

**Attachment C-1
Covid-19 Grant Project Status Report**

Before it will be possible to make any disbursement, you are required to provide to the Agency the status towards the specific purpose as stated in the grant contract (Attachment A-1). This report is to be completed by the grant recipient and each subrecipient. The grant recipient is to ensure all subrecipients' reports are to be included with cost reimbursement requests.
RECIPIENT COMPLETION INFORMATION:

1. Organization

Organization Name	North Carolina Policy Collaboratory at the University of North Carolina at Chapel Hill (GSPH/Epidemiology/Gordon-Larsen and Westreich)
Contract Agreement Number	23-01
Date	February 15, 2021

2. Financial Summary

Total Funding Authorized	Total Funding Received to Date	Balance
\$456,515	\$455,817.19	\$ 697.81
\$436,641	\$424,225.17	\$12,415.83

3. Performance: Recipient (or subrecipient) shall detail below how the organization has spent the amount of funding allocated for the specific purpose as stated in the grant contract. The description should include activities and progress against the recipient's (or subrecipient's) scope of work and outcomes of that work. Attach additional documents, as necessary.

The Sero Surveillance Network & The Gillings Center for Coronavirus Testing, Screening, and Surveillance

The Sero Surveillance Network and the Gillings Center for Coronavirus Testing, Screening, and Surveillance project teams worked hand in hand to create the [Gillings COVID-19 Dashboard](#). The Dashboard is a comprehensive resource for coronavirus information for researchers, policy makers, and anyone interested in learning more about the status of COVID-19 in NC.

The Dashboard provides essential information in a way that can be understood by everyone. It can be used by local officials to accurately understand the burden of COVID-19 across NC to determine when and where to focus resources and support services. The Dashboard can also be used by scientists and public health officials to better understand the epidemiology of the virus, including the true prevalence of infection in NC.

In addition to creating the Dashboard, the teams consulted with county health departments and researchers from across the state on SARS-CoV-2 research and developed “SaferWays”, a novel digital tool that tracks perceptions of crowding, social, distance, and mask wearing in real-time. The team also prepared six articles for publication related to their work and leveraged approximately \$2.6M in additional coronavirus funding from CDC/NC Public Health, UNC Gillings Innovation Laboratory funding, UNC Public Health Foundation, and National Science Foundation.

The UNC Team

The multi-disciplinary [UNC team](#) that created the Dashboard was comprised of 18 core faculty from the Gillings School of Global Public Health (17) and the School of Medicine (1) and 23 staff from Carolina Demography (4), the Carolina Population Center (1), the Cecil G. Sheps Center for Health Services Research (6), the College of Arts & Sciences (1), the Franklin Porter Graham Child Development Institute (4), the Gillings School of Global Public Health (2), the NC Institute of Public Health (3), the NC Translational and Clinical Sciences Institute (1), and the Office of the Executive Vice Chancellor and Provost for Research (1). In addition, four postdoctoral research fellows and 11 graduate students from the Gillings School for Global Public Health (14) and the Hussman School of Journalism and Media (1) played key roles in the development of the Dashboard.

Community Engagement

In developing the Dashboard, the UNC team engaged community partners (e.g., legislators, public health department leaders, faith community leaders) from across the state with a focus on underserved areas and vulnerable populations. An initial online survey was implemented to determine what coronavirus resources they wanted access to, how they would use these resources, and who they would serve with the resources. A second online survey and follow up one-on-one interviews focused on assessing and improving the usability of the Dashboard.

The Gillings COVID-19 Dashboard

The Dashboard is meant to compliment and add value to the NCDHHS COVID dashboard. Key resources developed for the Dashboard include county profiles, data visualizations, research calculators, white papers, FAQs and definitions, and a catalog of coronavirus studies in NC as well links to other coronavirus resources in the state.

County Profiles: The team developed downloadable county profiles that provide data on cumulative COVID-19 cases and deaths as well as cases and deaths in the past 7 days and compare them to NC overall. The profiles also report outbreaks in congregate living settings as well as clusters in childcare and school settings in the county. In addition, pre-pandemic demographic information is provided for each county to show factors that may be related to SARS-CoV-2 transmission, increase the risk of severe COVID-19, and/or make individuals vulnerable to the economic and social impacts of the pandemic, such as the percent living in crowded housing, percent lacking health insurance, and percent with selected pre-existing conditions. A sample county profile can be found here: [Orange County](#).

Data Visualizations: Four data visualizations were developed for the Dashboard. The data visualization team prepared an “automated ingest” that enable these visualizations to stay up to date without manual effort.

- [The NC Coronavirus Cases and Measures: Trends Over Time](#) visualization depicts trends in COVID-19 cases and deaths for all ages starting in June 2020 in each county, compared to regional and statewide COVID-19 measures. The number and density of reported COVID-19 cases varies by location in the state. Factors that may contribute to these differences include the age of people in the area, patterns of underlying health conditions, and unequal access to testing and healthcare. Differences in wearing masks and maintaining physical distancing recommendations may also affect local trends in COVID-19 cases and deaths.
- [The Colleges, Universities, Prisons, and Meatpacking Plants: Places Where People Gather](#) visualization shows the location of colleges, universities, prisons, meatpacking plants, and COVID-19 cases and deaths of all ages by county and zip code. Some COVID-19 clusters in NC have been linked to colleges, universities, prisons, and meatpacking plants. They represent environments that may have high potential for SARS-CoV-2 transmission in the absence of appropriate control measures.
- [The K-12 Schools, Children and Coronavirus](#) visualization shows the location of childcare facilities, schools, and laboratory-confirmed COVID-19 cases and deaths for all ages by county and zip code. Some COVID-19 clusters in NC have been linked to childcare facilities and schools. These facilities represent environments that could have elevated risk of SARS-CoV-2 transmission in the absence of appropriate control measures because they have enclosed spaces that enable long duration of exposure, can be crowded, and may contain a high number of asymptomatic children who can contribute to transmission.
- [The Long-Term Care Facilities](#) visualization shows the locations of long-term care facilities in NC and the distribution of laboratory-confirmed COVID-19 cases and deaths by county for residents of all ages. Some COVID-19 clusters in NC have been linked to long-term care facilities which include nursing homes, assisted living, and adult or family care homes. Adults aged 65 and older are the predominant age group living in these facilities and are at elevated risk for complications caused by COVID-19.

Research Calculators: Three research applications were developed for the Dashboard.

- [COVID-19 Testing: Pooling Calculator](#). As the number of COVID-19 cases increases, more tests are necessary for the diagnosis of the virus. One way to enhance the efficiency and accuracy of tests without dramatically reducing test sensitivity is to use pooled testing in which specimens from several people are combined and tested. If none come back positive for SARS-CoV-2 then none of the individual people need to be tested, potentially saving scarce materials and money. Only pools where a significant viral load of SARS-CoV-2 is

detected need to be tested. We created a dashboard app that provides algorithms to allow this type of pooling and provides visualizations and statistics for each pooling algorithm.

- [Calculator to Account for Test Accuracy When Estimating Coronavirus Prevalence](#). This application is a tool for re-calculating the prevalence of SARS-CoV-2 in studies based on the accuracy of the test used, giving a sense of true prevalence or seroprevalence of SARS-CoV-2. This app can educate the public on how the accuracy of SARS-CoV-2 tests affects our understanding of the prevalence of SARS-CoV-2 in different communities.
- [Calculator to Improve Testing Yield](#). This application is a tool for identifying groups of people who are likely to be infected with SARS-CoV-2. Applied to public health, the output can inform the development of an efficient SARS-CoV-2 testing strategy. In a research setting, the output can help researchers more efficiently recruit people with SARS-CoV-2 for studies.

White Papers: Three white papers were developed for the Dashboard.

- [Guidance on Pooling of Samples for SARS-CoV-2](#). This white paper provides guidance on pooled (or group or batch) testing, a process in which portions of individual samples are combined into a single pool, which is then tested for disease. If the pool is negative, each of the samples within that pool is considered negative and no further testing is required. If the pool is positive, the individual samples that contributed to it are tested to determine which of them are positive. We also present details on our free pooling calculator app that appears on our Dashboard (described above), including results developed to determine the optimal pooling size for SARS-CoV-2 RT-PCR testing based on assay sensitivity and specificity, the underlying prevalence of SARS-CoV-2 among samples tested, and assuming no greater than 20 percent dilution-related loss of sensitivity compared to individual testing.
- [Protocol for Designing Efficient and High-Yield SARS-CoV-2 Testing Strategies](#). On the Dashboard, we provide a protocol to rapidly identify people likely to be infected with SARS-CoV-2, which both speeds infection control efforts and results in better-powered clinical trials and observational studies. This protocol is a tool for identifying groups of people likely to be infected with SARS-CoV-2, including asymptomatic and pre-symptomatic cases. The purpose of the protocol is to help institutional decision-makers and researchers develop efficient and high-yield SARS-CoV-2 testing strategies that determine who in a given population should be approached for testing or recruited for a study on SARS-CoV-2.
- [Statistical Considerations in the Design and Analysis of SARS-CoV-2 Prevalence Studies](#). This document summarizes some of the statistical issues that should be considered when designing a SARS-CoV-2 prevalence study. A careful design is needed to allow the results of the study to be generalizable to the target population.

FAQs and Definitions: A comprehensive list of FAQs and definitions relevant to coronavirus:

- FAQs are organized into four categories: clinical, testing populations, slowing the spread, and business concerns. The 21 FAQs summarize the latest science in easy-to-understand terms and provides links to reputable resources. An example FAQ can be found here: [Coronavirus vaccines, are they safe?](#)
- In addition to the FAQs, 30 coronavirus-related definitions are included on the Dashboard. An example definition can be found here: [7-day average of new cases](#).

NC Coronavirus Studies. A catalog of [current coronavirus research studies in NC](#) was developed for the Dashboard that is searchable by region, test type (diagnostic, antibody, both) and population type (healthcare worker county residents, healthcare patients, and military).

[Links to Coronavirus Resources in NC](#). The Dashboard also contains [links](#) to local health department coronavirus websites, dashboards developed by colleges and universities in the state, and similar resources.

Consultation and Support for SARS-CoV-2 Research

Throughout the project, the team was actively engaged with county health departments and researchers from across the state to provide consult on COVID research. In addition, the team worked with Children's Health of Carolina to assist with a COVID-19 testing study for children in Robeson County, Children's Health's practice consists of approximately 80 percent Medicaid patients, with a diverse racial and ethnic mix (40 percent Native American, 30 percent African American and 12 percent Hispanic).

In August, the project team partnered with the Orange County Health Department to recruit UNC student volunteers to assist with data entry and contact tracing.

In addition, epidemiologists on the team provided guidance for users seeking to implement pooling and to explore scientific findings related to pooling. The team also reviewed literature on viral dynamics, and offer additional consulting help to other COVID-related investigations.

The team worked closely with NCDHHS to facilitate the timely execution of data use agreements for the entire UNC campus.

SaferWays Digital Tool

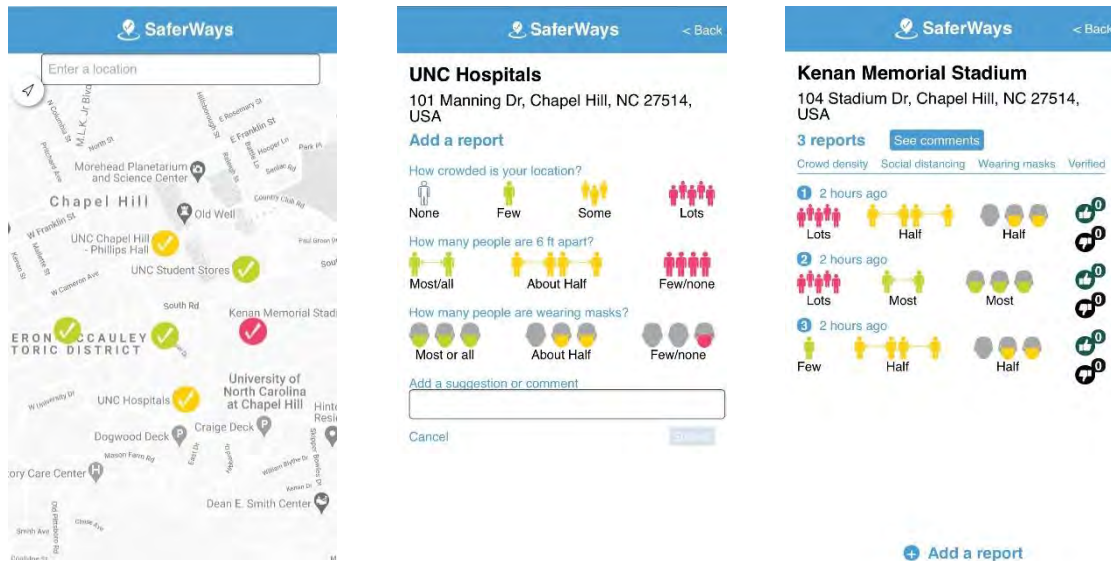
The team developed SaferWays, a digital tool to track community perceptions of crowding, physical distancing, and mask wearing in real-time to inform decision-making and reduce COVID-19 risk. SaferWays is currently a progressive web app (PWA) that can be used by anyone through an Internet browser, including those with iPhones (<https://app.wecoexist.ca/>). The UNC team collaborated with CoExist of Alberta, Canada, to adapt their digital tool to collect real-time, crowdsourced reports on crowd size, social distancing adherence, mask wearing adherence, and suggestions to improve COVID-19 safety. The app allows users to both make reports and search for specific locations. Each location that has existing reports also has a "view reports" page, which allows users to verify existing reports by clicking thumbs up/down and making comments (Figure 1).

After completing several rounds of design research and initial testing with UCN-CH faculty, staff, and students, the team identified several stakeholder groups who will benefit directly from this new digital tool:

- **Users.** Those who use the digital tool (e.g. faculty, staff, students, local business employers and employees, and community members) will be able to see real-time data on crowd size, social distancing, and mask wearing and make more informed individual decisions.
- **Local decision-makers.** Those who have the ability to change physical settings to improve COVID-19 safety (e.g., leaders of higher education institutions, local business employers, county and state health department officials) will be able to see and analyze data to identify 'hotspots' for their specific spaces, including crowdsourced recommendations for enhancing safety, to guide updated safety practices.

- Researchers.** Researchers (e.g., at universities or at local and state health departments) can analyze data collected through the digital tool and answer important questions about the feasibility and reliability of using technology like this to assess COVID safety risk and what influences users' perceptions of crowd size, social distancing, and mask wearing to inform future research and interventions.

Figure 1. Screenshots of the PWA. From left to right: the landing page map, which allows users to make reports or search for a location; the page for making a new report for UNC Hospitals; the “view reports” page for Kenan Memorial Stadium, which allows users to click thumbs up or down and make a comment.



Additional Funding

Approximately \$2.3M from the CDC/NC Public Health through July 31, 2023 to support the continuation of the serosurveillance community studies led by UNC, including Chatham County Surveillance and Antenatal Clinic Screening.

Establishing a sentinel surveillance system for COVID-19 in North Carolina: Using routine antenatal care visits to estimate real-time COVID-19 seroprevalence in diverse populations. Funded by UNC Gillings Innovation Laboratory and UNC Public Health Foundation. July 1, 2020 to June 20, 2021. \$99,639.

RAPID: Airborne CoV-2 viability and oxidation. Funded by National Science Foundation. August 1, 2020 to July 31, 2021. \$199,939.

Manuscripts and Publications

Filiatreau LM, Zivich P, Mullholland G, Max R, Edwards JK, Westreich D. Optimizing SARS-CoV-2 group testing strategies through incorporation of simple-to-implement symptom and exposure screening tools. In preparation.

Muller M, Chhetri SB, Basham C, Rapp T, Lin F-C, Lin K, Westreich D, Cerami C, Juliano J, and Lin J. Practical strategies for SARS-CoV-2 RT-PCR testing in resource-constrained settings. Submitted to peer-review.

Root H, Boyce R, Robinson WR. Learning from LMICs: best practices for leveraging sentinel surveillance systems to track the US COVID-19 pandemic. *BMJ Global Health*. 2020 Dec 1;5(12):e004685

Westreich D, Edwards JK, van Smeden M. [Comment on Williamson et al. \(OpenSAFELY\): The table 2 fallacy in a study of COVID-19 mortality risk factors.](#) *Epidemiology*. 2021 Jan;32(1):e1-e2.

Westreich D, Edwards JK, Tennant PWG, Murray EJ, van Smeden M. Choice of outcome in COVID-19 studies and implications for policy: the Missing Link Fallacy. Submitted to peer-review.

Westreich D, Cole SR, Edwards JK, Napravnik S, Silverberg M. Analysis of Categorical Outcomes for COVID-19 and Beyond. In preparation.