# State and Local Testing Strategies for Responding to Covid-19 Outbreaks in Communities: Considerations for Equitable Distribution

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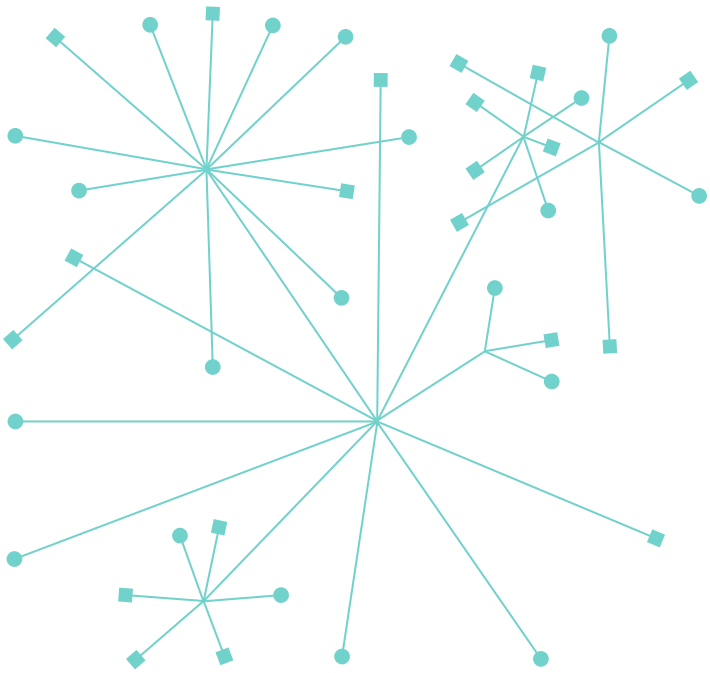


# Executive Summary

The purpose of this document is to support state and local leaders in developing equitable testing strategies to quickly identify, prevent, and respond to Covid-19 outbreaks in communities most impacted by the Covid-19 pandemic, including communities of color. Testing is and will continue to be a critical component of responding to outbreaks in the short term and managing the pandemic in the long term, in combination with vaccinations and other mitigation measures. Low income communities and communities of color face a disproportionate burden of Covid-19 cases, hospitalizations, deaths, and disability and yet have not received levels of testing that are commensurate to the disproportionate morbidity and mortality they experience.

To quickly identify and respond to outbreaks in communities, states and localities can follow the process depicted in Figure 1 and described in more detail throughout this paper. States and localities should identify accessible relevant data, and use that data to conduct a risk assessment to identify communities most at risk of an outbreak or high levels of severe disease and death from Covid-19 infection. Health officials can differentiate between areas that need additional access to more permanent diagnostic testing and areas that require an immediate, short term surge in screening testing to break the lines of disease transmission. As states and localities implement additional testing sites, attention to reducing barriers to testing may increase uptake and reduce inequities in who is being tested. Importantly, close coordination and engagement with communities is crucial at every step of this process.

## FIGURE 1 Developing a testing strategy

### ENGAGE COMMUNITIES

- Partner with trusted members of the community (faith-based organizations, community-based organizations, food banks, public housing sites, community health workers, and other community leaders)
- Consider using an opt-in approach where communities with high risk of transmission and exposure are asked to self-select for locating testing in communities
- Understand and address the barriers to testing, including social supports to facilitate quarantining in the event of a positive result
- Engage health systems, providers, and the private sector to supplement state and local resources

### USE RISK ASSESSMENT TO IDENTIFY HIGHEST TESTING PRIORITIES

- Identify available data (including case incidence and test positivity rates by zip code, wastewater surveillance, social and economic data, census data, race and ethnicity data, claims data for comorbidities, etc.)
- Use data to identify neighborhoods and communities with disproportionately low rates of testing and those at highest risk of infection, transmission, and severe consequences.

### IDENTIFYING TESTING NEEDS

- Consider the test purpose (clinical diagnosis, screening, or surveillance; see Table 2)
- Understand capacity, supply, and funding needs
- Consider opportunities presented by current and expected funding (see Table 3) to implement identified promising practices
- Longer-term: Standardize and improve data reporting requirements and tools

### LOCATING TESTING SITES

**Position testing sites equitably according to need**

- Develop longer-term diagnostic testing sites in communities that are identified as priorities and that currently have limited access to testing

**Mobile, Pop-Up, and Surge testing to hotspots**

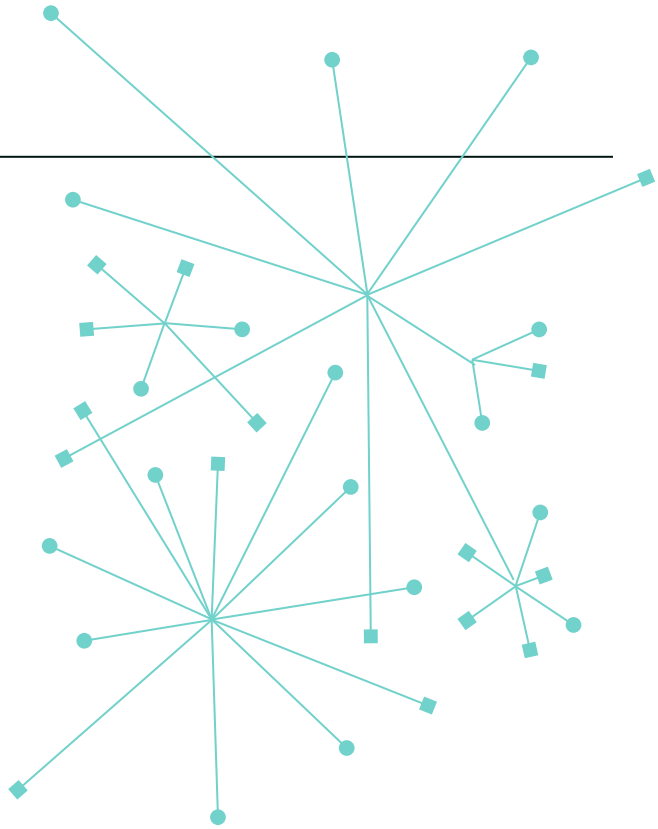
- Immediate: implement mobile and pop-up clinical diagnostic testing, along with local information campaigns, in communities with acute outbreaks
- Longer-term: Use surge testing to flood a community with screening tests

### IMPLEMENTING NO-BARRIER TESTING

**After engaging with communities to better understand specific barriers and needs:**

- Reduce or eliminate requirements for identification, insurance, appointments, and cost
- Use convenient operating hours and prioritize positive patient experiences
- Communicate clearly about who is eligible for testing
- Use bilingual and bicultural staff (at minimum provide access to translation services)
- Longer-term: Co-locate additional needed services (food and housing resources, quarantine supports, health and social services, care coordination)

# Objective



**This document aims to assist state and local governments with developing testing strategies to quickly identify, prevent, and respond to Covid-19 outbreaks in communities.** Such strategies must include the equitable distribution of community-based diagnostic and screening testing that reaches communities most impacted by the Covid-19 pandemic, including communities of color. The document includes examples and promising practices for identifying data-informed priorities for testing and increasing community-based testing that is culturally and linguistically responsive, and allocated and distributed in an equitable and inclusive manner to communities according to need.

# Introduction

Recent emergency use authorizations for Covid-19 vaccines are an important tool to end the widespread nature of this pandemic, yet vaccination needs to be coupled with increased and sustained testing and other mitigation measures to communities with the greatest need (see Example 1: Impact of Vaccinations). All 50 states exhibit community spread, with 46 states experiencing escalating or unchecked community spread at the time of this publication. Accessible testing and wrap-around supports that mitigate testing barriers are an urgent need, particularly for communities experiencing disproportionate risk of exposure, rates of transmission, rates of positive cases and mortality, and severity of Covid-19 cases. While such urgent needs are being addressed, states and localities should be simultaneously planning for the longer-term testing measures needed once current elevated caseloads subside, to predict and control local outbreaks and monitor for clinically relevant variants. A combination of accessible diagnostic testing, home-based testing, and screening programs, with other mitigation efforts, form a strategy for controlling the Covid-19 pandemic, reopening schools and businesses, and returning to more normal activities.

While communities experiencing the highest risk may vary by state and locality, communities of color, areas of low income or with high income inequality, and rural areas have experienced a disproportionate burden of Covid-19 nationally.[1,2,3] For example, there have been more Covid-19 cases per 100,000 people for Native Hawaiian/Pacific Islander, American Indian/Alaska Native, Hispanic/Latinx, and Black/African American people than for non-Hispanic, White people.[4] Further, Indigenous, Black, and Latinx Americans are more than 2.7 times as likely to die of Covid-19 than non-Hispanic, White people.[5] Individuals with low incomes are also at higher risk for serious illness if infected with Covid-19.[6] Although the level of racially segregated neighborhoods varies by region across the country, segregation remains high in the US.[7] As a result, many communities of color and lower-income communities have limited to no access to pharmacies and health systems that provide the foundation for testing and vaccination networks in many areas. In addition, communities of color face a disproportionate burden of the economic and social impacts of Covid-19, including higher rates of unemployment, reduced wages and hours, and housing and food insecurity.[8] Despite the inequities in Covid-19 disease burden, communities of color have not received levels of testing that are commensurate to the disproportionate morbidity and mortality they experience.[9,10,11,12] Early data indicates that the initial vaccine roll-out has resulted in similar disparities based on wealth, race, and ethnicity[13,14] making accessible testing even more critical, and community

partnerships should focus on increasing access and education on both. When testing sites are not located in communities of color, or if they are located equitably but there are other barriers to accessing testing, community members are less likely to be tested.

While some experts have called for diagnostic and screening testing of millions per day[15] and screening everyone in the US on a regular basis,[16,17] state and local governments have faced limited supplies of tests, ancillary supplies, funding, and personnel to implement testing strategies that reach all communities. States need to implement robust diagnostic, screening, and surveillance testing that reaches the hardest hit communities through testing models to increase accessibility.

### EXAMPLE 1: IMPACT OF VACCINES

The emergency use authorization of vaccines is a critical step towards ending the pandemic. However, it may take several months for the general population to receive vaccines and questions remain as to whether vaccinated individuals can transmit the virus and for how long vaccines will offer protection. There is strong evidence that vaccines reduce the severity of illness and likelihood of death. Additional evidence is needed to confirm whether the vaccines will impact the likelihood of transmission[18,19] and to determine how effective the vaccines are with new variants.[20] In addition, communities of color have experienced access disparities during the initial roll-out of vaccination in the US.[21] Depending on the evidence, screening testing may be able to be reduced among groups with high levels of vaccinations, but ongoing surveillance testing is still needed until there is certainty about transmission after vaccination and an adequate and equitable portion of the population has been vaccinated.

Prioritization of limited resources, coupled with increased investments in wrap-around services, is needed to achieve the greatest impact in reducing the spread of Covid-19. Therefore, we describe a process to assist states and localities in identifying, preventing, and responding to outbreaks in communities and considerations for prioritizing limited testing resources. In addition, we offer recommendations for the equitable distribution of testing resources including actionable steps that state and local leaders can implement, including:

- Engage communities by listening to and understanding their specific testing barriers, and facilitating true coordination and collaboration around decision-making, planning and implementation of testing plans;
- Use risk assessments to identify an area's highest testing priorities, including prioritizing communities of color at the highest risk;
- Identify and allocate resources needed to expand testing to sites that serve communities and reduce social barriers to testing;
- Position longer-term diagnostic testing sites equitably according to need;
- Surge testing to hotspots in communities as needed; and
- Implement no-barrier testing based on the specific needs of the community.

Our focus for this paper is on community members residing in neighborhoods. The important and unique needs of individuals who are incarcerated[22,23,24] or residing in congregate living settings[25,26,27] is out of scope. Schools and universities are critical settings for screening testing but have been addressed by other resources.[28,29,30,31]

# Engaging Communities

States and localities can engage communities by listening to and understanding specific testing barriers, and by facilitating true coordination and collaboration around decision-making, planning, and implementation of testing plans. In addition, these partnerships may be leveraged to support longer-term testing approaches, vaccinations, and strategies to increase health equity more broadly. Critical community partners include faith-based organizations, community-based organizations, food banks, public housing sites, community health workers, and other trusted community leaders. Benefits of successful community-based diagnostic and screening testing implemented through partnerships with community leaders and community-based organizations include:

- Trust and trustworthiness
- Identification of convenient community-based testing sites
- Communication and engagement with community members
- Reducing barriers to testing by partnering with other services like food distribution
- Culturally responsive and linguistically accessible testing strategies.[32]

Community leaders are able to supplement the risk assessment with qualitative information to identify communities exhibiting the highest need for diagnostic and screening testing and that have not received testing resources and opportunities to date. The experience of testing implementation demonstrates that access alone is not sufficient for increasing testing uptake. Partners have important and specific information about how other community members perceive testing and what the major barriers to testing are in that specific community. In cases where testing is already available in communities, but demand is low, state and local leaders can partner with communities to further increase demand and uptake of testing (see how Connecticut partnered with community leaders on a communications campaign in Example 5).

Much attention is given to historical medical traumas, yet ongoing and current systemic racism and discriminatory treatment and policies toward Black, Indigenous, Latinx, and other communities of color by the health and public health systems have also contributed to mistrust in medical institutions and systems.[33] Therefore, establishing trustworthiness, providing culturally responsive messaging, and employing staff that come from the community is critical for health and public health systems to earn trust from communities (see Example 10 for an example from New Orleans and Example 14 for an example from Minnesota). Coordination with community leaders can help inform the location for testing, facilitate trust and safety, communicate about testing, and identify specific wrap-around services to provide to individuals and their families if they test positive (see Example 3 for an example from the Navajo Nation and Example 12 for an example from North Carolina). States may consider using an opt-in approach where relationships help identify communities that are both at risk for outbreaks and are interested in partnering with the state or locality to bring resources to their community (see Example 5 for Connecticut's approach to testing, which allowed the community to lead).

States and localities should begin working with or strengthen existing partnerships with community leaders as early as possible in the process. As part of this process, they should consider and define the nature of the relationship (including through memoranda of understanding, procurements, etc.) and in what ways community partners will be paid for their contributions. States and localities have typically used a combination of state and federal Covid-19 funds and philanthropy to financially support such relationships. In addition, successful community-based testing programs have leveraged partnerships with universities, health systems, providers, and the private sector to supplement state, local, and community resources. Many of the examples included in this document relied on public-private partnerships

to support their community-based testing. For example, Wayne Health and Wayne State University partnered with the Ford Motor Company for their mobile testing program (see Example 4), The New Orleans Health Department partnered with the Louisiana State University Health Science Center and the CORE Foundation (see Example 10), and New York Health and Hospitals partnered with city agencies and community-based organizations to implement their test and trace corps (see Example 13).

### EXAMPLE 2: MICHIGAN CORONAVIRUS RACIAL DISPARITIES TASK FORCE

Governor Gretchen Whitmer signed Executive Order No. 2020-55 on April 20, 2020, creating the Michigan Coronavirus Task Force on Racial Disparities. The task force includes public health experts, faith leaders, medical doctors, community organizers, and tribal leaders. As part of the task force's work, Michigan has accomplished the following testing-related achievements:

- Required labs to report data on race and ethnicity
- Adjusted testing protocols to include asymptomatic household members, when any member tests positive
- Established 21 neighborhood diagnostic and screening testing sites in at-risk communities
- Directed employer diagnostic and screening testing for migrant agricultural works with state support for testing and isolation housing

The task force reports that they have seen improvements from their work. From October through December 2020, Black residents accounted for less than 10 percent of Covid-19 deaths, a decrease of more than 30 percent since March through April 2020.[34]

### EXAMPLE 3: NAVAJO NATION COMMUNITY CONNECTORS

The Navajo Nation comprises more than 200,000 tribal members spread across Utah, Arizona, and New Mexico. Many residents have limited or no access to internet and phone connectivity, creating challenges related to increasing public awareness of Covid-19 and providing care and support to harder-to-reach individuals. To address this, the Navajo Department of Health developed a Unified Command Group in May 2020 to oversee Covid-19 response, reducing duplicative efforts among tribal, federal, and state partners. One of the group's main objectives is to expand testing and contact tracing.

The Navajo Department of Health has integrated testing, contact tracing, and wrap-around support services. Mass testing and mobile testing efforts are conducted through the use of existing Indian Health Service infrastructure. Local "community connectors" who are familiar with the area are deployed to engage with residents who cannot be contacted by phone. Contact tracers also identify what individuals need in order to isolate successfully, such as supplies, medication, and other forms of assistance, so that incident command outposts can provide these resources. To date, over 170,000 tests have been administered to Navajo Nation residents.

# Testing Is One Effective Component of a Comprehensive Mitigation Strategy

State and local leaders should consider testing as one critical layer of protection to reduce the likelihood of transmission within a community, in combination with several others that must be taken to reduce the spread of Covid-19. While no strategy will offer perfect protection, layering these strategies together creates a stronger and more resilient protective effect (Figure 2).

**FIGURE 2:**

**Layers of protection that must be taken to ensure Covid-19 spread reduction**

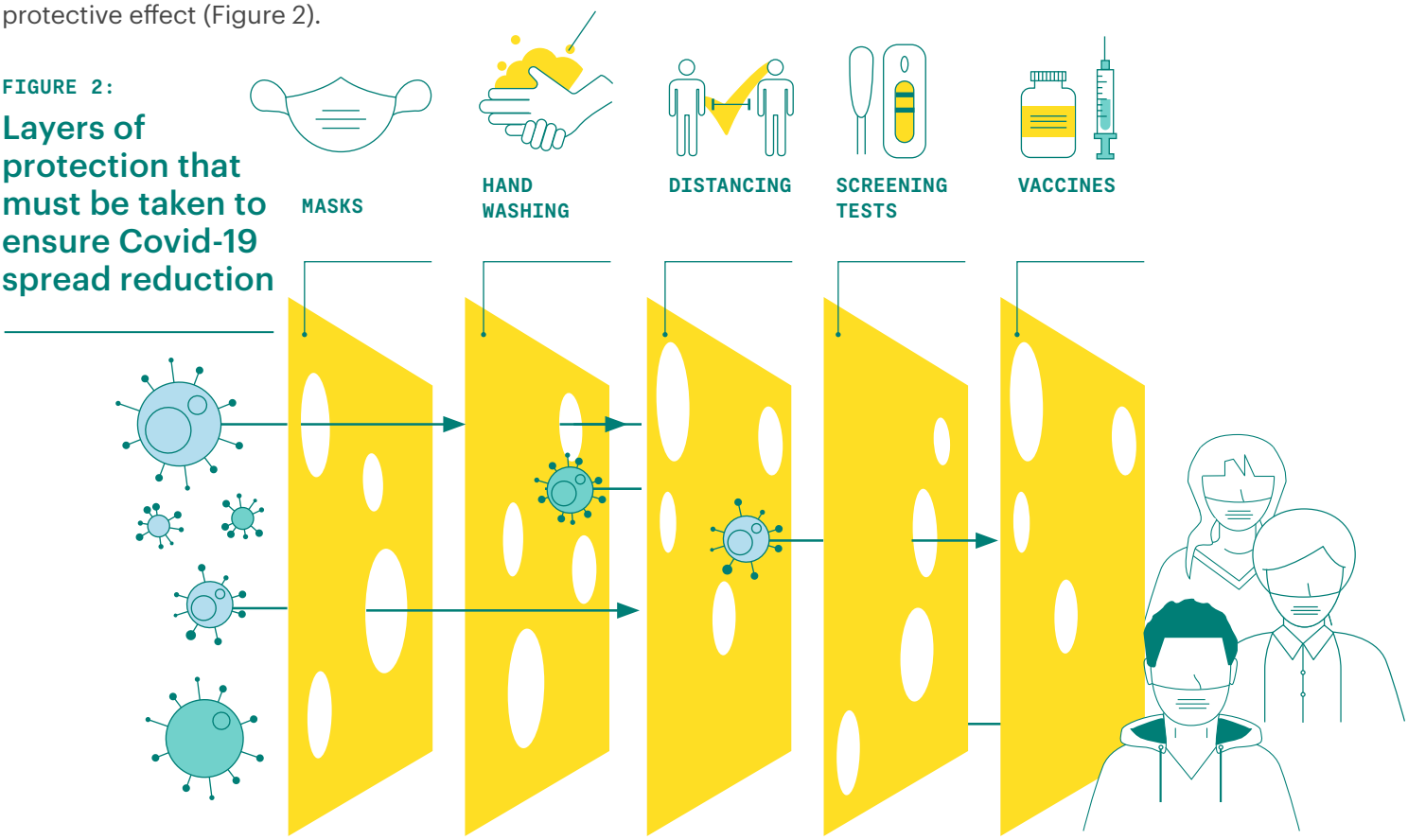



Figure 2 illustrates the "Swiss cheese" model of risk mitigation. Multiple types of precautions must be taken in order to effectively reduce Covid-19 spread. As none of these methods are 100% effective, a combination of many layers of protection is needed. Where one method fails (a "hole" in the "Swiss cheese"), another layer may succeed in blocking transmission. Together, the mitigation measures make a more solid and resilient barrier to transmission.

Many individuals are unable to adhere to certain recommended mitigation measures due to their work conditions, living arrangements, and financial obligations. Importantly, this inability to adhere to guidance is not a personal choice or due to behavioral health. For example, workers who are going to their jobs in-person are at higher-risk for exposure to Covid-19 and Black, Indigenous, and other people of color are disproportionately represented in occupations without work-from-home options.[35] In addition, people in lower-paying, essential jobs often lack paid sick leave, have less flexibility to work from home, and travel by public transportation. All of these systemic factors increase their risks of transmission. There are real opportunity costs of implementing mitigation measures for individuals, families, and communities and those costs disproportionately fall to low-income individuals and Black, Indigenous, and other people of color. State and local leaders can consider how they can better support individuals in implementing mitigation measures, including providing wrap-around services such as food distribution and housing security, and prioritizing less burdensome mitigation measures when others are impractical.

# Using Risk Assessment to Identify Highest Testing Priorities

Given limited supplies of tests, ancillary supplies, funding, and personnel, states and local officials are forced to prioritize their testing strategies in order to have the greatest impact. Supplies have steadily increased and are expected to continue to grow, yet underlying structural challenges need to be addressed to effectively implement equitable testing that reaches communities of color and neighborhoods experiencing outbreaks. Additionally, significant capacity is needed not just for the immediate response to current outbreaks, but also to sustain diagnostic and screening testing for ongoing monitoring, preventing and responding to future outbreaks, and identifying emergent variant strains.

State and local governments should identify the data they have available to them to assist with prioritizing limited resources. Most states and localities have access to incidence and test positivity data by county, zip code, or both. In addition, states and localities often have access to social and economic data that can be used in combination with incidence and test positivity to identify communities that are at higher risk, including the Centers for Disease Control and Prevention's (CDC's) Social Vulnerability Index. Social and economic data may include, either through the state and/ or higher education partners, socioeconomic status, household composition, minority status, housing type, transportation, mobility data, and health comorbidities. One early example of this type of data-driven approach to locating testing is from Wayne Health and Wayne State University, who began implementing their program in April 2020 (see Example 4). Others have since implemented similar approaches that layer infection rates, social and demographic data, and health data to place their testing sites, for example, Connecticut (see Example 5) and a group out of the greater Cincinnati area (see Example 7).

Given the existing disparities in access to testing and the disparities in morbidity and mortality for communities of color, implementing additional testing directly to the community as quickly as possible should be a priority. States and localities can use the data they already have to identify areas that have not received adequate testing and to identify communities of color and begin implementing with that knowledge immediately. More in-depth analyses and targeting can be implemented as this initial work is already underway. As states and localities work on more in-depth analyses to identify high-risk neighborhoods and distinct demographic and cultural populations for prioritization of testing, they can consider 1) the risk of infection, 2) the risk of transmission, and 3) the risk of severe consequences after infection.

## Risk of infection

As incidence of Covid-19 increases in a community, the probability that at least one individual in any group is infectious at a given time increases.[36] States and localities can use infection rates, test positivity, and hospitalization rates by home zip code as their main data points to establish the risk of infection. The need for additional testing sites may best be identified by test positivity rates. A high test positivity rate, typically considered 5 percent or greater, suggests that testing is not easily accessible or that access to wrap-around services or paid sick leave is not available, so only the highest-risk or symptomatic individuals are getting tested. States have created ways to define communities at high risk of infection, often using combinations of incidence, change in cases over time, and test positivity at levels that make sense for their specific context. Many states have defined community risk differently. Table 1 provides select examples from California, New Mexico, North Carolina, and Oregon.

## Risk of transmission

In addition, states and localities can use census data to identify concentrations of essential workers or other individuals who are working in-person, publicly available transportation data to identify areas with high traffic, mobility data, and local information on mask mandates and mask wearing to inform the risk of transmission within a community. Studies have shown that increases in mobility following relaxation of lockdown restrictions (through data provided by Google) was associated with almost parallel increases in viral transmission.[37] This information, layered with infection and test positivity rates, may provide information on neighborhoods and groups of individuals where transmission is more likely.

## Risk of severe consequences

Finally, the severity of the consequences of transmission depends on social determinants and characteristics of communities and of the individuals within those communities. Individuals and communities at higher risk for especially adverse outcomes, such as severe illness or death, include older adults and people with underlying health conditions.[38] For many Black, Indigenous, and people of color, these underlying health conditions are a result of poor access to food, housing, education, and other social determinants of health, and are not due to personal choice.[39,40,41] States and localities can use demographic, health, and social data to identify these individuals and communities. Together with infection rates, test positivity, and the risk of transmission, state and local leaders can identify neighborhoods and demographic or culturally specific communities for testing prioritization.

### EXAMPLE 4: DETROIT, MICHIGAN - WAYNE HEALTH AND WAYNE STATE UNIVERSITY MOBILE TESTING

In April 2020, Wayne Health and Wayne State University partnered with Ford Motor Company to deploy vehicles for mobile diagnostic and screening testing in communities in and around Detroit, Michigan. To guide decision-making about where to deploy mobile testing, Wayne Health mapped local data showing Covid-19 prevalence, comorbidities, and social vulnerability. Areas with large changes in weekly Covid-19 cases are prioritized for testing, and testing locations are posted in advance on the program's website. Testing sites are held at locations of trusted community partners from faith-based organizations, schools, and health systems, many of whom provide on-the-ground assistance with testing. Results are typically provided within 24-48 hours.

Community members are surveyed to assess their health needs prior to receiving testing. Additional public health and social services are offered at testing sites, including HIV testing, blood pressure screening, flu vaccinations, social determinants of health screening, access to food, and Medicaid enrollment. Patient navigators are present at every testing site to link community members to health care and social services, as needed. The program aims to eliminate barriers by not requiring a prescription, insurance, ID, payment, or Covid-19 symptoms to be tested. Since the program's launch, mobile testing vehicles have gone to over 200 locations and tested more than 30,000 people.[42]

## TABLE 1: State Definitions of Community Risk Classifications

| NEW MEXICO | NORTH CAROLINA | CALIFORNIA | OREGON |
|---|---|---|---|
| **Red**<br>• Greater than 8 daily new cases per 100,000 county residents AND<br>• Greater than 5% test positivity | **Red**<br>• Rate of cases greater than 200 new cases per 100,000 in 14 days (about 14 average daily new cases per 100,000) AND<br>• At least 42 new cases in 14 days AND<br>• Greater than 10% test positivity OR<br>• High impact on county hospitals | **Widespread**<br>• More than 7 daily new cases per 100,000 (7-day average)<br>• More than 8% test positivity (7-day average) | **Extreme risk**<br>• Rate of cases greater than 200 new cases per 100,000 in 14 days (about 14 average daily new cases per 100,000) AND<br>• Number of cases greater than 60 per 100,000 over 14 days<br>• Greater than 10% test positivity over 14 days |
| | **Orange**<br>• Rate of cases between 101 and 200 new cases per 100,000 in 14 days (between about 7 and 14 average daily new cases per 100,000) AND<br>• At least 21 new cases in 14 days AND<br>• Between 8% and 10% test positivity OR<br>• Moderate impact on county hospitals | **Substantial**<br>• Between 4 and 7 daily new cases per 100,000 (7-day average)<br>• Between 5% and 8% test positivity (7-day average) | **High risk**<br>• Rate of cases between 100 and 200 per 100,000 over 14 days (between about 7 and 14 average daily new cases per 100,000)<br>• Number of cases between 45 and 59 per 100,000 over 14 days<br>• Between 8% and 10% test positivity over 14 days |
| **Yellow**<br>• Greater than 8 daily new cases per 100,000 county residents OR<br>• Greater than 5% test positivity | **Yellow**<br>• Less than 101 new cases per 100,000 in 14 days (less than 7 average daily new cases per 100,000) AND<br>• Less than 8% test positivity OR<br>• Less than moderate impact on county hospitals | **Moderate**<br>• Between 1 and 3.9 daily new cases per 100,000 (7-day average)<br>• Between 2% and 4.9% test positivity (7-day average) | **Moderate risk**<br>• Rate of cases between 50 and 100 per 100,000 over 14 days (between 4 and 7 average daily new cases per 100,000)<br>• Number of cases between 30 and 45 per 100,000 over 14 days<br>• Between 5% and 8% test positivity over 14 days |
| **Green**<br>• Less than or equal to 8 daily new cases per 100,000 county residents AND<br>• Less than or equal to 5% test positivity | | **Minimal**<br>• Less than 1 daily new case per 100,000 (7-day average)<br>• Less than 2% test positivity (7-day average) | **Lower risk**<br>• Rate of cases less than 50 per 100,000 over 14 days (less than 4 average daily new cases per 100,000)<br>• Number of cases less than 30 per 100,000 over 14 days<br>• Less than 5% test positivity over 14 days |

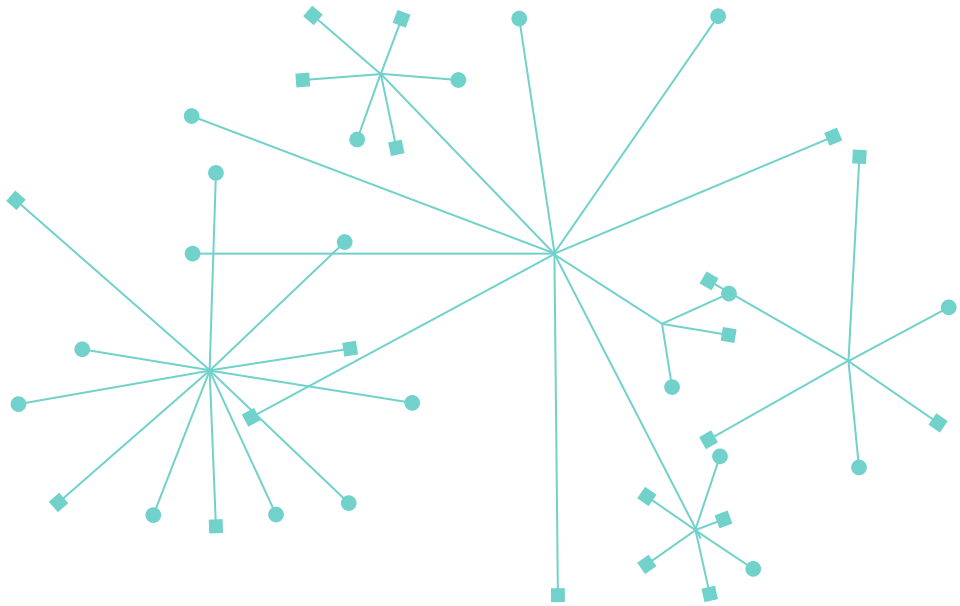
# Identifying Needed Testing Resources

As states and localities implement community-based testing strategies, state and local leaders can balance their specific priorities with the types of tests they have access to, their capacity, supply, funding realities, and their reporting requirements to determine the specific testing approach that is most appropriate for their situation. For additional operational considerations related to the implementation of community-based testing sites, see the Network for Regional Healthcare Improvement's Off-site Covid-19 Testing Toolkit.

## Test purpose

There are many purposes and types of testing for Covid-19 (Table 2), including diagnostic, screening, and surveillance testing, that have different benefits with regard to sensitivity and specificity. It is important to choose the right test for the right purpose. The highest priority type of test within communities continues to be diagnostic testing of people with symptoms and close contacts of confirmed cases. However, screening and surveillance testing have the possibility of helping communities to prevent and detect outbreaks earlier on, especially as case rates begin to fall and states and localities can prioritize screening and surveillance testing.

Most tests currently available under Emergency Use Authorization from the Food and Drug Administration (FDA) have not been evaluated for performance in asymptomatic individuals (or for screening/ surveillance testing),[43] but evidence of test performance in asymptomatic testing and in screening test strategies is increasing and promising.[44,45,46,47] In addition, the FDA encourages the use of these tests for screening and surveillance purposes. Further, surveillance testing where individual results are not returned does not require the use of a test with an EUA, although it is still encouraged. State and local leaders may consider using screening test programs in areas that continually have high rates of Covid-19 infections and "surging" screening tests to communities with outbreaks (discussed in more detail later). Surveillance testing techniques will increase in importance as the immediate pandemic subsides, and should be used to ensure that local outbreaks are managed swiftly and that the nation is effectively monitoring for new clinically relevant variants.



## TABLE 2: Testing purposes and characteristics

| TESTING TYPE | PURPOSE | PRIORITY CHARACTERISTICS | PREFERRED SENSITIVITY AND SPECIFICITY |
|---|---|---|---|
| **Diagnostic Testing** | Diagnosing symptomatic individuals and close contacts of those infected for clinical and public health decision-making. | Highly accurate results with a short enough time to result for appropriate clinical treatment (if required) and effective isolation and contact tracing. | > 95% Sensitive<br>> 99% Specific |
| **Screening Testing** | Identifying and isolating of cases among individuals without symptoms or known exposure through routine, repeated testing. The objective of screening is to reduce transmission by identifying and isolating "silently" infected individuals faster to protect public health.<br><br>Screening testing protocols can also be done only in response to an outbreak. This is referred to as "surge testing" and routine testing continues until the outbreak is controlled. | Highly accurate results with a short enough time to result for appropriate clinical treatment (if required) and effective isolation and contact tracing. | > 70% Sensitive<br>> 97% Specific (higher specificity is required if used in low prevalence settings) |
| **Surveillance Testing** | Understanding prevalence in a community to inform workplace, local, or regional policies; individual results are not returned. | Frequency and time to results should be appropriate to allow timely decision-making and course adjustment. | Because these tests are not used for individual decision-making, less accurate tests can be used if highly validated to allow for appropriate statistical adjustments. |

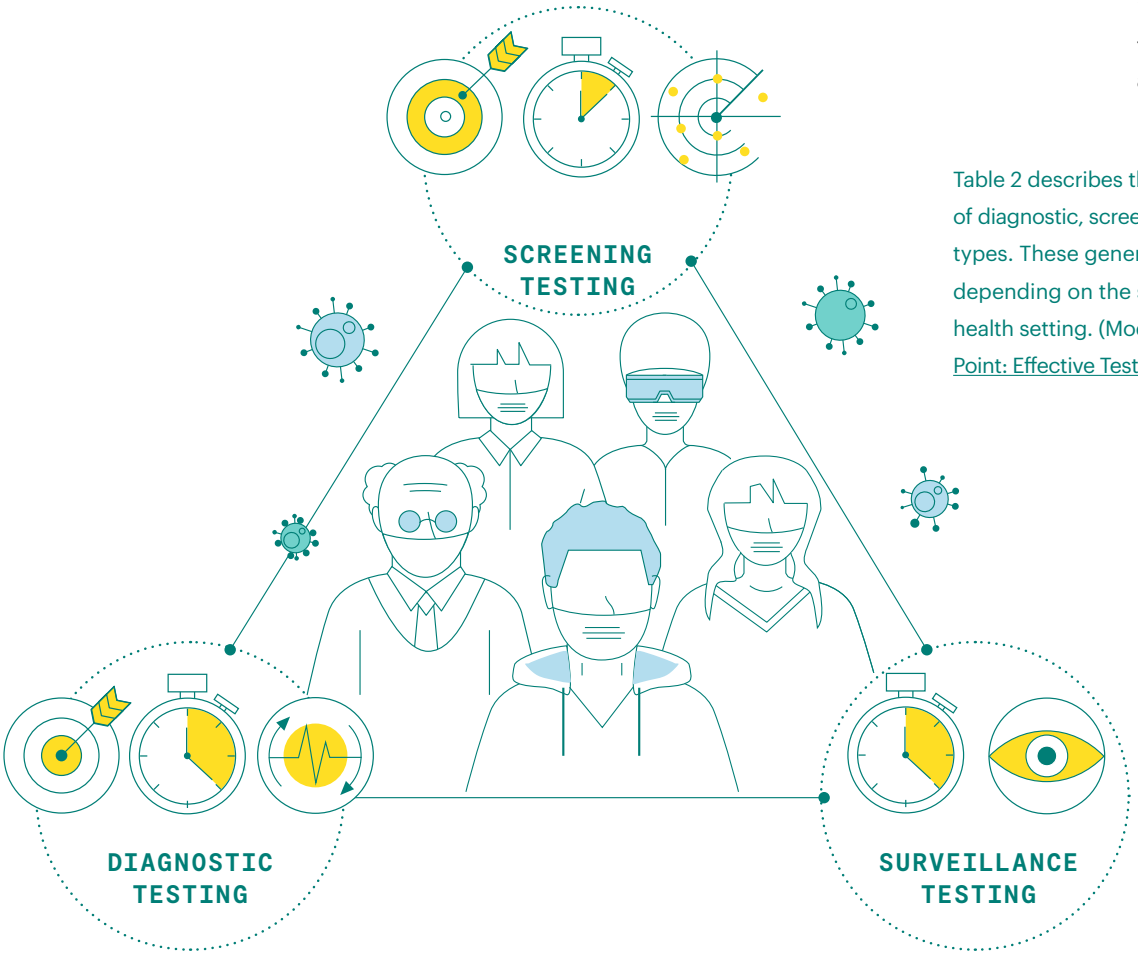



Table 2 describes the purpose and characteristics of diagnostic, screening, and surveillance testing types. These general characteristics may change depending on the specific clinical and/or public health setting. (Modified from: A National Decision Point: Effective Testing and Screening for Covid-19).

## EXAMPLE 5: CONNECTICUT'S COMMUNITY-LED TESTING APPROACH

Connecticut's strategic testing approach follows a bottom-up process. Key partnerships have included federally qualified health centers, churches and other faith-based communities, schools, community centers, and parks and recreation. The state's primary role is to support community and local partners by providing guidance and resources that is helpful to communities. However, with limited budget, supply, laboratory capacity, and personnel, Connecticut's leadership identified that their resources needed to be prioritized. In June 2020, as the state secured additional supply and laboratory capacity, they began using data on poverty, neighborhood density, population, and race and ethnicity to identify 15-20 towns that were in critical need of accessible diagnostic and screening testing. Later in the summer and into the fall, outbreaks became apparent in specific communities, and eventually across the state. The Department of Public Health partnered with higher education institutions to identify outbreaks for prioritization and to further expand the communities targeted for testing.

The state contracted with testing vendors to implement a combination of permanent diagnostic, mobile, and pop-up screening testing as needed in priority locations. Based on community need and input, the state's testing vendors located testing at trusted and familiar locations such as schools, parks, churches, and community centers. Danbury was one of the first communities with a large outbreak. In partnership with local leaders, a comprehensive communications campaign with components in Portuguese and Spanish was created to drive demand for testing and provide information on additional mitigation measures. At the state-sponsored sites anyone can get tested at any time, regardless of symptoms or exposure, and identification and insurance is not required. In high risk communities the state recommends screening testing once per month.

## EXAMPLE 6: WASTEWATER SURVEILLANCE

Routine testing of wastewater is one potential approach for surveillance on a regional or local level, rather than testing individuals. Covid-19 viral particles can be found in wastewater when they are shed through feces from infected individuals. The Centers for Disease Control and Prevention (CDC) provides resources and guidance to states and communities considering utilizing wastewater surveillance.

The Massachusetts Water Resources Authority (MWRA), which provides sewage treatment services to the Greater Boston metropolitan region, has tested sewage for viral particles since March 2020. The data is provided to public health officials at the state and local level and to the broader public. The city of Cambridge notes that they are able to use the data to identify spikes in viral levels in the sewage three to seven days sooner than individual testing would. They are using this data as one of their metrics for determining the process for returning to in-person schooling.

The University of Arizona performed wastewater surveillance at the building and block level during the Fall 2020 semester, facilitating the rapid identification of a new cluster of infected individuals in one dormitory. The early identification of a hotspot allowed for rapid and targeted diagnostic testing and concurrent contact tracing and isolation of close contacts.

# Capacity, Supply, and Funding

When states and localities are identifying communities to implement testing and working on developing permanent or mobile testing sites, they may consider the resources, supply, and funding for the tests themselves in addition to other operational, clinical, and administrative supports. Establishing testing sites, reimbursing community partners, staffing the sites, and reporting results all have significant supply, personnel, and funding requirements for states and localities. Equity should be prioritized and considered in the planning, decision-making, and implementation of capacity, supply and funding.

States should assess their current supply of tests and ancillary supplies as well as their laboratory capacity to determine whether additional supply and capacity is needed to increase community-based testing or whether some current supply can be redistributed. The Covid Tracking Project reports that there was an average of 1.6 million new tests completed per day[i] in the US for the first week of February 2021, down from a peak of 2 million in mid-January 2021. AdvaMed, who represents the manufacturers of 80 – 85 percent of all tests on the market, reports that their survey participants shipped about 10 million tests for the last week in January 2021. Test availability and laboratory capacity, as well as access to crucial supplies, has steadily increased and is expected to continue to grow. However, supply chain shortages and uncertainty have been major challenges for states since the pandemic began, limiting the extent to which states could implement widespread screening and surveillance testing.[49]

The cost of diagnostic tests and the laboratory services to process the tests are required to be fully covered by insurance at no cost to patients.[50] For clinical diagnostic testing, states differ in whether they choose to use an insurance model or to fund the tests directly to reduce real or perceived barriers to testing.[51] Screening and surveillance testing are not currently required to be covered by insurance,[52] although HHS has clarified and expanded required insurance coverage for testing individuals without symptoms or known exposure.[53] States and localities have also received federal funding for Covid-19 testing since the start of the pandemic (see Table 3) and the Biden-Harris administration released a plan for an additional $50 billion to expand testing, which is likely to be approved through Congress. However, states and localities continue to struggle with the level of funding that is needed to implement wide-spread strategic testing and have supplemented the federal dollars with state general funds, philanthropic grants, and public-private partnerships. Recent funding and expected future funding provide an opportunity for states to take steps to implement the emerging promising practices outlined in this paper.

As states are ramping up their vaccination programs, strained personnel and funding resources are being repurposed or further constrained to support those crucial operations. State and local public health agencies are being challenged to meet the needs for both testing and vaccinations simultaneously. This challenge may be even more acute in states that need to increase access to testing in communities of color. In addition, when testing programs include wrap-around services at the testing locations (such as medical or social services, as discussed later in this paper), those services bring additional supply, personnel, and funding needs.

[i] Differences in how states report tests and cases complicate the utility of this number. Some states include repeated screening testing in this number whereas others only include diagnostic testing.

## TABLE 3: Federal funding for states and localities for Covid-19 testing

| FUND SOURCE AND DATE ALLOCATED | DOLLAR AMOUNT ALLOCATED TO STATES | ALLOWABLE USES |
|---|---|---|
| **CARES Act of 2020 – Epidemiology and Lab Capacity (ELC)**<br>April 2020 | $631 MILLION | • Testing<br>• Contact tracing<br>• Containment |
| **CARES Act of 2020 – Coronavirus Relief Fund (CRF)**<br>April 2020 | $150 BILLION | • Testing<br>• Health care<br>• Support for counties, cities and towns<br>• Economic and small business relief<br>• Education |
| **Coronavirus Response and Relief Supplemental Appropriations Act, 2021**<br>January 2021 | $22.4 BILLION | • Testing<br>• Contact tracing<br>• Surveillance<br>• Containment<br>• Mitigation<br>• $2.5 billion for high-risk and vulnerable populations |

## Data reporting

State and local leaders should balance the need for robust data on demographics, test type, and results with concerns from the public about data collection, how the data may be used, and the consequences of potential positive results. In addition, robust data collection can be in opposition with the goal of reducing barriers to testing by requiring individuals to provide personal information. In partnership with local communities, state and local leaders can determine the willingness of the public to provide personal information and weigh the benefits and costs of collecting such data. Therefore, states and localities may decide to prioritize implementing as much testing as possible over perfect data collection and reporting processes. Improved data collection and reporting processes may then be prioritized as states and localities have the time and resources to do so.

All 50 states and the District of Columbia are currently reporting confirmed cases and deaths by race and ethnicity. In addition, collecting and reporting data by gender, age, residence type, occupation, and zip code can provide important information for public health decision-making.[54] However, only seven states (Delaware, Illinois, Indiana, Kansas, Nevada, Rhode Island, and Utah) and the District of Columbia report total testing rates by race and ethnicity.[55] This data can be crucial to help states and the public evaluate whether their testing levels are commensurate with morbidity and mortality by race and ethnicity. Community-based testing sites are required to be equipped to report results to patients and also to local, state, and federal public health agencies. In circumstances where more robust data is captured, that information must also be collected, stored, and transmitted. In some cases, states, localities, and testing vendors have implemented new requirements for reporting and developed new systems to capture and report data according to those requirements.[56]

# Locating Testing Sites

Depending on the target population and the purpose of the testing, more permanent diagnostic testing or more temporary diagnostic and screening drive-through, walk-up, home-based, or community-based mobile testing may be most successful. Location is an important consideration in standing up community-based testing. States and local governments should focus on bringing tests to the populations at highest risk, locating testing sites within the community and in a location that is trusted, familiar, and easily accessible to community members. Trusted and convenient locations may vary by community, demonstrating the importance of partnerships with community leaders. State and local testing leads have indicated that some common trusted locations include churches and other faith-based institutions, schools, parks, community centers, shopping centers, community-led events, and pharmacy and health care providers (for state and locality-specific examples, see Example 4, Example 5, and Example 10). In addition, home-based testing is increasingly becoming more of a reality with multiple options for "swab and send" home-based test collection kits (for example, see Minnesota's Test at Home Program in Example 8) and some options that provide results at home emerging.[ii] As this capacity continues to increase, home-based testing could become a crucial component of longer-term screening programs in the community or could be tied to returning to work, school, and travel.

## Position testing sites equitably according to need

Access to diagnostic testing is crucial to address community outbreaks. However, access has been inequitable thus far in the pandemic. States and localities can utilize information on the risk level and current accessibility and utilization of testing to identify areas at high risk and with additional need for testing sites, as discussed previously. States and localities can then prioritize those locations to develop additional longer-term diagnostic testing centers. States and localities may begin to consider what a sustainable approach to long-term access to diagnostic testing would entail, including partnering with community-based organizations, health care providers, and the private sector to reach people in their communities or at home (see Example 4, Example 8, Example 10, and Example 13 for examples of these types of partnerships).

### EXAMPLE 7: DATA-DRIVEN TESTING LOCATIONS IN GREATER CINCINNATI, OHIO

Beginning in April 2020, a group of researchers and improvers at the Cincinnati Children's Hospital Medical Center partnered with the local Regional Health Information Organization, area health systems, and public health departments to monitor and analyze multiple sources of data to characterize and track Covid-19 in the region and inform a multi-sector approach to its management. Over time, additional partners joined, including those from schools, businesses, and community settings. The team used quality improvement and geospatial methods to understand and learn from variation. For example, in the context of locating community-based testing sites, the team identified neighborhoods with significantly high positivity or low testing completion. They then overlaid these data with additional sociodemographic data including population density, race and ethnicity, socioeconomic status, and vehicle access. Potential sites were then defined to maximize equitable testing access.

These sites, and the data and maps used to identify them, were then shared with a community engagement team who worked with on-the-ground community leaders to optimize localization and deployment of testing sites. To do this, this community team established partnerships in areas where the data indicated testing was needed to stand up additional testing sites. In placing these testing sites, the team aims to maximize coverage while also prioritizing areas of highest vulnerability and need.

[ii] The FDA granted EUAs for three antigen tests that may be performed and results received at the patients' home, Abbot Diagnostics' BinaxNOW Covid-19 Ag Card Home Test, Ellume Limited's Ellume Covid-19 Home Test, and the Cue COVID-19 Test for Home and Over the Counter Use.

### EXAMPLE 8: MINNESOTA'S COVID-19 TEST AT HOME PROGRAM

In October 2020, Minnesota launched a pilot program to offer at-home Covid-19 saliva diagnostic and screening testing to residents in select counties and tribal nations where opportunities to get tested were previously limited. Tests became available for residents to order online at no cost in an effort to reduce barriers to testing. Recipients perform the test under the supervision of a healthcare professional via a telehealth visit, and the test is then shipped to an in-state laboratory that can provide results within 24-48 hours of arrival.

Following the pilot's initial success, Minnesota partnered with Vault Medical Services to expand the program statewide in November 2020. The program is now available for all Minnesotans, with or without symptoms, at no cost. On the day of the program's launch, 30,000 people registered to receive tests; over the next week, over 150,000 tests were ordered.[58]

## Mobile, Pop-up, and Surge testing to hotspots

### Mobile and Pop-Up Testing

State and local leaders can also identify communities experiencing acute outbreaks and quickly shift resources to provide rapid access to testing in those communities. These resources can be made available to anyone, regardless of symptoms or exposure to Covid-19, allowing for diagnostic testing of those who need it and screening testing to quickly identify asymptomatic individuals and stop transmission.[iii] Mobile testing vans, pop-up testing sites, and home testing are especially useful to reach the specific neighborhood or community experiencing the acute outbreak. Examples of successful mobile and pop-up testing programs can be found throughout this document, for example the Navajo Nation in Example 3, Massachusetts in Example 9, New Orleans in Example 10, and New York City in Example 13.

These approaches can be useful in many communities experiencing community transmission. Implementing more testing sites quickly in under-resources areas is more important that waiting to pinpoint the perfect spot or to have the resources needed to implement the perfect strategy. In addition, mobile sites are flexible and can be moved as outbreaks subside, more data becomes available, understandings of risk evolve, and additional resources are available.

### EXAMPLE 9: MASSACHUSETTS STOP THE SPREAD TESTING

In July 2020, Massachusetts launched "Stop the Spread" (STS), an initiative to increase access to testing in 8 communities across the state where cases far exceeded the statewide average and testing rates were low. Residents of these communities had positive test rates of 8 percent as compared to the statewide rate of 1.9 percent. New stationary diagnostic and screening testing sites and mobile testing vans were made available to test Massachusetts residents with and without Covid-19 symptoms at no cost.[59]

The STS program has rapidly expanded since its launch. In September 2020, approximately 28,000 people were tested at STS sites; in October, this grew to 42,500 people; and in the week before Thanksgiving, more than 91,500 people were tested. Officials from Salem, Massachusetts encouraged all residents to be tested twice per month, regardless of whether they have symptoms or not. Governor Baker's administration announced an expansion to a total of 50 state-run testing locations across the state, which will be able to conduct a total of 110,000 free tests per week.

[iii] States and localities should review their current guidance on who may receive testing to ensure that asymptomatic individuals are included. In addition, states can decide to issue standing orders authorizing testing sites to administer tests to anyone recommended under state guidance, eliminating the need for an individual provider to order tests. For more information, see the Association of State and Territorial Health Officials (ASTHO) blog on state orders for Covid-19 testing.

### EXAMPLE 10: NEW ORLEANS MOBILE TESTING

The New Orleans Health Department partnered with federal and state governments to organize the nation's first drive-through testing site in March 2020. The Health Department mapped the addresses of residents who were tested to visualize areas with low testing rates. Since then, the Health Department has also partnered with the LSU Health Science Center and CORE Foundation to develop mobile diagnostic and screening testing deployed to under-tested communities in high-risk locations, including senior apartments, homeless shelters, and low-income developments. The demographics of tested populations now match the demographics of the city more closely, and over 625,000 tests have been administered throughout the city.[60]

To overcome additional barriers to testing in underserved neighborhoods, the New Orleans Health Department has been working to build community trust and eliminate cumbersome requirements. They built trust in historically disinvested communities by engaging trusted neighborhood intermediaries, deploying trained local professionals as contact tracers, and recruiting plainclothes volunteers who look like the people being served. The program has also eliminated state ID and health insurance requirements.

## Surge testing

As the pandemic starts to be more controlled due to decreased cases after the winter holidays and vaccination, states and localities may begin to plan for their longer-term approaches to testing, which will be crucial for controlling Covid-19 in the long term. Despite the vaccine roll-out, the need for testing will remain as vaccination rates are uneven and incomplete, variant strains continue to emerge, and states and communities prioritize reopening businesses and returning to daily life. Surge testing may be a useful approach for emerging outbreaks when states or localities have the resources and ability to do so. This approach "floods" tests into a community, screening a large percentage of community members, regardless of symptoms or known exposure to Covid-19 (see Example 11 for an example from Liverpool and their SMART Testing Pilot). States and localities may consider planning in order to implement this type of approach at a later time, while immediately bringing testing to hard hit communities using the mobile and pop-up strategies discussed previously.

States and localities may want to know how many tests would be needed and how long surge testing efforts would need to be maintained if a surge in cases were detected. To investigate these questions, simulations were run to estimate how quickly an outbreak can be controlled using different strategies on when the "surge" starts, what volume of tests is distributed, and how well the tests perform. Figure 2 provides four example scenarios for community-based surge testing. The simulations showed that in general, surge testing that targets screening at least 25 percent of the population per day can bring an outbreak under control in less than a month, assuming that individuals who test positive are able to isolate effectively. Education, communication, and outreach in combination with easy access to testing would likely be required in order to reach enough of the population. Such communication campaigns could also emphasize the importance of other mitigation measures to slow the spread of infection in the community, thereby reducing the amount of time needed to bring an outbreak under control through surge testing. In addition, these simulations assume that individuals isolate immediately. Many individuals will require additional supports in order to do so (discussed further in Figure 2). Simulations also showed that early and strong action with surge testing is the most effective, and ultimately uses fewer tests while also avoiding infections, when compared with a weaker or later response. In addition, rapid antigen tests were preferable over PCR tests if it took 2 or more days to report back results. For the full results from the simulations and an explanation of methodology, see Appendix A.

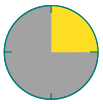
## FIGURE 2: Simulated results of community-based surge testing programs

### SCENARIO 1

State or locality acts quickly (there are **25 PER 100,000** cases)


Screening with
**RAPID ANTIGEN TESTS**
Outbreak under control in 2.4 weeks
(using 4,500 tests per 1,000 people)

**4,500 TESTS /1,000 PEOPLE**

**25%**
of the population
is tested per day

Screening with
**PCR TESTS** with 2-day turn-around
Outbreak under control in 3.9 weeks (using
just under 6,800 tests per 1,000 people)

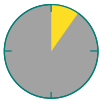
**6,800 TESTS /1,000 PEOPLE**

### SCENARIO 2

State or locality acts quickly (there are **25 PER 100,000** cases)


Screening with
**RAPID ANTIGEN TESTS**
Outbreak under control in 9.9 weeks
(using 6,600 tests per 1,000 people)

**6,600 TESTS /1000 PEOPLE**

**10%**
of the population
is tested per day

Screening with
**PCR TESTS** with 2-day turn-around
Outbreak under control in 3.9 weeks (using
just under 9,600 tests per 1,000 people)

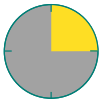
**9,600 TESTS /1,000 PEOPLE**

### SCENARIO 3

Outbreak is more advanced (there are **100 PER 100,000** cases)


Screening with
**RAPID ANTIGEN TESTS**
Outbreak under control in 4 weeks
(using 7,000 tests per 1,000 people)

**7,000 TESTS /1,000 PEOPLE**

**25%**
of the population
is tested per day

Screening with
**PCR TESTS** with 2-day turn-around
Outbreak under control in 6 weeks (using
just under 9,700 tests per 1,000 people)

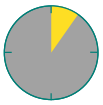
**9,700 TESTS /1,000 PEOPLE**

### SCENARIO 1

Outbreak is more advanced (there are **100 PER 100,000** cases)


Screening with
**RAPID ANTIGEN TESTS**
Outbreak under control in 9.6 weeks
(using 5,900 tests per 1,000 people)

**5,900 TESTS /1,000 PEOPLE**

**10%**
of the population
is tested per day

Screening with
**PCR TESTS** with 2-day turn-around
Outbreak under control in 11 weeks (using
just under 6,500 tests per 1,000 people)

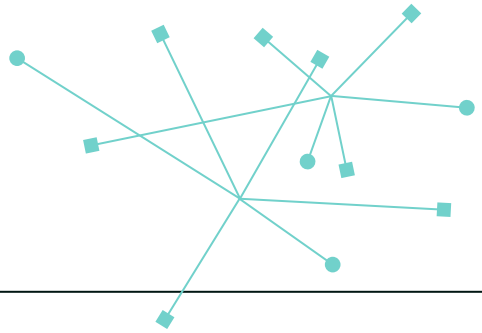
**6,500 TESTS /1,000 PEOPLE**

Figure 2 illustrates how quickly and with how many tests community-based surge testing programs may require in order to control an outbreak (below 10 cases per 100,000). Components of the simulated testing strategies include how quickly the community responded to the outbreak; levels of community participation; and test type used. These results are based on a simulation model and the full results of the simulation, as well as the methodology is located in Appendix A. This simulation assumes that testing is the only mitigation measure that is increased in response to the outbreak. With formal and informal contact tracing and increased adherence to mitigation measures like masking, distancing, and limiting gatherings, we expect the outbreak to become under control more quickly.

### EXAMPLE 11: LIVERPOOL COVID-19 SMART TESTING PILOT

Liverpool began a pilot testing program for residents without symptoms in November 2020, titled SMART (systematic, meaningful, asymptomatic, repeated testing). All residents, regardless of symptoms, were offered tests with follow up tests offered every two weeks. The program used both rapid antigen tests and polymerase chain reaction (PCR) tests and were implemented at care homes, schools, universities, and workplaces.

In the first month, 61% of the 498,000 residents were tested, identifying 3,799 positive cases. This represented one third of all positive cases identified during that time, all individuals who would not have received testing without the pilot. The main barrier to testing uptake was fear of not having adequate support to isolate if tested positive. The pilot was strengthened by partnership between different levels of government and local leaders. In February these efforts were expanded to test for the South African variant.



# Implementing No-Barrier Testing

State and local leaders should consider how to develop and implement testing strategies to ensure equitable access, allocation, and distribution. In February 2021, nearly a quarter of surveyed Americans reported they were not able to receive Covid-19 testing when they wanted it. Gaps in access to testing for communities of color and low-income communities have persisted due to long wait times, lack of support for individuals with a positive diagnosis, requirements for insurance and state IDs, limited or no paid sick leave, limited or no transportation options, distrust of medical and public health institutions, and distrust and fear of deportation. Access alone is not sufficient to increase the uptake and impact of testing. Community leaders can help identify the specific barriers their community is facing related to testing. Based on experience, testing sites have identified the following important considerations for implementation.

## Removing barriers to testing

To remove barriers to testing, states and localities may partner with community-based organizations and community leaders to inform specific potential barriers to testing that should be avoided or removed. State and local testing leaders have indicated that not requiring identification, insurance, or appointments for individuals to access testing has been crucial in reducing barriers. Testing sites should also be designed with hours of operation that are most convenient for the target population. Early in the response to Covid-19, many testing sites were operating Monday through Friday between 9am and 5pm. These sites quickly learned that those hours are convenient for only a small portion of the population and expanded hours were necessary to increase uptake. Furthermore, testing could be offered at no cost to recipients, whether or not they have insurance. Lastly, testing sites have highlighted customer service and patient experience as important for increasing word of mouth referrals to testing.[61] States and localities also may consider addressing concerns regarding lack of paid time off in the event of a positive test. Many wage-based workers are not able to miss work as this would result in lost income, aggravating housing and food insecurity.

## Communications to increase awareness and demand for testing

Changing federal, state, and local guidelines for testing, the frequent introduction of new testing technology, and a lack of trust in government and medical institutions has complicated the public's understanding of and demand for testing.[62] In some cases, testing is available in communities, but uptake and demand has been limited. States report that the public is less interested in testing as the pandemic exceeds one year and attentions have turned to vaccinations. One poll recently reported that 41% of Americans believe vaccinations are more important for returning to normal, compared with testing at 20%. Clear and consistent communication is important for reducing fear and confusion and increasing interest around testing.[63] State and local testing leaders have relied on their partnerships with community leaders to identify strong communication approaches and messengers (see Connecticut's approach in Example 5) by utilizing social media, church and faith communities, and schools and community centers to increase education and awareness of testing resources. For example, communities with a high proportion of people living without legal status have benefited from town halls and other public forums to clarify misinformation about public charge, which community leaders have noted as a barrier to testing.

## Cultural and linguistic accessibility

Testing sites must be accessible for individuals who speak a primary language other than English and have limited English proficiency. Some testing sites have found the most success with using bi-lingual and bi-cultural staff based on the communities' need (see New Orleans' program which trained locals to assist with their testing program in Example 10). Communications related to the testing site should also be available in multiple languages, most importantly, those that are most commonly spoken among the communities that the state or locality is intending to reach.

## Co-locating additional needed services

Successful testing sites have partnered with housing and food service providers to provide food, information, and other resources at testing sites. In addition, testing sites have co-located additional health services and provided access to community health workers and care coordinators.[64] The economic impacts of Covid-19 have created and exacerbated inequities in housing and food insecurity. According to the Household Pulse Survey, 33 percent of adults experienced a likelihood of eviction or foreclosure, 10 percent were facing food scarcity, and 33 percent reported difficulty paying during usual household expenses, during the week of January 20, 2021 through February 1, 2021.

Importantly, positive results from testing can have serious implications, including concerns about the loss of income if paid sick leave is not available, inability to continue caretaking responsibilities, and difficulty quarantining in multi-generational living situations. These implications can lead to hesitation about getting tested at all. Successful testing programs acknowledge and address the specific concerns of the individuals and communities by providing resources and wraparound services, including:

- Mitigation supplies such as masks and hand sanitizer (for example New York City's Test and Trace Corps in Example 13)
- Needed medications and medical services (for example the Navajo Nation in Example 3)
- Social services such as food and housing (for example the Latin-19 program in North Carolina in Example 12 and Minnesota's program in Example 14)
- Care coordination and navigations services to connect individuals with other needed services (for example Wayne Health and Wayne State University in Example 4)

## EXAMPLE 12: LATIN-19 NORTH CAROLINA

Latinx residents of North Carolina have had nearly three times the number of Covid-19 cases per 100,000 residents as compared to non-Hispanic residents. LATIN-19 (Latinx Advocacy Team & Interdisciplinary Network for Covid-19), a coalition of medical professionals and community members, has worked to provide testing to the Durham, North Carolina area's Latinx communities in a manner that is culturally relevant, accessible, and safe. LATIN-19 has worked to build trust in these communities by partnering with community leaders. The coalition has also engaged city, county, and state leaders to raise greater awareness of the needs of Latinx communities in the state during the pandemic.

LATIN-19 has established Covid-19 testing sites at popular locations in the community, such as retail parking lots and faith-based organizations. LATIN-19 also partnered with another community-based organization, La Semilla, to offer free boxes of fresh foods at community testing sites in Durham. Once this started, the number of tests administered in the community tripled, reflecting the food insecurity community members are experiencing. The coalition is now seeking additional funding to provide mobile Covid-19 testing in the community. Community-based testing is implemented in collaboration with community-based organizations that distribute food to the community.

## EXAMPLE 13: NEW YORK CITY'S TEST & TRACE CORPS

The NYC Test & Trace Corps was launched in June 2020 by NYC Health + Hospitals in collaboration with city agencies and community-based organizations. The initiative provides free walk-in Covid-19 diagnostic and antibody testing to all New Yorkers at hundreds of locations across the five boroughs of the city. Testing locations include mobile testing vans, hospitals and clinics, parks and recreational centers, and public housing developments. Residents can check wait times for each testing site on the program's website.

For residents who test positive for Covid-19, contact tracers reach out to provide additional information and make connections to medical care and support services. The program can provide "Take Care" packages including personal protective equipment, cleaning supplies, thermometers, and pulse oximeters. New Yorkers who test positive or who may have been exposed to Covid-19 can also qualify for a free hotel room for up to 10 days to separate from family members and roommates. Since launch, the program reports that it has referred over 125,000 people to wrap-around services.

## EXAMPLE 14: MINNESOTA COVID-19 COMMUNITY COORDINATORS

The Minnesota Department of Health (MDH) partnered with communities to form a work group specifically focused on increasing Covid-19 testing for communities of color, LGBTQ communities, people with disabilities, rural communities, and vulnerable populations, such as those who are homeless. As part of this work group, MDH contracted with community-based organizations that draw on community strength and trusted community networks to stand up Covid-19 Community Coordinators (CCCs). CCCs connect individuals in communities that are most affected by Covid-19 (including communities of color, American Indian communities, LGBTQ communities, and Minnesotans with disabilities) to Covid-19 testing, vaccinations, and resources such as employment, food, housing, child care, and legal services.

# Conclusion

## To address Covid-19 outbreaks in communities, states and local governments need to increase access to testing resources that reach communities, both in the short and long term.

To achieve this goal, states and localities must prioritize equity in their supply, personnel, and capacity. States and local leaders can do so by using data and qualitative information from communities to identify neighborhoods and communities of people, including communities of color, who are at highest risk for infection, transmission, and consequences of transmission. Taking their testing priorities and supply and capacity realities together, states and localities can strategically increase community-based testing at permanent diagnostic testing centers and through mobile, pop-up, and surge testing to address acute outbreaks. Equitable access to testing can be strengthened by removing barriers to testing, increasing trust and accessibility, and co-locating additional needed services.

# Appendix A: Modeling Community Testing Strategies

The Duke-Margolis Center research team collaborated with Dr. Daniel Larremore, a computer scientist and infectious disease modeler at the University of Colorado Boulder, to project the effects of various testing strategies on mitigating a surge in cases using community testing. In particular, this modeling focuses on the questions (i) how long will it take for testing to suppress a surge in cases, and (ii) how many tests will be used in the process? This allows for the comparison of different testing strategies and budgets, and also shows how those strategies and budgets may be affected by different surge intensities, as described in detail below.

This model of testing and SARS-CoV-2 transmission calculates the spread of the virus from one person to another in a population of fixed size. Starting from a number of initially infected individuals, the virus spreads from infected to uninfected individuals, and is calibrated so that, at the start of each simulation, an infected individual would go on to infect R uninfected individuals. (This number R is often called the "reproductive number" of the viral spread.) In each day of simulation, susceptible individuals may be infected by those who are currently infected, and they may also acquire an infection from a source outside the community.

Importantly, the model keeps track of each individual's viral load, taking into account: the early latent phase, when the virus is undetectable at secondary sites like the nose, throat, or saliva; the detectable phase, when viral loads exponentially grow, peak and decline; and eventual clearance. As a consequence of this trajectory, the same test applied on different days of the infection may be more or less likely to return a positive result. And, two different tests applied on the same day could return the same or different results. This individual-level model is used so that in the present study, the effects of test sensitivity, frequency, and turnaround time can be realistically included in efforts to use testing to mitigate a surge.

In each simulation, a surge of SARS-CoV-2 infections was simulated in a community of either 10,000 or 20,000 individuals. A surge was defined by a case load of either 25 or 100 cases per 100,000 population averaged over 10 days, corresponding to either early or late action being taken to mitigate the surge, respectively. We assumed 5X lower ascertainment than the true burden. The reproductive number was set to either R=1.1 or R=1.2, representing less aggressive and more aggressive spread, respectively. The rate at which individuals became infected from a source outside the community was either 1 infection per 10,000 individuals per day or 1 infection per 10,000 individuals every 2 days. Each simulation was then run forward with a chosen level of testing, described below, until the 10-day case average dropped below 10 cases per 100,000 population. During this process, the simulation tracked (i) the time until the surge ended, and (ii) the total number of tests used.

Testing was simulated by distributing some number of tests per day, at random, to the community, such that a specified number of tests were *taken* per 1000 susceptible individuals, per day, ranging from 25 to 250. In this way, the model varied the number of tests taken, but not the number of tests *distributed*. Tests were modeled as either PCR tests or rapid antigen tests, with the following parameters. PCR tests were assumed to have an analytical sensitivity to detect 103 or more RNA copies per mL, with a 90% per-test sensitivity (10% false negative rate) and a two-day turnaround time. Rapid antigen tests were assumed to have an analytical sensitivity equivalent to detect 106 or more RNA copies per mL, with a 90% per-test sensitivity (10% false negative rate) and an immediate turnaround time. Thus, the tests differ both in their ability to detect individuals at different stages of infection, as well as the time delay between testing and the delivery of actionable results, which resulted in the isolation of COVID-19 positive individuals.[66]

## FIGURE A1: TIME AND TESTS NEEDED TO CONTROL A LESS AGGRESSIVE SURGE

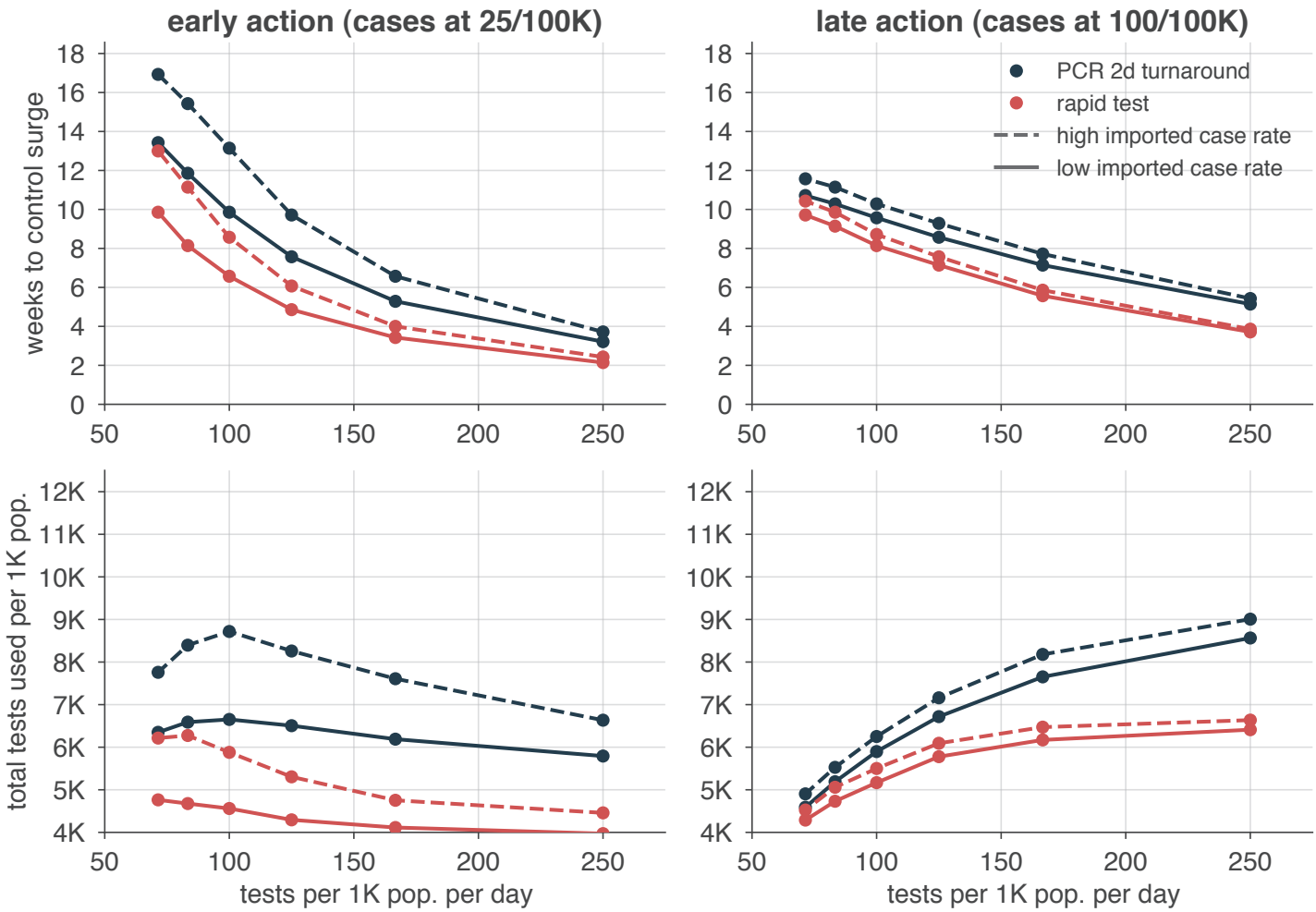



**Figure A1 — Time and tests needed to control a less aggressive surge:** For a less aggressive surge (R=1.1), the median number of weeks to control the surge (top row) and the total number of tests used to do so (bottom row) are shown for surges mitigated by PCR testing with a two-day turnaround time (blue) and rapid antigen testing (red), as the number of tests done per 1,000 population per day varies. Left column: testing begins early in the surge, when 10-day average daily incidence reaches 25 cases per 100K population. Right column: testing begins later in the surge, when 10-day average daily incidence reaches 100 cases per 100K population. Solid and dashed lines show variation when the number of cases acquired outside of the community is low (solid) or high (dashed). Each point shows the median result from 500 independent simulations, with a population of 20,000 total individuals; simulations with a population of only 10,000 did not vary substantially (not shown).

## FIGURE A2: TIME AND TESTS NEEDED TO CONTROL A MORE AGGRESSIVE SURGE

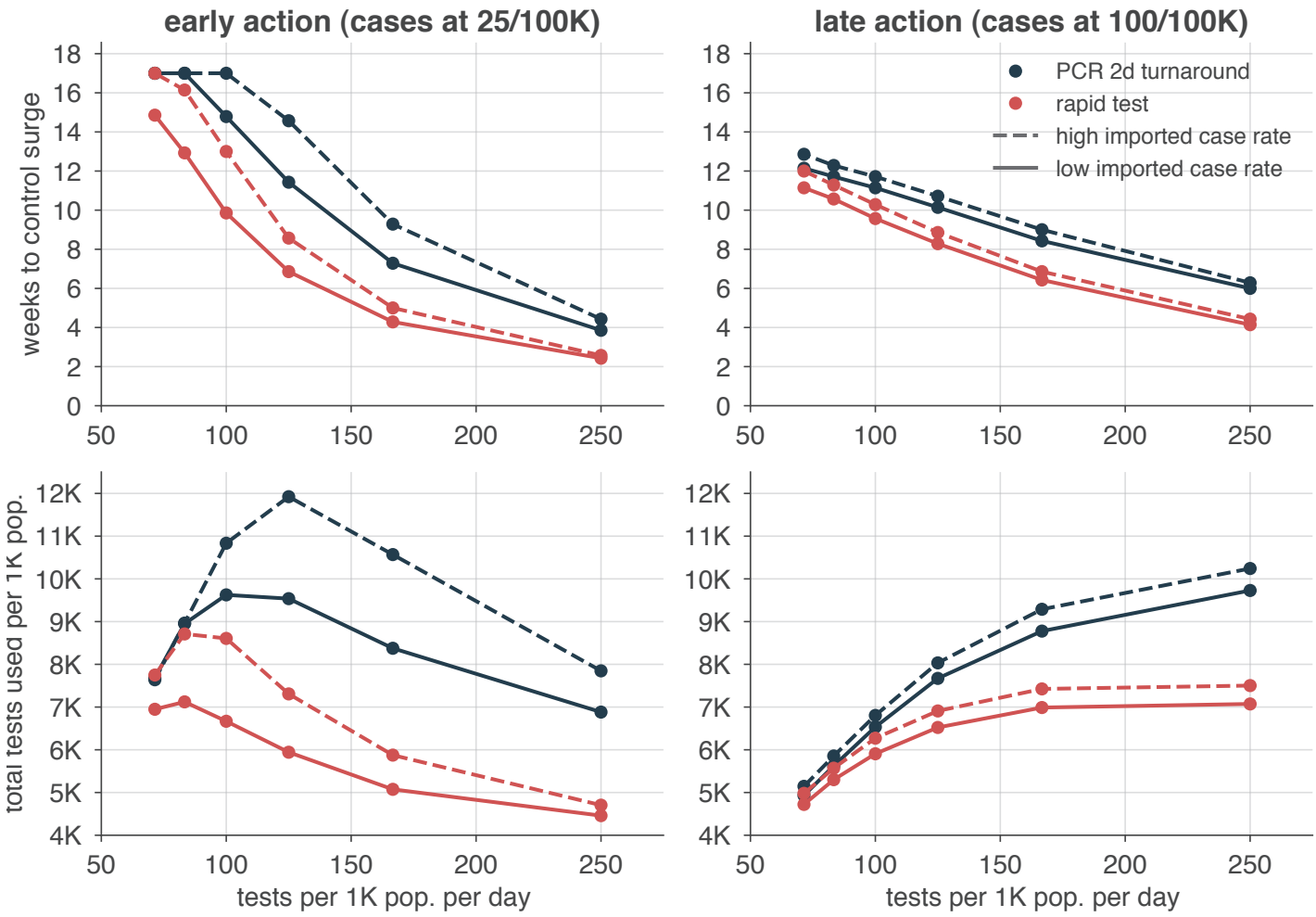



**Figure A1 — Time and tests needed to control a mores aggressive surge:** For a more aggressive surge (R=1.2), the median number of weeks to control the surge (top row) and the total number of tests used to do so (bottom row) are shown for surges mitigated by PCR testing with a two-day turnaround time (blue) and rapid antigen testing (red), as the number of tests done per 1,000 population per day varies. Left column: testing begins early in the surge, when 10-day average daily incidence reaches 25 cases per 100K population. Right column: testing begins later in the surge, when 10-day average daily incidence reaches 100 cases per 100K population. Solid and dashed lines show variation when the number of cases acquired outside of the community is low (solid) or high (dashed). Each point shows the median result from 500 independent simulations, with a population of 20,000 total individuals; simulations with a population of only 10,000 did not vary substantially (not shown).

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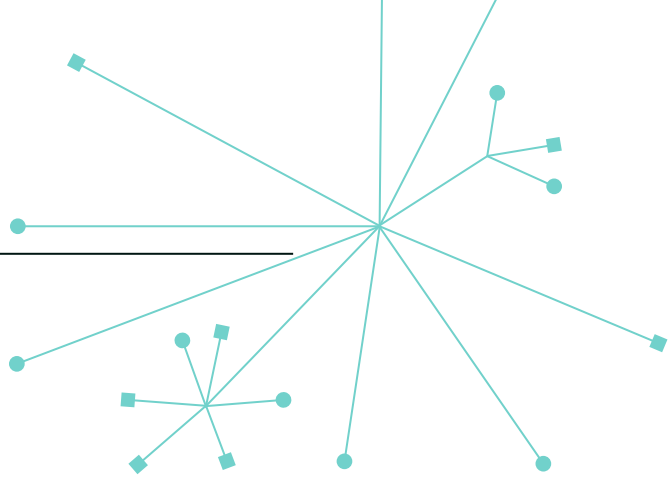


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## Disclosures

Mark B. McClellan, MD, PhD, is an independent board member on the boards of Johnson & Johnson, Cigna, Alignment Healthcare, and Seer; co-chairs the Guiding Committee for the Health Care Payment Learning and Action Network; and receives fees for serving as an advisor for Arsenal Capital, Blackstone Life Sciences and MITRE. The other authors have no financial interests related to testing or other content included in this report to disclose.

## About the Duke-Margolis Center for Health Policy

The Robert J. Margolis, MD, Center for Health Policy at Duke University is directed by Mark McClellan, MD, PhD, and brings together expertise from the Washington, DC, policy community, Duke University, and Duke Health to address the most pressing issues in health policy. The mission of Duke-Margolis is to improve health and the value of health care through practical, innovative, and evidence-based policy solutions. Duke-Margolis catalyzes Duke University's leading capabilities, including interdisciplinary academic research and capacity for education and engagement, to inform policy making and implementation for better health and health care. For more information, visit healthpolicy.duke.edu.

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