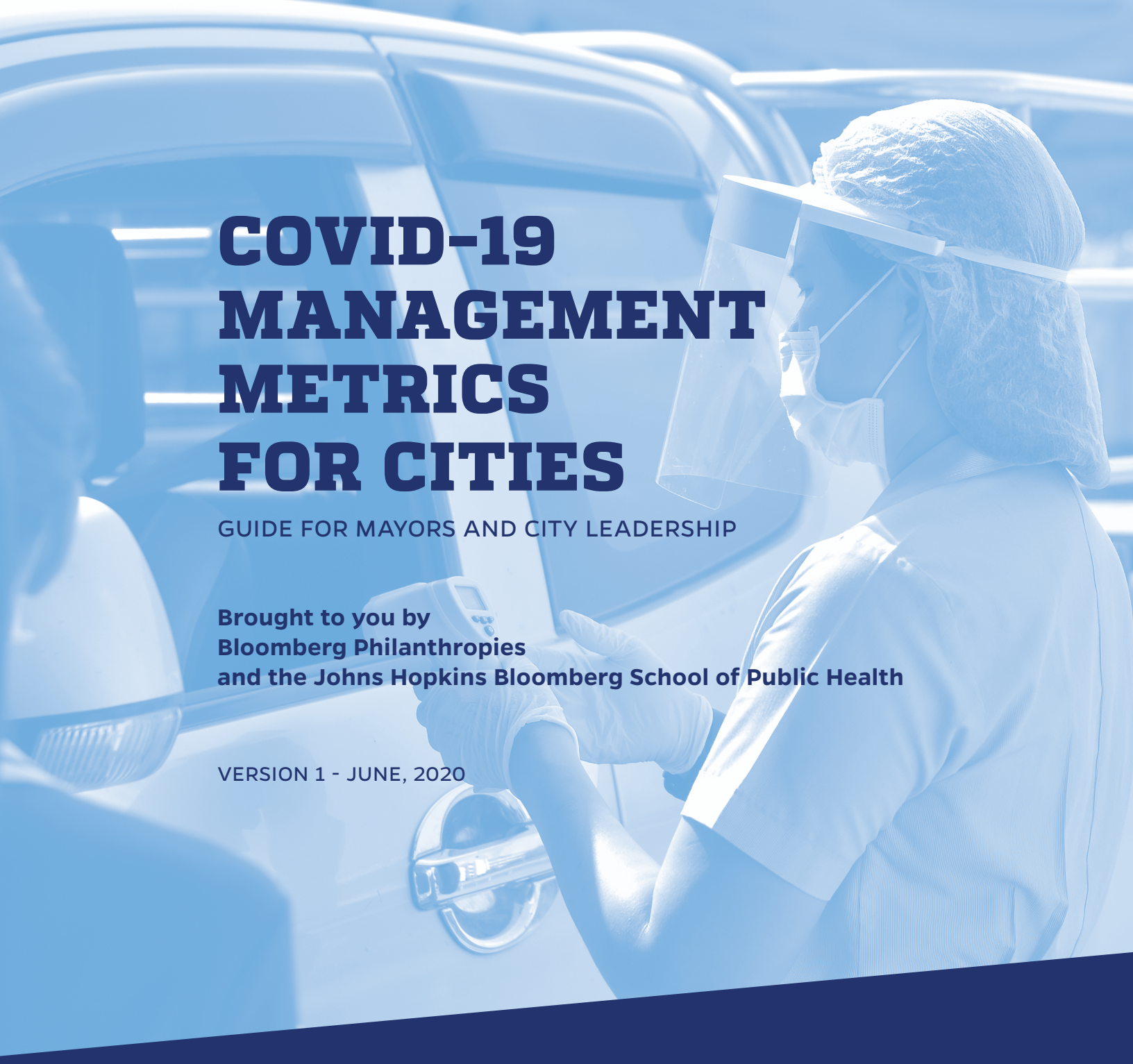

COVID-19 MANAGEMENT METRICS FOR CITIES

GUIDE FOR MAYORS AND CITY LEADERSHIP

Brought to you by
Bloomberg Philanthropies
and the Johns Hopkins Bloomberg School of Public Health

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What Works Cities

TABLE OF CONTENTS

INTRODUCTION

Context

COVID-19 has dramatically impacted communities across the United States, with disparate and disproportionate impacts on communities of color. Mayors are positioned to drive a more equitable response and advocate for at-risk populations to ensure the health and safety of all residents. In order to do this effectively, city leaders need data to guide decision making.

Bloomberg Philanthropies brought together the Johns Hopkins Bloomberg School of Public Health and the What Works Cities Initiative to develop this comprehensive set of evidence-based COVID-19 management metrics designed specifically for cities. The Johns Hopkins University Center for Government Excellence along with Delivery Associates will help cities use these metrics effectively as part of Bloomberg Philanthropies' long-standing mission to support cities' use of data in local governance and decision making.

Mayors should continue to collaborate with local public health departments, states, and counties to make evidence-based, data-driven decisions about public health safety measures.

In addition to enforcing public health measures, mayors must also make daily city management decisions. To respond to the ongoing COVID-19 crisis effectively and responsibly, local leaders need to collect, monitor, analyze, and share a wide range of key metrics. They must also understand how and when to use data to make smarter, faster decisions.

These metrics are essential indicators for municipal leaders in the COVID-19 crisis. They include critical indicators that cities should use to guide the next phase of response to the crisis and will be regularly refined as our understanding of the COVID-19 crisis evolves.

Purpose

This document helps city leadership make critical decisions and build support for those decisions within city government and with the public. With these indicators, leaders are better equipped to:

MANAGE their city

Residents rely on city governments to provide essential services. Mayors may need to make operational decisions based on availability and capacity of these services.

COMMUNICATE clearly with residents

Effective public communications are grounded in reliable data from trusted sources. These data can undergird efforts on the part of city leaders to garner support for policy decisions, including local public health interventions.

ADVOCATE for at-risk populations and people of color

Mayors are responsible for vulnerable populations as well as communities of color with a history of underinvestment. Disaggregating data by race, gender, age, neighborhood or zip code, census tract, and income level, if possible, helps highlight the disparate impact of COVID-19 on different populations and can help guide resource allocation to work toward a more equitable city, now and in the future.

ALLOCATE resources according to need

Mayors may need to step in to ensure high-need populations (health care workers, congregate facility staff and residents, workers in high-risk professions, as well as underserved communities) are receiving priority access to testing, personal protective equipment (PPE), and more.

Document Organization

This document includes:

1. **Summary of Management Metrics for Cities**
   With city-specific needs in mind, we've gathered:
   a. Key Questions for cities to ask as they navigate the COVID-19 crisis
   b. Specific metrics to help answer those questions and guide data-driven decisions
2. **Detailed Information for Cities**
   For every metric, we provide, as applicable:
   a. **Rationale:** Why cities should consider this metric, and what it means for them
   b. **Disaggregation factors:** How data can be broken down to highlight the disparate impact of COVID-19 and associated response measures on different populations
   c. **Definition:** How the metric is defined and/or calculated
   d. **Source:** Where the data can be found
   e. **Limitations:** Concerns with or shortcomings of the data

How to Use This Resource

1. **Continue to build a comprehensive view of the situation in your city.**
   Use these Key Questions and metrics to assess the unique situation in your city and adapt guidance accordingly. Icons throughout will indicate how each metric contributes to the Purpose statements listed above; ie: manage, communicate, advocate, and allocate.
2. **Identify any gaps in your knowledge.**
   Note which metrics you have readily available, and which ones you cannot quickly, easily, accurately, or reliably access.
3. **Reach out to us at civicimpact@jhu.edu**
   We want to know if you're adapting this framework, and if so:
   a. Which metrics you have access to and which ones you don't
   b. What questions or feedback you have

When to Use This Resource

This version of the document covers metrics for ongoing management decisions throughout the COVID-19 crisis. **A subsequent version will also include considerations for long-term recovery and resilience.**

NOTE: Knowledge is evolving rapidly. Make sure you are working with the latest version of these or any other organization's recommendations.

SUMMARY OF MANAGEMENT METRICS FOR CITIES

These Key Questions and associated metrics are critical for cities to track as they navigate the COVID-19 crisis in a comprehensive and locally relevant way. More details for each metric can be found in the full document below.

Key Question 1
Is the population infection rate under control?

- **Metric 1.1** Daily case incidence*
- **Metric 1.2** Syndromic data (Influenza-like illness [ILI] or COVID-19-like illness [CLI])*
- **Metric 1.3** Number of confirmed and probable deaths
- **Metric 1.4** New hospital admissions from COVID-19

Key Question 2
Is the healthcare system capacity sufficient?

- **Metric 2.1** ICU availability (including surge capacity)*
- **Metric 2.2** Number of healthcare worker infections*
- **Metric 2.3** Ventilator use rate
- **Metric 2.4** PPE burn rate with days on hand

Key Question 3
Do we have sufficient testing and contact tracing, and is the system working effectively and efficiently?

- **Metric 3.1** Percent tests returning positive*
- **Metric 3.2** Number of tests conducted per 1,000 residents per day*
- **Metric 3.3** Percent positive cases from quarantined contacts*
- **Metric 3.4** Number of contact tracers hired and trained per 100,000 residents
- **Metric 3.5** Percent contacts traced; time from first potential exposure to notification
- **Metric 3.6** Percent symptomatic contacts tested within 24 hours of symptom onset

Key Question 4
What is the level of compliance with public health safety measures?

- **Metric 4.1** Percent residents wearing face masks in public (if required by local guidance)
- **Metric 4.2** 311 calls and other reports of noncompliance
- **Metric 4.3** Social media and movement trend monitoring - changes in travel by mode
- **Metric 4.4** Foot traffic density in key public spaces

Key Question 5
Are we ensuring the protection and preparedness of essential workers?

- **Metric 5.1** Daily case counts among essential workers
- **Metric 5.2** Number of days of adequate PPE supply for all public-facing city facilities and workers
- **Metric 5.3** Absentee rate by department or function

Key Question 6
Are we protecting and preparing congregate facilities (prisons/jails, assisted/senior living, etc)?

- **Metric 6.1** Number of positive cases at congregate facilities
- **Metric 6.2** Number of confirmed and probable deaths among congregate facility residents
- **Metric 6.3** Percent congregate facilities equipped with sufficient PPE
- **Metric 6.4** Number of congregate facility staff infected or in quarantine

Key Question 7
Are we ensuring preparedness of businesses for reopening?

- **Metric 7.1** Availability of supplies and PPE in businesses and commercial buildings planning to reopen
- **Metric 7.2** Confirmed cases among essential and/or public-facing employees; absenteeism rates; quarantined employees

**All metrics accompanied by an asterisk are aligned with Resolve to Save Lives (RTSL) Alert-level System guidelines.*

DETAILED INFORMATION FOR CITIES

These Key Questions and associated metrics are intended to facilitate both an in-depth assessment as well as day-to-day management of the situation in your city, including infection rates, healthcare capacity, testing and tracing systems, compliance with public health safety measures, and infection among vulnerable populations. Taken together, these metrics are tools for city leaders as they make critical decisions, including how to manage and communicate effectively and how to advocate for and allocate resources to vulnerable populations.

KEY QUESTION 1: IS THE POPULATION INFECTION RATE UNDER CONTROL?

These metrics help leaders understand their "curve," or the extent and impact of the virus in their community. It's important to monitor trends over time, and to disaggregate data to understand different levels of exposure and impact among different populations.

METRIC 1.1 Daily case incidence

The number of cases is the ultimate measure of how and whether infections are under control. In addition to the *number* of infections, it's important to consider the source of transmission. Unlinked cases may indicate community spread and may prompt cities to prioritize testing for high-risk groups, communicate caution to those at risk, and direct available PPE to frontline workers.

DISAGGREGATE DATA BY:
Transmission (travel, limited person-to-person contact, community spread), race, gender, age, zip code

DEFINITION:
The daily number of individuals with laboratory confirmation of COVID-19/100,000 people/day, with case numbers calculated using a 7-day rolling average

SOURCE:
City data set; use state or county if your city does not have an independent health department.

LIMITATIONS:

- Assumes stable and sufficient testing
- Data may lag due to time between symptom onset, testing, and results reporting
- For cities with smaller populations, this number could become increasingly challenging to communicate as the number of new cases falls below 1 per 100,000; consider daily case counts as an alternative

METRIC 1.2 Syndromic data (Influenza-like illness [ILI] or COVID-19-like illness [CLI])

Not every person with COVID-19 symptoms is tested, so some number of people reporting ILI symptoms are likely infected with COVID-19. ILI syndromic surveillance is therefore a proxy indicator of undiagnosed or to-be-diagnosed COVID-19 cases in your community. Make sure to consider the seasonal average to understand what is above normal for your area in any given time of year.

Non-COVID infections can also pose a serious threat in their own right; for example, a concurrent influenza outbreak in your city would place additional strain on the healthcare system. Monitor syndromic data to communicate caution to residents and better allocate healthcare capacity.

DISAGGREGATE DATA BY:
Race, gender, age group (0-4, 5-24, 25-49, 50-64, and ≥65 years), zip code

DEFINITION:
Number of patients reporting symptoms of an ILI or CLI. ILI is defined as "fever (temperature of 100°F [37.8°C] or greater) and a cough and/or a sore throat without a known cause other than influenza," and should be compared to the seasonal average number of cases.[1] CLI is defined as "fever and cough or shortness of breath or difficulty breathing or the presence of coronavirus diagnosis code."[2]

SOURCE:

- U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet)[3]
- State or county data set
- Potential 3rd-party data sets or surveys (eg, Facebook symptom tracker)

LIMITATIONS:
With COVID-19 concerns, some states have stopped influenza surveillance for the season, and data availability may be limited in some jurisdictions.

METRIC 1.3 Number of confirmed and probable deaths*

It is important to monitor loss of life for many reasons, primarily because the ultimate goal of any response measure is to save lives. The exact measurement used will yield different insights. Death counts are a lagging but highly visible proxy indicator of growing infection rates in the absence of sufficient testing capacity; case fatality rate (CFR) is the most effective tool for understanding the disparate impact of COVID-19 on different populations.** Finally, it's worth noting that even when death counts aren't a primary decision-making metric, they are nevertheless important to your residents and worthy of clear communication.

DISAGGREGATE DATA BY:
Race, gender, age, zip code, facility type, COVID-19 vs all-cause death rate

DEFINITION:
Number of confirmed and probable deaths*

SOURCE:
City data set; use state or county if your city does not have an independent health department

LIMITATIONS:
In some cases, it may be difficult to confirm the cause of death (COD), and pairing this with measures of excess deaths or suspected COVID-19 deaths may be useful.

**A probable case or death is defined by the Centers for Disease Control and Prevention (CDC) as "A person meeting clinical criteria AND epidemiologic evidence with no confirmatory laboratory testing performed for COVID-19; a person meeting presumptive laboratory evidence AND either clinical criteria OR epidemiologic evidence; a person meeting vital records criteria with no confirmatory laboratory testing performed for COVID-19."*[4]

***"Case fatality rate (CFR) can measure the severity of the disease for a specific population, at a specific time, in a specific location. The crude mortality rate (CMR) measures the probability of an individual in a certain population dying from the disease. Neither are perfect. The most useful measurement would be infection fatality rate (IFR), but in order to measure that accurately, you'd need to know the total number of cases, which, due to testing limitations, we cannot know at this time" (Jane Ebot-Bish, PhD, interpersonal communication, May 2020).*

METRIC 1.4 New hospital admissions from COVID-19

Along with the death rate, hospitalization is a highly visible proxy indicator of infection rate when testing is insufficient. Hospital admissions can also help inform assessment of healthcare system capacity (Key Question 2) as they are an early indicator of declining capacity (Jennifer Nuzzo, DrPH, personal interview, May 7, 2020).

Hospitals may not communicate directly with each other; cities can assess capacity at different facilities in different neighborhoods, identify neighborhoods where need might be greater, and help coordinate with facilities elsewhere in the city where capacity may still be available.

DISAGGREGATE DATA BY:
Race, gender, age, zip code, facility, COVID-19 vs unrelated

DEFINITION:
Number of hospitalizations of positive cases (daily counts)

SOURCE:

- County health department; may include 3rd-party data sets (hospital reporting)
- COVID-19-Associated Hospitalization Surveillance Network (COVID-NET)*[5]

**According to the CDC, "COVID-NET conducts all-age, population-based surveillance for laboratory-confirmed COVID-19-associated hospitalizations in more than 250 acute care hospitals in 99 counties in the 10 Emerging Infections Program (EIP) states (CA, CO, CT, GA, MD, MN, NM, NY, OR and TN) and four Influenza Hospitalization Surveillance Project (IHSP) states (IA, MI, OH and UT). In total, ~10% of the U.S. population is covered by this surveillance system. . . . Data gathered are used to estimate age-specific hospitalization rates on a weekly basis and describe characteristics of persons hospitalized with COVID-19 illness."*[2]

KEY QUESTION 2: IS THE HEALTHCARE SYSTEM CAPACITY SUFFICIENT?

These metrics assess the local healthcare system's ability to provide uncompromised care for critically ill patients, whether COVID or non-COVID. These metrics are helpful for assessing current capacity, as well as ensuring adequate capacity in the event of a sudden increase in COVID cases. Ideally, the local healthcare system is prepared to handle double the current COVID caseload without compromising quality of care.

METRIC 2.1 ICU availability (including surge capacity)

It is important to measure the local healthcare system's capacity to admit critically ill patients, including COVID and non-COVID. Ensuring surge capacity may require finding bed space elsewhere in a hospital setting or other facilities (eg, field hospitals or similar arrangements).

DISAGGREGATE DATA BY:
Facility, zip code

DEFINITION:
Number of ICU beds available (including surge capacity)

SOURCE:

- State or county data set
- Facility self-reporting

METRIC 2.2 Number of healthcare worker infections

Healthcare workers are a high-risk population; the ultimate goal is to protect them from loss of life. Secondary goals include forecasting staffing concerns due to infection and obtaining another lens on infection rates overall, since healthcare workers may have more reliable access to testing than the general population. Increasing infections among healthcare workers may indicate insufficient PPE or new transmission sources.

DISAGGREGATE DATA BY:
Facility

DEFINITION:
Number of total positive tests among healthcare workers

SOURCE:

- State or county data set
- Facility self-reporting

LIMITATIONS:

- May be limited if testing of healthcare workers is not consistent and universal
- Because this is tracked by facilities, it may be hard for cities to track this data

METRIC 2.3 Ventilator use rate

Combining current ventilator availability with trends in infection rates can help cities anticipate future shortages and communicate their needs to their states accordingly.

DISAGGREGATE DATA BY:
Adult vs pediatric utilization rate, COVID vs non-COVID utilization rate

DEFINITION:
Number of ventilators in use/number of total ventilators available

SOURCE:

- State or county data set
- Facility self-reporting

METRIC 2.4 PPE burn rate with days on hand*

PPE for healthcare workers can be measured in terms of both cases and days; ie, days' worth of PPE assuming a certain number of cases. Cities should aim to have ≥90 days of supply on hand for all essential healthcare workers and potential patients.[6] Ideally, PPE is sufficient for all healthcare workers; however, if you need to prioritize, consider beginning with acute care hospitals.

In addition to current PPE supply, consider potential procurement and supply chain issues (Anthony Corso, AIA, LEED AP, personal interview, May 2020). If a PPE shortage is anticipated, mayors can mobilize efforts to secure additional supplies. They can advocate to the state and federal government for more PPE, communicate to residents the importance of saving N-95 masks for first responders, allocate resources toward purchase of more PPE, and direct available PPE toward the most critical outbreak centers.

DISAGGREGATE DATA BY:
Individual facility, PPE type

DEFINITION:

- Quantity of PPE (broken out by type)/amount used in 1 day*
- ALTERNATE: Number of facilities reporting PPE supply concerns

SOURCE:

- State or county data set
- Individual facility self-reporting

LIMITATIONS:
For some facilities, calculating PPE burn rates may be difficult. Cities should take care to ensure that facilities are providing sufficient PPE for all essential health workers, prioritizing acute care settings.

**Facilities can use the CDC's Burn Rate Calculator to determine the average rate at which they use PPE. Calculating this rate helps facilities gauge the amount of PPE they need to order and when their current supply will be depleted.[7]*

KEY QUESTION 3: DO WE HAVE SUFFICIENT TESTING AND CONTACT TRACING, AND IS THE SYSTEM WORKING EFFECTIVELY AND EFFICIENTLY?

Testing is our window into the pandemic and how it is spreading; it is one of our most important tools in the fight to slow and reduce the spread and impact of the virus. While confirmed positive cases, hospitalization rates, and death counts are all lagging indicators of infection rates, testing is a leading indicator. Testing identifies infected individuals, guides their medical treatment, allows rapid contact tracing and quarantine, and can help leaders allocate medical resources and staff more efficiently.[8, 9]

Testing also informs our understanding of the distinct risks COVID-19 poses for different populations. This is important for allocating resources and making decisions about costly interventions such as social distancing and the shutdown of entire areas and industries. Testing and contact tracing are operational systems. As such, they need to be monitored for efficacy, efficiency, and equity. These metrics help you assess the operational function of your testing and contact tracing system.

NOTE: It's unclear whether previous infection prevents subsequent infections, which is why antibody tests are not currently a priority.

KEY QUESTION 3: DO WE HAVE SUFFICIENT TESTING AND CONTACT TRACING, AND IS THE SYSTEM WORKING EFFECTIVELY AND EFFICIENTLY?

METRIC 3.1 Percent tests returning positive

As the extent and availability of testing expands, a decreasing share of tests should come back positive. Therefore, the percent of tests returning positive not only indicates infection rates, but also whether testing operations are sufficiently robust.[10] If not, mayors can advocate for more testing in their cities.

Disaggregating by race, gender, age, and zip code, as well as by priority populations (essential healthcare workers and congregate care facility residents and staff, etc) can highlight how and to what extent testing is equitably distributed, and identify specific areas and populations still in need of better access (Jennifer Nuzzo, DrPH, personal interview, May 7, 2020). This can help mayors direct limited resources where they are needed most.

DISAGGREGATE DATA BY:
Race, gender, age, zip code, priority populations (essential healthcare workers, congregate facility residents and staff, etc)

DEFINITION:
Percent of total tests reported positive

SOURCE:
State or county data set

LIMITATIONS:
Percentage of tests coming back positive will be a function of testing extent; may have limited use where testing is limited overall (see also Metric 3.2).

KEY QUESTION 3: DO WE HAVE SUFFICIENT TESTING AND CONTACT TRACING, AND IS THE SYSTEM WORKING EFFECTIVELY AND EFFICIENTLY?

METRIC 3.2 Number of tests conducted per 1,000 residents per day

Comprehensive, accurate testing is one of the most important ways to identify new infections and start the contact tracing process, which leads to rapid containment of new outbreaks.[8] It's also the best way to get a full read on the spread and impact of the virus in your city. Many experts recommend >10 tests/1,000 residents/day.

Disaggregation is particularly important because different groups have different testing needs and access. Hospitals and congregate facilities need their own robust and reliable testing access; densely populated areas may need more than rural areas. With disaggregated testing data, cities can advocate for at-risk populations and push the state to prioritize certain testing locations (Jennifer Nuzzo, DrPH, personal interview, May 7, 2020).

DISAGGREGATE DATA BY:
Race, gender, age, zip code or census tract, location (inpatient, outpatient, drive-through testing, congregate facility type)

DEFINITION:
Number of tests conducted each day per 1,000 residents

SOURCE:

- State or county data set
- Private labs

LIMITATIONS:

- There is lag time between the day a test is conducted and the day results are reported
- Cities may not be able to immediately access information about tests done through private labs

KEY QUESTION 3: DO WE HAVE SUFFICIENT TESTING AND CONTACT TRACING, AND IS THE SYSTEM WORKING EFFECTIVELY AND EFFICIENTLY?

METRIC 3.3 Percent positive cases from quarantined contacts

In addition to reducing the number of positive cases, it's crucial to identify the source of new cases. Unlinked cases are cause for concern, as they indicate widespread community transmission. Cases should increasingly come from known sources who are already in quarantine (Jennifer Nuzzo, DrPH, personal interview, May 7, 2020). If not, this may indicate that testing and contact tracing are not operating effectively in your city.

DISAGGREGATE DATA BY:
Zip code or census tract

DEFINITION:
Percent of new COVID-19 cases coming from traced contacts during self-monitoring period

SOURCE:

- State or county data set
- Case management system

LIMITATIONS:
Will be most useful with a robust contact tracing system in place (limited use if not)

METRIC 3.4 Number of contact tracers hired and trained per 100,000 residents

Contact tracing works hand-in-hand with expanded testing to quickly identify and contain outbreaks. The goal is to have 30 contact tracers hired and trained per 100,000 residents.[11] This metric is a leading indicator that helps cities plan their system; the metrics above are lagging indicators that let you know how well it's working.

DEFINITION:
Total number of contact tracers hired and trained per 100,000 residents. Training includes individuals trained through live webinar/teleconference, recorded webinar, or a self-paced eLearning course (note that in some states, training completion is dependent on a post-training assessment).

SOURCE:
State or county health department

LIMITATIONS:
Should be paired with other metrics of contact tracing extent to understand efficacy

KEY QUESTION 3: DO WE HAVE SUFFICIENT TESTING AND CONTACT TRACING, AND IS THE SYSTEM WORKING EFFECTIVELY AND EFFICIENTLY?

METRIC 3.5 Percent contacts traced; time from first potential exposure to notification

In order for contact tracing to work effectively, contact tracers need to be able to reach a large share of contacts (goal is 100% of contacts) for all known cases, accurately explain appropriate next steps, and provide necessary resources (housing, food, etc) for those who can't easily self-isolate and/or belong to a vulnerable population.[12] Challenges in tracing contacts for particular groups may be an indication that specific outreach is needed.

DISAGGREGATE DATA BY:
Race, gender, age, zip code of originating case

DEFINITION:
Proportion of contacts notified; time from first potential exposure to notification

SOURCE:
Case management database, usually managed at the state level

LIMITATIONS:
Requires a robust data entry/case management system

METRIC 3.6 Percent symptomatic contacts tested within 24 hours of symptom onset

Testing symptomatic contacts quickly enables rapid additional contact tracing and isolation to swiftly contain the spread of infection. Increases in this metric may also help the public feel confident in the tracing system.

DEFINITION:
Percent of symptomatic contacts tested within 24 hours of symptom onset

SOURCE:
Case management database, usually managed at the state level

KEY QUESTION 4: WHAT IS THE LEVEL OF COMPLIANCE WITH PUBLIC HEALTH SAFETY MEASURES?

These metrics assess the behavior of residents in your city, which is important for two main reasons: First, in order to accurately assess the efficacy of any measures you've taken to date, you need to assess how closely residents have complied with those measures. Second, in order to predict areas of future risk in your city, you need a sense of how residents are behaving in response to the COVID-19 crisis. For example, frequent large gatherings or high-traffic areas both suggest potential future risk.

KEY QUESTION 4: WHAT IS THE LEVEL OF COMPLIANCE WITH PUBLIC HEALTH SAFETY MEASURES?

METRIC 4.1 Percent residents wearing face masks in public (if required by local guidance)

Many cities, counties, and states have required or recommended wearing masks in public. While this data is difficult to collect, periodic assessment of compliance with this important public health safety measure can inform messaging and other recommendations (Kate Bender, MUP, written communication, May 2020).

DISAGGREGATE DATA BY:
Zip code or census tract

DEFINITION:
Number of people wearing masks in public/total number of people in public

SOURCE:
Sample or surveillance data based on local surveys, if available

LIMITATIONS:
Data may be infrequent and difficult to collect consistently.

METRIC 4.2 311 calls and other reports of noncompliance

While people's appetite for reporting the noncompliance of others may vary widely, trends in reporting can help indicate whether compliance is increasing or decreasing, or where there may be particular areas of concern. Widespread noncompliance may indicate the need for better or more frequent communication with residents.

DISAGGREGATE DATA BY:
Neighborhood, type of noncompliance, personal/social vs business

DEFINITION:
Number of 311 calls to report noncompliance

SOURCE:
City data set

LIMITATIONS:
By nature, this data will not be comprehensive and may be skewed by those who report most frequently.

KEY QUESTION 4: WHAT IS THE LEVEL OF COMPLIANCE WITH PUBLIC HEALTH SAFETY MEASURES?

METRIC 4.3 Social media and movement trend monitoring - changes in travel by mode

These data can provide indicative, aggregated information about whether residents have complied with stay-at-home orders while also highlighting trends or changes in travel behavior. In addition to mobility within your city, certain data sets may show how many people are commuting between your city and neighboring cities (Daniel Polsky, PhD, personal interview, May 7, 2020). This is particularly important when coordinating regional policy (Anthony Corso, AIA, LEED AP, personal interview, May 2020). An upward trend in travel when public health safety measures have not been relaxed may indicate a need for greater public communication or regional coordination.

DEFINITION:
Availability will vary by service; may include trends in travel such as location type or mode. For example:

- Percent staying home
- Trips per person (work and non-work)
- Miles traveled per person
- Percent change in trips by mode
- Destination

SOURCE:
3rd-party data, including social media and cell phone companies (eg, Apple Mobility Trends, Google Community Mobility Reports, Facebook Mobility Data Network, University of Maryland COVID-19 Impact Analysis Platform)

LIMITATIONS:

- Could raise privacy concerns with residents
- Public versions of the data are often aggregated to a high level (eg, county), which mitigates privacy concerns but limits usefulness in identifying particular areas of non-compliance

KEY QUESTION 4: WHAT IS THE LEVEL OF COMPLIANCE WITH PUBLIC HEALTH SAFETY MEASURES?

METRIC 4.4 Foot traffic density in key public spaces

This metric helps identify potential "hotspot" or problem areas in your city where infections might spread in the event of a future outbreak. Understanding high-risk areas helps create proactive, site-specific policies (Daniel Polsky, PhD, personal interview, May 7, 2020).

DEFINITION:
Movement data for select locations

SOURCE:
Anonymized data from Google Maps

LIMITATIONS:

- Ability to gather data will be higher for cities who have invested in "smart city" infrastructure
- Could raise privacy concerns with citizens

KEY QUESTION 5: ARE WE ENSURING THE PROTECTION AND PREPAREDNESS OF ESSENTIAL WORKERS?

As mayors work to keep their cities running, they must ensure the safety and readiness of their essential workers, including first responders, utility operators, health departments, and specific worker classes as designated by the city or state authority. This may be most relevant for those with resident-facing roles.

NOTE: If possible, tracking these metrics for essential workers in the private sector (grocery workers, delivery workers, etc) through business exception requirements can help control community spread and ensure access to essential private goods and services.

METRIC 5.1 Daily counts among essential workers

First and foremost, this is a matter of health and safety for essential workers. Additionally, positive tests can help anticipate staffing shortages.

DEFINITION:
Daily number of essential workers who have tested positive for COVID 19*

SOURCE:
City human resources department

**Depending on sample size, you may use a 7-day rolling average to adjust this figure.*

KEY QUESTION 5: ARE WE ENSURING THE PROTECTION AND PREPAREDNESS OF ESSENTIAL WORKERS?

METRIC 5.2 Number of days of adequate PPE supply for all public-facing city facilities and workers

When considering whether to make additional services available to the public for in-person interactions, the city needs to ensure adequate PPE is available for those workers who will come into regular contact with residents. As with any consideration of PPE, include current supply and any potential issues with future supply.

DEFINITION:
Number of days' worth of face masks or other PPE available for identified workers (target is PPE supply sufficient for ≥90 days)[6]

SOURCE:
Internal reports from relevant department(s)

METRIC 5.3 Absentee rate by department or function

This indicates whether the city has adequate workforce available, helps anticipate staffing shortages, and serves as an indicator of those who may be in self-quarantine.

DEFINITION:
Number of absent days during the week/the number of available work days in the week (by department or function)

SOURCE:
City HR department

KEY QUESTION 6: ARE WE PROTECTING AND ENSURING PREPAREDNESS OF CONGREGATE FACILITIES?

Congregate facilities are defined here as any facility which is the primary residence of the people it serves: for example, correctional facilities such as prisons and jails; healthcare settings such as assisted and independent living; senior residential communities where healthcare is provided; social services settings such as shelters for people experiencing homelessness or for victims of domestic abuse, and group homes for children. Any place where people live together in close quarters is highly vulnerable to outbreaks, and requires specialized consideration.

KEY QUESTION 6: ARE WE PROTECTING AND ENSURING PREPAREDNESS OF CONGREGATE FACILITIES?

METRIC 6.1 Number of positive cases at congregate facilities

Given a stable and sufficient level of testing, this is the clearest indicator of how quickly the virus is spreading in congregate facilities. This can also be used to gauge the share of total cases coming from congregate facilities.

DISAGGREGATE DATA BY:
Facility type, individual facilities

DEFINITION:
Number of positive cases (daily counts)

SOURCE:

- State or county data set
- 3rd-party facility reporting

LIMITATIONS:

- Assumes stable and sufficient testing
- Data may lag due to time between symptom onset, testing, and results reporting

METRIC 6.2 Number of confirmed and probable deaths among congregate facility residents*

Loss of life requires no rationale as a decision-making factor. However, death is a lagging indicator and by the time death counts rise, especially in a facility, the infection is likely already widespread. Cities should monitor the percentage of total deaths coming from congregate facilities, as this will indicate where to focus resources.

DEFINITION:
Number of confirmed and probable COVID-19 deaths among congregate facility residents*

SOURCE:

- State or county data set
- 3rd-party facility reporting

LIMITATIONS:
In some cases, it may be difficult to confirm the COD.

**A probable case or death is defined by the CDC as "A person meeting clinical criteria AND epidemiologic evidence with no confirmatory laboratory testing performed for COVID-19; a person meeting presumptive laboratory evidence AND either clinical criteria OR epidemiologic evidence; a person meeting vital records criteria with no confirmatory laboratory testing performed for COVID-19."*[4]

KEY QUESTION 6: ARE WE PROTECTING AND ENSURING PREPAREDNESS OF CONGREGATE FACILITIES?

METRIC 6.3 Percent congregate facilities equipped with sufficient PPE

Congregate facilities must be well prepared to protect residents and staff. This will look slightly different for different kinds of facilities and may also include plans such as designation of COVID-19-specific areas within facilities. Mayors can advocate for priority access to testing supplies and PPE for congregate facilities (eg, a sufficient supply for at least 90 days for all residents and staff).

DISAGGREGATE DATA BY:
Location, facility

DEFINITION:
Share of total congregate facilities reporting sufficient PPE supplies for ≥90 days assuming current occupancy*[6]

SOURCE:
3rd-party facility reporting

LIMITATIONS:
Additional site-specific precautions may be required at some congregate facilities (eg, types of physical barriers available), which you may wish to ask facilities to track and report on a case-by-case basis.

**Facilities can use the CDC's Burn Rate Calculator to determine the average rate at which they use PPE. Calculating this rate helps facilities gauge the amount of PPE they need to order and when their current supply will be depleted.*[7]

METRIC 6.4 Number of congregate facility staff infected or in quarantine

First and foremost, this is a matter of health and safety for workers. Additionally, positive tests can help anticipate staffing shortages.

DISAGGREGATE DATA BY:
Location, facility

DEFINITION:
Number of staff at congregate care facility with a positive COVID-19 test result or in a self-monitoring period

SOURCE:
- 3rd-party or facility reporting
- Potentially state or county data sets

KEY QUESTION 7: ARE WE ENSURING PREPAREDNESS OF BUSINESSES FOR REOPENING?

As businesses prepare to reopen, they need to make sure they're prepared to do so safely. This will look very different for different types of businesses and facilities, especially since some will have been granted permission to open or close by state officials. Mayors can work closely with businesses and community leaders to ensure that those businesses that reopen are doing so in a way that minimizes risk.

METRIC 7.1 Availability of supplies and PPE in businesses and commercial buildings planning to reopen

Any business planning to reopen should have sufficient availability of supplies or infrastructure such as hand sanitizer at every entrance, and space or design solutions for social distancing among employees and customers.

DISAGGREGATE DATA BY:
Business type or sector, zip code, women- or minority-owned

DEFINITION:
Share of total businesses and commercial sites reporting ≥90 days of sufficient PPE/supplies[6]

SOURCE:
Business exception or permitting process reporting requirements

METRIC 7.2 Confirmed cases among essential and/or public-facing employees; absenteeism rates; quarantined employees

This may complement business-type-specific guidance on occupancy, types of services that can be offered, or planning processes to follow. If considering an exception or permitting process for businesses, consider requesting regular reporting on levels of appropriate PPE, number of confirmed cases among employees, or absenteeism rates.

CLOSING

The metrics in this document are designed for ongoing management decisions throughout the COVID-19 crisis. These metrics will be updated as experts continue to refine their recommendations.

We want to hear from you. Did you use these metrics? If so, which ones did you find most helpful? Which ones were you unable to locate? Do you have any questions? Email us here: civicimpact@jhu.edu

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