream for private industries that have faced an economic downturn during past public health crises.
Evidence	• Harvard University's Kennedy School of Government discussed how public-private partnerships aided the response to COVID-19 in the U.S. Examples include government agencies coming together with non-profit accelerators to match the needs of health care systems with private manufacturers. • Research suggests that establishing public-private partnerships early and providing strong institutional platforms and support can impact future success.

2. Allocate state aid to health systems and private industry based on the European Commission Temporary State Aid Framework through work programs and employee and tax support.

In response to COVID-19, the European Commission (an executive branch of the European Union [EU]) established a framework for allocating aid to support the economy. The framework explains how government funding will contribute to building and upgrading pandemic preparedness infrastructure, conducting COVID-19-related research and development, and producing COVID-19 related products and supplies. The two aspects of the European Commission Framework that are relevant to this recommendation include:

- Tax deferrals and/or suspensions of employees' social security contributions.
- Wage subsidies for employees to avoid lay-offs during an outbreak.

While the Coronavirus Aid, Relief, and Economic Security (CARES) Act provided direct payments to workers, the impact on reducing unemployment is waning. Therefore, North Carolina policy makers should consider establishing a work sharing program to implement during times of high unemployment (examples below). Similar programs have been used throughout the EU to successfully reduce unemployment during the coronavirus pandemic. Table 5 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 5. Primary Stakeholders, Benefits, and Supporting Evidence, PP Rec. 2

Topic	Description
Primary Stakeholders	• Governor & State Executive Branch (Lead) • Private Industry
Benefit	Prioritizes immediate infrastructure development necessary to minimize unemployment increases and/or consequences of unemployment. These programs would also generally support the economy and employees' health and well-being.
Evidence	• Communication from the European Commission detailing the "Temporary Framework for State aid measures to support the economy in the current COVID-19 outbreak." • The European Commission Framework includes many temporary recommendations that can be adapted to North Carolina. • The Kenan Institute discusses the successes and limitations of the CARES Act. • European short-time work programs have helped prevent mass unemployment.

3. Develop public-private partnerships to support investment of private resources to rapidly scale health system capacity.

Local governments, health systems, and private industries can collaborate to determine which companies can pivot their production capabilities to serve public needs during a crisis. During the COVID-19 pandemic, hundreds of private companies repurposed resources to protect the public, which in turn created revenue and jobs that stimulated the economy. Table 6 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 6. Primary Stakeholders, Benefits, and Supporting Evidence, PP Rec. 3

Topic	Description
Primary Stakeholders	• Governor & State Executive Branch (Lead) • Private Industry • Health Systems
Benefit	Reduces burden on health systems' internal resources to solve public health challenges. These partnerships would also create a sustainable revenue stream for private companies that would otherwise face economic challenges to remain viable.

Evidence	• The National Governors Association (NGA) discusses public-private partnerships as part of their "Road to Recovery" plan. • Some assessments suggest that hotels could be converted to patient facilities when health systems reach maximum capacity. This type of arrangement could significantly expand health systems' abilities to scale medical capacity to meet demand. • In Texas, industrial painting contractors repurposed vapor sandblasting machines to quickly sanitize and disinfect surfaces. • Forbes summarizes multiple private sector efforts to fight COVID-19.

4. Continually maintain stockpiles of critical medical supplies at the state level using the federal Inventory Management and Tracking System (IMATS).

Government officials and health system executives should expand and constantly maintain emergency medical supply stockpiles. State officials can coordinate and manage inventory by working closely with health systems, private industry, and public health departments to ensure North Carolina is prepared for future pandemic-induced shortages and prevent reliance on a federal Strategic National Stockpile (SNS). To assist states with the maintenance and inventory management of emergency stockpiles, the federal government has provided resources such as the Inventory Management and Tracking System (IMATS). Table 7 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 7. Primary Stakeholders, Benefits, and Supporting Evidence, PP Rec. 4

Topic	Description
Primary Stakeholders	• Governor & State Executive Branch (Lead) • Federal Government • Health Systems
Benefit	Improves state-level tracking of emergency medical supply stock and provides necessary access to critical stockpiles should federal access be limited or unavailable.
Evidence	• The national stockpile was not prepared for the COVID-19 pandemic, largely due to an insufficient amount of medical supplies and neglect that rendered many stocked supplies useless. Masks and ventilators were never replenished or obtained, despite plans to do so. • This chapter on the Strategic National Stockpile discusses its origin and evolution, including the transition to an "all-hazards response," which depleted funds specific to a chemical, biological, radiological, or nuclear threat. • This fact sheet from the Association of State and Health Officials (ASTHO) provides information on the SNS.

Key Questions for Consideration: Prevention & Protection

1. **Establish public-private partnerships to acquire and maintain critical medical supplies (PPE, ventilators, testing kits, vaccines, etc.) at the state level.**
   - What are the critical supplies needed for a future outbreak, and which companies have the competencies for a partnership?
   - What is the best strategy in pursuing these partnerships?
   - What is the mutual benefit for private companies and the State government in the partnership?

2. **Allocate state aid to health systems and private industry based on the European Commission Temporary State Aid Framework.**
   - What are the proper recommendations from the European Commission Framework to adapt for North Carolina?
   - How must policies be changed to support these recommendations?

3. **Develop public-private partnerships to support investment of private resources to rapidly scale health system capacity.**
   - How can businesses and private industry collaborate with the state government to plan for a future pandemic/shutdown while still optimizing normal operations?

4. **Continually maintain stockpiles of critical medical supplies at the state level using the federal Inventory Management and Tracking System (IMATS).**
   - How can NC fund an expanded stockpile sustainably?
   - What is the investment value and return?
   - Does the existing stockpile space support the expansion in NC?

Additional Information

We provide additional resources to support further investigation below:

1. KPMG article on the European Commission Framework: This article summarizes the EC Temporary Framework for tax deferrals and other State support.
2. The German Answer to the Great Recession: Germany utilized short-time work, or work sharing programs, to decrease unemployment and recover from the economic crisis.
3. Austrian short-time work as international role model: Austria utilized short-time work to mitigate mass unemployment during the COVID-19 pandemic.
4. Brookings Work Sharing: Work sharing programs only exist in 26 US states, but these programs can be used nationally to support employment during future public health or economic crises.

Chapter 3: Surveillance & Detection

This chapter focuses on strategies to continuously surveil outbreaks and detect risks during public health crises. Federal, state, and local officials should develop and memorialize surveillance standard operating procedures and detection protocols prior to identifying an imminent threat. This chapter provides recommendations for:

- Collecting and analyzing data to support evidence-based decision-making.
- Determining the best methods for sharing surveillance and detection data with key stakeholders.
- Implementing a North Carolina Command Center that includes representatives from key agencies, industries, and demographics, to centralize surveillance efforts across the state.

State officials can leverage accurate, real-time surveillance data to understand risk, prioritize interventions, and coordinate strategies across key stakeholder groups. Community leaders will benefit from a robust and thoughtful surveillance program that implements data-driven solutions to complex public health problems.

Recommendations

1. Implement location tracking app(s) to automate contact tracing.

Public health officials can significantly reduce the amount of resources required to conduct contact tracing by leveraging digital tools and supplementing manual efforts with automation. The North Carolina Department of Health and Human Services (NC DHHS) can work with private industry to acquire contact tracing data through apps and can partner with private companies to further develop their contact tracing capabilities, when appropriate.

We provide summaries of the two common types of tracking applications available in the marketplace (e.g. Global Positioning System (GPS) and Bluetooth: see Additional Information). States typically have four options when it comes to choosing contact tracing solutions:

1. Implement GPS-based location tracking applications, which provide enhanced data collection capabilities.
2. Implement Bluetooth-based location tracking applications, which provide enhanced privacy and security capabilities.
3. Implement both GPS- and Bluetooth-based location tracking applications, which significantly increases the cost of tracing.
4. Rely exclusively on traditional manual contact tracing methods, as demonstrated by New York's COVID-19 contact tracing program.

Regardless of how public health officials choose to proceed, the solution must be capable of reaching a critical mass, addressing privacy concerns, and overcoming access challenges to be effective. Additionally, public health departments will need to provide a base level of manual services to complement any technology solution. We recommend employing students and other temporary workers as a way to staff critical tracking efforts while infusing cash into the local economy. Table 8 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 8. Primary Stakeholders, Benefits, and Supporting Evidence, SD Rec. 1

Topic	Description
Primary Stakeholders	• NC DHHS (Lead) • Health Systems • Private Industry

Benefit	Reduces heavy resource requirements needed for manual contact tracing, while providing officials with reliable surveillance data to track disease spread and emerging risks.
Evidence	• Johns Hopkins developed a plan for using contact tracing to support the domestic public health response that discusses GPS and Bluetooth capabilities. • In a study published by Avira, only 29% of Americans surveyed would download and use contact tracing applications. Over 40% do not trust any organization to keep their information safe, and only 14% trust the U.S. government to handle their data properly. Survey respondents were most comfortable with health systems managing the data. • Solutions to promoting adoption of contact tracing apps include: 1. Ensuring applications are open sourced. 2. Implementing strict privacy policy requirements for all location tracking apps. • The Massachusetts Community Tracing Collaborative is designed to trace contacts of positive COVID-19 cases. They utilize the state's Command Center and hire public health college students. We include this article to highlight a successful model that can be emulated in North Carolina. • COVID Watch published a paper on using crowdsourced data to track disease spread. The paper also discusses uses of cell phones, app interventions, and privacy considerations.

2. Develop a centralized Surveillance Command Center that is led by the NC Department of Health and Human Services in coordination with local healthcare systems.

The NC DHHS should establish a Surveillance Command Center to centralize data collection, communications, and strategic surveillance efforts, incorporating local officials and representatives from health systems through a hub and spoke model. This would create a centralized network for aggregating and analyzing key surveillance data while allowing individual health systems flexibility to adapt solutions to their local environments. Table 9 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 9. Primary Stakeholders, Benefits, and Supporting Evidence, SD Rec. 2

Topic	Description
Primary Stakeholders	• Governor & State Executive Branch (Lead) • NC DHHS • Health Systems
Benefit	Creates a centralized network for compiling and organizing resources, connects key stakeholders, and supports health systems by providing flexibility to adapt solutions to meet the unique needs of their specific population(s).
Evidence	• Minnesota's Department of Health deployed a similar model by partnering with Mayo Clinic and the University of Minnesota. • NC hospitals in the research triangle area activated their Emergency Operations Centers in response to COVID-19. • Massachusetts formed a COVID-19 response Command Center in March of 2020.

3. Adopt best technology/platform to enable real-time surveillance of contact tracing and other data.

Officials should adopt a technology platform to support and enhance surveillance efforts. This platform must be intuitive and should, at a minimum, include best-in-class data visualization capabilities and enhanced privacy and

security features. Data sources can include disease testing and contact tracing results, clinical data (i.e. disease registry, admissions, discharges, & transfers (ADT)), social determinants of health (SDOH), and other information that can help key stakeholders monitor the crisis and develop effective interventions. Table 10 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 10. Primary Stakeholders, Benefits, and Supporting Evidence, SD Rec. 3

Topic	Description
Primary Stakeholders	• NC DHHS (Lead) • Health Systems • Private Industry
Benefit	Improves public health officials' ability to assess resource requirements and manage outbreaks across the state, while also providing key information to policy-makers about re-opening.
Evidence	• Command Centers with artificial intelligence technology help hospitals manage operations under normal circumstances. • The Kenan Institute created a dashboard of COVID-19 statistics, including healthcare utilization rates and hospitalizations. • NC DHHS maintains a COVID-19 dashboard with daily case and testing numbers as well as other surveillance tools to track outbreaks and clusters.

4. Analyze surveillance data with population demographics to create cohort risk profiles.

Public officials should use management tools to develop risk profiles for individuals and communities. For example, individuals who are older or who have co-morbidities may have increased health risks, while others who are unable to work remotely may be at increased risk for facing economic hardships. Community leaders can use these risk profiles to better understand and manage the complex interactions and relationships between health and economic activities. More information on specific health and economic risk factors can be found in the Additional Information section of this chapter. Table 11 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 11. Primary Stakeholders, Benefits, and Supporting Evidence, SD Rec. 4

Topic	Description
Primary Stakeholders	• NC DHHS (Lead) • Health Systems
Benefit	Improves visibility and focus on high-risk populations and informs evidence-based policies for allocating resources and customizing intervention tactics.
Evidence	• A command center approach can be used for centralizing population health management efforts. • The New England Journal of Medicine constructed a 9-cell grid to exhibit risk levels based on age, pre-existing conditions, and occupational and behavioral environments. • Across the country and in NC, blacks and other minority groups are disproportionately affected by COVID-19 and have higher death rates.

Key Questions for Consideration: Surveillance & Detection

1. **Implement location tracking app(s) to automate contact tracing.**

- How should public officials ensure balance between individual privacy and public good?
- What is the best contact tracing method and/or technology to use in NC?

2. **Develop a centralized Surveillance Command Center that is led by the NC Department of Health and Human Services in coordination with local healthcare systems.**
   - Which public and private agencies should be involved in two-way communications or collaboration with the Command Center?
3. **Adopt best technology/platform to enable real-time surveillance of contact tracing and other data.**
   - How will the state procure this technology? And who will develop it?
   - What is the best way to coordinate health systems with the local government to obtain this information in real time?
   - What are the bylaws organizations must agree to in order to feel confident sharing information with potential competitors?

4. **Analyze surveillance data with population demographics to create cohort risk profiles.**
   - What SDOH factors alone drive higher infection rates?
   - What correlations exist between SDOH factors and health co-morbidities?

Additional Information

1. Contact Tracing application information:
   - **GPS**
     - **Capabilities**: GPS applications are able to track how long a contact occurred and can log the specific location where one may have been exposed to an infected person.
     - **Limitations**: User settings can affect accuracy, such as Wi-Fi on/off and battery saving mode. While it is generally accurate within 16 feet, it can be hundreds of feet off depending on topography.
     - **Examples**: MIT's Path Check and the "Healthy Together" app used in Utah.
   - **Bluetooth**
     - **Capabilities**: Bluetooth applications can identify if a user has been near an infected person. Evidence shows that individuals concerned about privacy would be slightly more likely to use Bluetooth over GPS (32% over 27%).
     - **Limitations**: This technology cannot log the user's identity or identify a specific location that a potential infection occurred.
     - **Examples**: The Apple and Google applications use a Bluetooth model. Bluetooth contact tracing apps are used in Arizona, Alabama, and South Carolina. COVID Watch is an example used in Arizona.
2. The COVID-19 Command Center in Massachusetts issued a situation update communication document to provide information on testing sites, travel orders, case numbers, and other updates.
3. Health Risk Stratification Factors include:
   - Age (80% of Americans who have died from COVID-19 have been 65 or older)
   - Race
   - Others: Co-morbidities (Chronic Health Conditions), incarceration, and individuals experiencing homelessness
4. Economic Risk Stratification Factors include:
   - Low income (% of FPL), current employment status, and ability to work from home
   - Education level

Chapter 4: Response and Recovery

This chapter focuses on response and recovery actions state officials and key stakeholders can leverage to support North Carolinians during, and immediately following, a public health crisis:

- Supporting private businesses by providing financial incentives and establishing guidelines for safely maintaining or resuming operations following a temporary shutdown.
- Providing critical social support to the general public, particularly vulnerable populations.

State officials and key stakeholders need well-developed response strategies to support a robust recovery following a public health crisis. Officials should prioritize the needs of vulnerable populations (e.g. elderly, low-wage workers, and Black, Indigenous, People of Color (BIPOC)) to minimize long-term negative effects and increase the speed and strength of recovery.

Recommendations

1. Implement a phased recovery approach based on economic necessity, business sector or function, and the overall risk to employee health and safety.

To re-open successfully, state officials must incentivize private businesses to implement safety measures that protect employees and customers. Officials should support essential businesses re-opening by providing or subsidizing personal protective equipment or cleaning supplies and establishing clear protocols for maintaining business operations. State officials should coordinate with private industry and manufacturers to safely increase manufacturing outputs and ensure timely distribution. Table 12 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 12. Primary Stakeholders, Benefits, and Supporting Evidence, RR Rec. 1

Topic	Description
Primary Stakeholders	• Governor & Department of Commerce (Lead) • Private Industry
Benefit	Stimulates the local economy by supporting the resumption of 'normal' business operations and protects employees and patrons by standardizing health, safety, and cleaning requirements.
Evidence	• The CDC provided guidelines for cleaning workspaces during the COVID-19 outbreak. • This MIT study analyzed the risk of re-opening businesses by type during the COVID-19 pandemic.

2. Require all people in public spaces to wear a mask or face covering throughout the recovery phase to reduce the potential of further contamination.

States and counties across the U.S. issued public mask or face covering mandates during the COVID-19 pandemic. State officials should issue a similar mandate as a first line of defense for combatting a future disease outbreak to prevent potential airborne transmission. We recommend maintaining the mandate through the recovery phase, until the number of cases, or spread of the disease, significantly decreases, to support re-opening business and resuming economic activity. Table 13 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 13. Primary Stakeholders, Benefits, and Supporting Evidence, RR Rec. 2

Topic	Description
Primary Stakeholders	• Governor & State Executive Branch (Lead) • Private Industry
Benefit	Prevents airborne or respiratory droplet transmission of disease while enabling businesses to re-open and resume economic activity.
Evidence	• Face mask mandates are associated with declining COVID-19 cases. • Many companies and businesses encouraged the government to establish mask mandates during COVID-19. • Research from Goldman Sachs indicates that a national mask mandate for COVID-19 would increase the portion of people wearing masks by 15%, reduce daily infections between .06-1%, and prevent a 5% loss in national GDP (roughly $1 trillion).

3. Create a specialized task force to assess and respond to the needs of vulnerable populations.

Government officials should work with non-profits, philanthropists, and private organizations to provide enhanced social services and support to vulnerable populations. Key resources include employment support, food and basic health supplies, mental health resources, and temporary housing or rent relief. By implementing and organizing resources for vulnerable populations, state officials can mitigate the long-term impacts of public health crises and economic shutdowns. Table 14 identifies the primary stakeholders, the benefits of this approach, and supporting evidence for acting.

Table 14. Primary Stakeholders, Benefits, and Supporting Evidence, RR Rec. 3

Topic	Description
Primary Stakeholders	• Governor & State Executive Branch (Lead) • Community Leaders • Private Industry • Non-profits and Philanthropists
Benefit	Coordinates support efforts for efficient aid and intervention programs to assist vulnerable populations and mitigate compounding health and economic impacts.
Evidence	• The Governor of Michigan implemented a Task Force on Racial Disparities during the coronavirus. • The CDC provided a list of resources for stress and mental health implications during a pandemic. • Partnerships with hotels or private industry and non-profits can support victims of homelessness and domestic violence. • Addressing the needs of incarcerated individuals is paramount to reducing disease spread.

Key Questions for Consideration

1. **Implement a phased recovery approach based on economic necessity, business sector or function, and the overall risk to employee health and safety.**
   - What is the best strategy for closing or re-opening businesses based on risk, to prevent permanent closure of businesses and frequent changes in their permitted status?

- How can state officials work with businesses and collaborate to increase safety and promote compliance with regulations?

2. **Require all people in public spaces to wear a mask or face covering throughout the recovery phase to reduce the potential of further contamination.**
   - How can state officials combat the growing anti-mask sentiment?
   - What is the best strategy for mask mandate enforcement to promote public health and safety?

3. **Create a specialized task force to assess and respond to the needs of vulnerable populations.**
   - How can state officials ensure that individuals or populations in need know about resources and have appropriate access to health supplies or services?
   - Which resources from the task force must continue beyond an immediate public health threat to address social determinants of health (SDOH)?

Additional Information

1. Disaster Preparedness and Social Justice in a Public Health Emergency, Duke University Press: This article discusses necessary support infrastructure and measures for vulnerable populations, particularly in times of a public health threat. The article also addresses the need for a robust disaster preparedness plan.
2. Testing Responses through Agent-based Computational Epidemiology (TRACE) program: The TRACE program is a model created in collaboration with Brookings and Washington University in St. Louis, that aims to inform policies based on testing and contact tracing data.

Appendix: Additional Sources

Deloitte's "Executing the COVID-19 recovery" was helpful for formulating the provided recommendations. This document provided comprehensive strategies for state and local governments, particularly for developing communication strategies, forming a command center, and utilizing data and technology.

Brookings worked with many experts to develop, "Reopening America," a comprehensive look at many topics dealing with COVID-19 response. This document was used in forming recommendations and for general research. Of note is Chapter 19: "How AI and emerging technologies and help and hurt us" by Darrell M. West.

In Indiana, the Central Indiana Corporate Partnership (CICP) created well-designed playbooks for three prominent industries in the area, which were used in forming recommendations and for general research.
All three of these playbooks are published, and can be found and accessed for free on the CICP website.

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Pandemic Preparedness Infrastructure: An Action Plan for North Carolina

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