



N.C. Policy Collaboratory

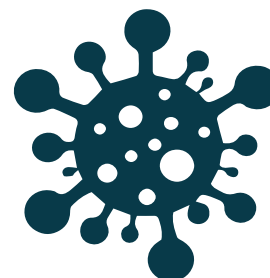
COVID-19 RESEARCH INITIATIVE

**Submitted to the North Carolina General Assembly's Joint Legislative Oversight
Committee on Health and Human Services**

September 1, 2020

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EXECUTIVE SUMMARY

As stipulated by the North Carolina General Assembly (NCGA), the North Carolina Policy Collaboratory (Collaboratory) submits this progress report to the Joint Legislative Oversight Committee on Health and Human Services to define interim progress related to the deployment of \$29 million in funds appropriated to the Collaboratory specifically for COVID-19 research efforts. The Collaboratory was established by the NCGA in July 2016 (Section 11.8 of Session Law 2016-94 as amended by Section 8.(c) of Session Law 2020-74) to be located at The University of North Carolina at Chapel Hill and facilitate the dissemination of the policy and research expertise of The University of North Carolina System for practical use by State and local government.

Starting in March of 2020, in response to the SARS-CoV-2 (coronavirus) pandemic, the Collaboratory proactively deployed funding totaling \$126,500 for three projects: 1) the transfer of personal protective equipment (PPE) located in idle research labs at UNC System campuses to frontline healthcare facilities (\$17,500), 2) the creation of a wastewater viral monitoring network to identify and observe trends of viral remnants in both urban and rural human waste streams (\$54,000), and 3) acquisition and analysis of anonymized statewide mobility data (e.g., cell phone movement, traffic flows, etc.) as a proxy for social response prior to and during the pandemic (January 2019 through December 2020) (\$55,000).

In May of 2020, the Collaboratory received a \$29 million appropriation from the NCGA to be used for (i) the rapid development of a countermeasure of neutralizing antibodies for COVID-19 that can be used as soon as possible, (ii) bringing a safe and effective COVID-19 vaccine to the public as soon as possible, (iii) community testing initiatives, and (iv) other research and activities related to monitoring, assessing, and addressing the public health and economic impacts of COVID-19 (subdivision (23) of Section 3.3 of Session Law 2020-4; effective May 4, 2020).

During May and June of 2020, the Collaboratory worked with its Advisory Board and leaders from across the UNC System to solicit, vet, and identify a slate of 85 strategic projects across 14 UNC System campuses (i.e., AppState, ECSU, FSU, NCA&T, NCCU, NCSU, UNCA, UNCC, UNC-CH, UNCG, UNCP, UNCW, WCU, and WSSU). East Carolina University (ECU) was not funded by the Collaboratory because it received a separate \$15 million appropriation from the NCGA for the Brody School of Medicine to carry out a similar COVID-19 research mandate (see subdivision (24) of Section 3.3 of Session Law 2020-4 for ECU/Brody appropriation language). The Collaboratory's broad portfolio ensures that every university campus in the UNC System is being utilized to address the public health and economic impact of COVID-19 across North Carolina.

The appropriation language for the Collaboratory's COVID-19 funding also directed the facilitation among various entities best practices and strategies to maximize resources and achieve a comprehensive response to the coronavirus pandemic. Further, the language stated that the Collaboratory may assemble an advisory panel of representatives from various entities as necessary to discuss, review, and analyze progress towards meeting goals and the use of available funds. The Collaboratory established the COVID Academic Research Team (CART), which has met twice (July 1 and August 5, 2020) and will continue to meet the first Wednesday of every month through December if not beyond. CART members include representatives from each entity that received direct COVID-19 appropriations (i.e., Campbell

@ \$6 million, Duke @ \$15 million, ECU @ \$15 million, Wake Forest @ \$20 million, Collaboratory @ \$29 million) as well as personnel with the North Carolina Department of Health and Human Services (NCDHHS).

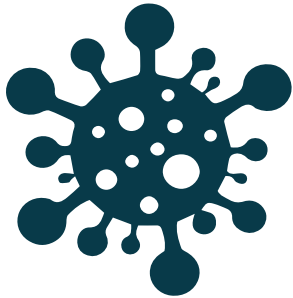
The Collaboratory received the first half of its COVID-19 appropriation (i.e., \$14.5 million) from the Office of State Budget and Management (OSBM) on July 27, 2020 and is hoping to receive the second half during September 2020. Because of the critical nature of the Collaboratory's overall research portfolio and the compressed timeframe in which to fully utilize these funds (i.e., reversion on December 30, 2020 per stipulations in the federal CARES Act), key efficiencies were achieved during execution of research funding agreements between the Collaboratory and each of its 85 investigative teams. The average turnaround time for full execution of all 85 agreements was than three days with a median value of one day (i.e., the difference between the date the final award document was sent out by the Collaboratory to the individual funding recipient and the date it was signed with the appropriate signature from the recipient investigator/unit/campus). In almost all cases, funding was transferred from the Collaboratory's account to each project's research team within 24 hours of receiving the fully executed funding agreement.

The Gillings School of Public Health at UNC-Chapel Hill is the number one public university public health school in the country, and home to cutting edge researchers such as Dr. Ralph Baric who is one of the world's foremost coronavirus experts.



BY THE NUMBERS

NC Policy Collaboratory
COVID-19 RESEARCH INITIATIVE



\$29M

total Collaboratory funding from
NCGA for COVID-19 research.



14

UNC campuses
involved.



85

total projects
funded.



3

vaccine-related
projects.



\$6M

funding for 32 projects
across six Historically
Minority Serving Institutions
in the UNC System.



16

economic
impact
projects.



20

community
testing
initiatives.



\$1.9M

external funding leveraged so far,
including a project that leveraged
external funding at a 1:5 ratio within
just one month of research award.



7

campuses with
community
testing initiatives.



3

projects
focused on
elderly adults.



>800

research
team members.



>50K

study participants
across all projects.



14

therapeutic
treatment
projects.

In April 2020, when the lockdown was in its initial stages, State policymakers and public health officials began making critical decisions related to public safety, economic impacts, and the healthcare industry. The Collaboratory utilized its Rapid Response Research Reserve (non-reverting funds appropriated by the NCGA through a \$3.5 million Challenge Grant; Section 27.5 of Session Law 2016-94 as amended by Section 10.4.(a) of Session Law 2017-57) to initiate two pilot projects for the purposes of conducting applied research projects that would assist state and local government officials with decision-making. A third project that expedited the re-deployment of critical PPE in academic labs that had been taken offline due to pandemic-related campus closures was funded with \$17,500 from the Collaboratory's annual recurring operating fund appropriated by the NCGA. These three early efforts to proactively address COVID-19 are described below.

Personal Protective Equipment

At the same time as the research pilot projects were beginning (April 2020), the Collaboratory worked directly with its faculty research partners at universities across North Carolina to identify critical PPE in labs of our faculty research partners across the UNC System that had been shut down because of the pandemic. This PPE included respirators, face shields, face masks, gowns, and gloves that were rounded up and re-deployed to hospitals across North Carolina. In total, \$17,500 in Collaboratory funding was utilized to provide donor labs with the funds necessary to restock PPE when academic labs slowly came back online in later summer. Campuses that participated in this PPE re-deployment program to assist frontline healthcare workers included UNCC (Dr. Mei Sun; \$500), UNC-CH (Drs. Rebecca Fry, Hadley Hartwell, Ralph House, Rachel Noble, and Richard Superfine; \$15,000), UNCW (Dr. Ralph Mead; \$500), and NCSU (Drs. Morton Barlaz, Owen Duckworth, David Genereux, Detlef Knappe; \$1,500).



PPE from academic lab at UNC Applied Physical Sciences donated to UNC Health.

Tracking SARS-CoV-2 Across a Range of Municipalities

Rachel Noble, UNC Institute of Marine Sciences

The objective of this project is to contribute valuable information to the State of North Carolina on the presence and persistence of SARS-CoV-2 like viruses in complex infrastructure and environmental systems utilizing viral loading trends identified in both rural and urban wastewater streams. This work, will in turn, guide our ability to track SARS-CoV-2 as it expands its range and establishes itself endemically. This information is valuable for the protection of those in the respective industries, but direct data will also assist us in allaying any concerns of the public about the safety of our recreational waters, and confidence in North Carolina's burgeoning bivalve shellfish industry.

The initial pilot phase of this work was funded with \$54,000 from the Collaboratory's Rapid Response Research Reserve. The scope of this project was greatly expanded across the State, including partnerships with NCSU, UNCC, UNCW, and the North Carolina Department of Environmental Quality, by an additional \$1.8 million from the NCGA COVID-19 appropriation. The initial pilot project was critical step in jump-starting this study by providing a four-month lead with funding necessary to develop/finalize sample acquisition and laboratory protocols/methods and locate/acquire the chemical reagents required for laboratory analyses.

*Mark Ciesielski (graduate student, left) and Tom Clerkin (lab technician, right) sample water waste in Rachel Noble's lab at the UNC Institute of Marine Sciences, to track COVID-19 outbreaks across North Carolina.
Photo courtesy of Megan May, Office of Research Communications.*

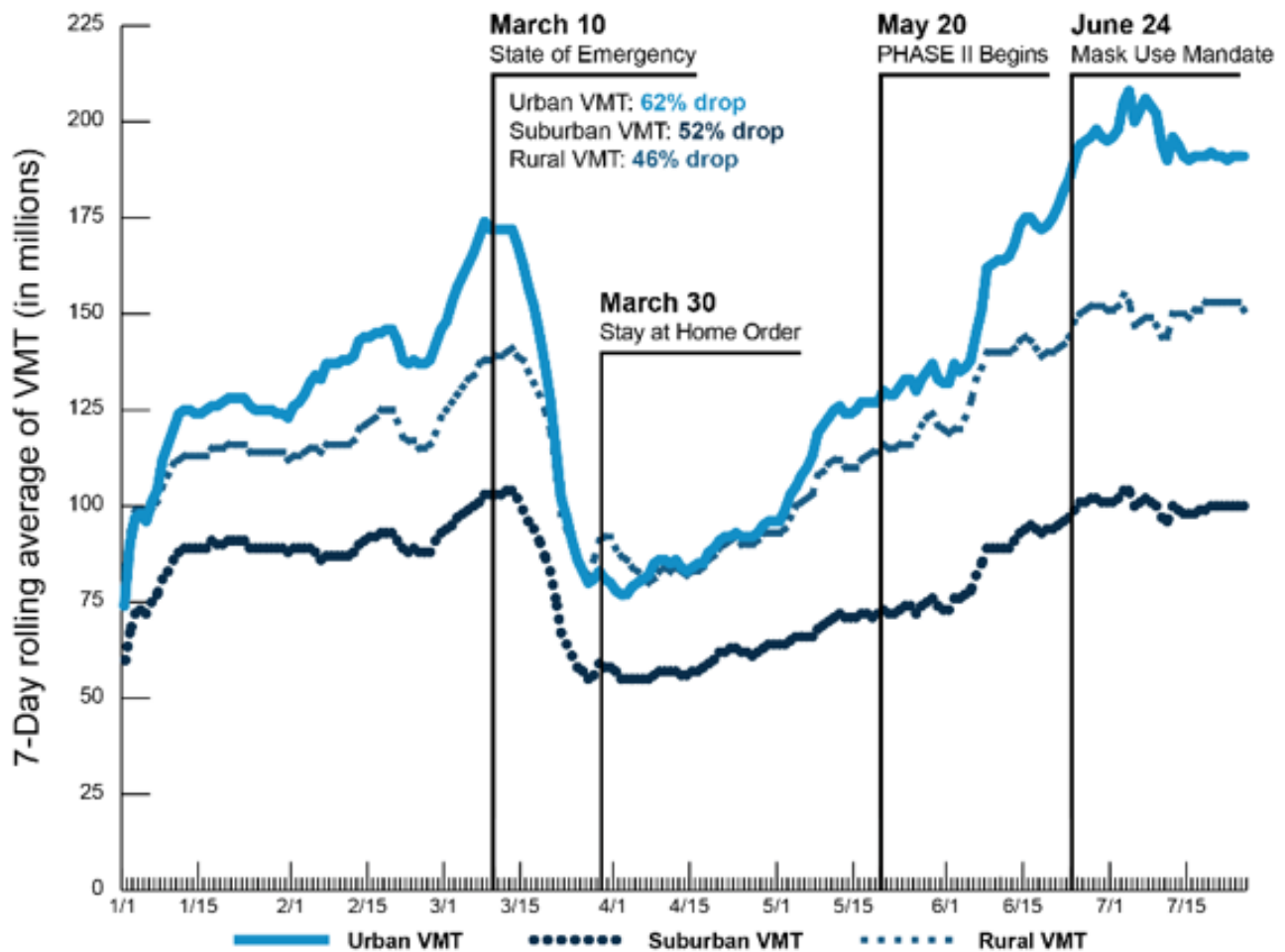


North Carolina COVID-19 Mobility and Health Study

Randa Radwan, UNC Highway Safety Research Center

This project will examine whether shelter-in-place policies, emergency declarations, and general news and events (local and nationwide) have reduced movement within the North Carolina, and is this slowing the spread of COVID-19? Further, what are the differences in mobility between urban and rural counties and how do these trends vary through time? Finally, will a 15-county subset in central North Carolina (Wake, Durham, Orange, Alamance, Caswell, Person, Vance, Franklin, Nash, Wilson, Johnston, Harnett, Lee, Chatham) provide sufficient data to address these research questions on a statewide level.

The initial pilot phase of this project was funded with \$55,000 from the Collaboratory's Rapid Research Response Reserve. The scope of this project was greatly expanded across the State, including additional third-party data identification and acquisition, by an additional \$929,000 from the NCGA COVID-19 appropriation. The initial pilot project was a critical step in jump-starting this study by providing a four-month lead by allowing the research team to identify, negotiate, purchase, and acquire third-party aggregate mobile phone data critical for geospatial and statistical analyses.



North Carolina Statewide Vehicle Miles Traveled (VMT) Trends for Urban, Suburban and Rural Areas, Data Source: Streetlight.

On May 4, 2020, the North Carolina Governor signed the NCGA appropriations bill into law (Session Law 2020-4) that allocated \$29 million in federal CARES Act funding to the Collaboratory to support research on treatment, community testing and prevention of COVID-19 (as mandated by the NCGA in subdivision (23) of Section 3.3 of Session Law 2020-4; The complete text of the session law can be found in Appendix I of this document).

Specifically, the legislation outlined four areas for the allocation of funds:

- 1) The rapid development of a countermeasure of neutralizing antibodies for COVID-19 that can be used as soon as possible to both prevent infection, and for those infected, treat infection.
- 2) Bringing a safe and effective COVID-19 vaccine to the public as soon as possible.
- 3) Community testing initiatives.
- 4) Other research and activities related to monitoring, assessing and addressing the public health and economic impacts of COVID-19.

The legislature also provided the Collaboratory the means to assemble an advisory panel of representatives from various entities to discuss and review progress toward the use of these funds. Also, importantly the legislation recognizes the expedited nature of this research and provides an exception to the state purchasing statutes for equipment and supplies.

The legislation requires the Collaboratory to provide an update on the use of the funds to the Joint Legislative Oversight Committee on Health and Human Services by no later than September 1, 2020. The submittal of this report fulfills this requirement.

PROJECT SELECTION PROCESS

The Collaboratory worked closely with the leadership at universities across the UNC system and at UNC-Chapel Hill to develop the research plan and award funding for projects. Final funding decisions were made in a thorough and transparent manner and involved input and guidance from numerous experts.

The project selection process resulted in the funding of 85 projects across 14 UNC System campuses. The 85 projects chosen are intended to provide critical data to our state over a short timeframe to address both the economic and public health components of this pandemic within North Carolina and make a positive impact fighting COVID-19 in our state. (A full list of 85 projects can be found in Appendix II and more detailed information about each project can be found on the Collaboratory website: <https://collaboratory.unc.edu/>)

In the development of the Collaboratory's research plan to support and fund COVID-19 research, the project review process took place among three main categories outlined below.

UNC-Chapel Hill Ad Hoc Advisory Committee

The UNC-CH Office of Vice Chancellor for Research (OVCR) formed an ad hoc advisory committee of research deans at UNC-CH which included the School of Medicine, Gillings School of Global Public Health, Eshelman School of Pharmacy, and the Adams School of Dentistry to identify proposals and prioritize projects.

This group originally was allocated approximately \$15 million based on the existing faculty expertise, infrastructure, and opportunity related to the fact that UNC-CH currently has the largest coronavirus research portfolio (in terms of dollar amount) than any other academic institution in the nation.

According to Microsoft Academic, a public search engine for academic publications and journals, UNC-CH was the third highest ranked U.S. institution for coronavirus research behind the Centers for Disease Control and the National Institute of Health.

Collaboratory Advisory Board

The Collaboratory received more than 50 project proposals from units across UNC-CH that were in addition to the projects identified and prioritized by the OVCR process. The Collaboratory's Advisory Board (an eight-member board appointed by the UNC-CH Provost), in conjunction with leadership of the UNC-CH College of Arts and Sciences, assisted in reviewing projects across the UNC-CH campus that would provide timely and meaningful results in support of State and local government efforts to respond to public health and economic challenges. Funding for these projects totals approximately \$6.7 million (including nominal funding for project management duties by the Collaboratory and the UNC-CH Institute for Convergent Science).

UNC System Partnerships

Collaboratory staff worked with the UNC Board of Governors Historically Minority-Serving Institutions (HMSI) Committee and representatives from UNC System universities to develop research projects addressing COVID-19. As a result, approximately \$1 million was allocated to each of the UNC Systems' six HMSI campuses (\$6 million total) to fund 32 separate investigations):

- Elizabeth City State University
- Fayetteville State University
- North Carolina A&T University
- North Carolina Central University
- UNC Pembroke
- Winston-Salem State University

In addition, approximately \$600,000 was allocated to UNC-Asheville who will partner with the non-profit Mountain Area Health Education Center (MAHEC). Collaboratory staff also funded proposals from Appalachian State, UNC-Charlotte, UNC-Greensboro, and Western Carolina (both solicited and unsolicited) totaling just under \$500,000. East Carolina University (ECU) Brody School of Medicine received a direct appropriation from the NCGA for \$15 million to address COVID-related issues and, therefore, did not require Collaboratory funding to participate in this multi-campus UNC System initiative. Thanks to the State's investment, COVID-19 research is being carried out on every UNC System university campus.

The Genome Science Building at UNC-Chapel Hill is home to the newly launched Institute for Convergent Sciences (ICS), which the Collaboratory is utilizing to work alongside multiple COVID-19 studies to identify additional collaborative opportunities and scale-up that, in turn, will pave the way for practical applications in the form of translational research and commercial start-ups.



PROJECT FUNDING PROCESS

When the COVID-19 research appropriation became law, Collaboratory leadership quickly established general guidelines for how the overall dollars would be distributed across the UNC System. Because UNC-CH is the highest-ranked university in the US for coronavirus research, and the third-highest entity (academic and non-academic) in the US, ranking only behind the CDC and the NIH, it was decided that a large portion of the funding should be invested at UNC-CH to develop new projects and bolster ongoing programs, including those led by one of the top coronavirus researchers in the world, Dr. Ralph Baric (whose lab participated in the successful trials of Gilead Sciences' therapeutic Remdesivir).

See WRAL TechWire story for more information about UNC-CH's coronavirus research:

<https://www.wraltechwire.com/2020/05/08/unc-ch-ranks-as-a-world-leader-in-covid-19-research-heres-why/>

Additional consideration was given to the fact that approximately 70 to 75% of all external research funding into the UNC System comes to UNC-CH, and 2020 marks the first time ever UNC-CH's external research funding has risen above \$1 billion (the most recent National Science Foundation Higher Education Research and Development, of NSF HERD, survey, using 2018 data, accounts for 62% of total research funding in the UNC System, and internal data from the UNC-CH Office of Research shows a 12% increase from 2019 data that is not yet reported in the NSF HERD survey but is a higher percentage than 2018 according to internal communications at UNC-CH).

See NSF HERD Survey for more information: <https://ncesdata.nsf.gov/herd/2018/html/herd18-dt-tab067.html>

Therefore, approximately \$21 million of the \$29 million total COVID-19 appropriation (or 72%) was allocated for UNC-CH-based projects (some of which is for project management and oversight and some of which flows to other campuses such as NCSU, UNCC, and UNCW as well as the NC Department of Environmental Quality for COVID-19 projects being run and overseen by UNC-CH faculty).

The Collaboratory also worked with UNC Board of Governor Member Darrell Allison in his capacity as the chair of the Historically Minority-Serving Institution (HMSI) Committee to allocate \$6 million to these six campuses (ECSU, FSU, NCA&T, NCCU, UNCP, WSSU). The resulting 32-project effort serves two purposes: 1) deployment of critical funds to campuses often left out of large research initiatives and allowed these funds to support and build out existing faculty/staff/student expertise, and 2) ensuring the minority communities hardest hit by this pandemic, including both the on-campus and off-campus communities served by these universities, could benefit from local/regional research and development efforts (including community testing and culturally sensitive public health messaging and surveys).

The remaining funds were distributed amongst the remaining seven UNC campuses (with the exception of ECU, which received its own targeted appropriation) for both unsolicited and solicited project proposals.

To track these COVID-19 funds, the OSBM requires monthly reporting of research progress and expenses. Per the OSBM contract language with the Collaboratory, UNC-Chapel Hill (of which the Collaboratory is a part) is considered the funding award recipient. As the recipient, the Collaboratory submits one comprehensive expense and progress report each month on behalf of all research being carried out at UNC-Chapel Hill. Every other UNC System campus receiving Collaboratory funding (which transferred the full amount each campus' COVID-19 research funding allocation) is considered a subrecipient by the OSBM and uploads monthly expense and progress reports directly to the OSBM through a unique portal (URL) specific to the Collaboratory's appropriation (while also providing a monthly copy of uploaded records to the Collaboratory for review). All OSBM documents related to this project, including the executed contract language and amendments referenced within the contract, are available through the unique portal (URL) provided by the OSBM as follows:

<https://ncosbm.sharefile.com/share/view/s40c72567d9c4faba/foa28398-ee9e-4d21-9b14-613cd62e95c0>

*Lab samples are taken in Rachel Noble's lab at the UNC Institute of Marine Sciences.
Photo courtesy of Megan May, Office of Research Communications.*



Appendix II contains a comprehensive list of the 85 individual COVID-19 research projects funded by the Collaboratory. The following project spotlights are intended to give a sample of the type of research underway at UNC-CH and across universities in the UNC System.

Project Spotlight #1

UNC-Chapel Hill Research: *Setting the National Standard for COVID-19 Research*

Over the last year at UNC-CH awards for research conducted by the university exceeded \$1 billion. This is the first time the university has eclipsed that mark. The record amount in new grants, contracts and awards received in the fiscal year that concluded June 30, 2020 comes largely from sources outside of North Carolina primarily from federal research agencies, industry and nonprofit organizations.

UNC-CH has nationally renowned researchers in a range of fields, including health sciences and medicine. Consequently, since the onset of the COVID-19 pandemic, faculty, staff and students are working on gathering new data and finding solutions to address the global health crisis. The UNC-CH Office of Research estimates that the university will bring in another \$60-80 million funding for research related to COVID-19.

As mentioned earlier, UNC-CH has been designated as the top academic institution in the country in terms of coronavirus research. As such, a majority of the \$29 million in Collaboratory funding, close to 70%, went to UNC-CH to expedite ongoing research, and in some cases evaluate new issues and identify near-term solutions.

Much of the success of UNC-CH's research portfolio comes from its strengths in collaboration across disciplines.



*Researchers at UNC are working to develop treatments for COVID-19.
(photo courtesy of UNC Research)*

Rapidly Emerging Antiviral Drug Discovery Initiative (READDI)

One of the funded COVID-19 projects of particular note is the Rapidly Emerging Antiviral Drug Discovery Initiative (READDI). The goal of READDI is to develop antiviral drugs for epidemic and pandemic viruses. In the current environment, READDI is focused exclusively on identifying and developing antiviral drugs to treat COVID-19.

Developing these new drugs requires a multidisciplinary effort with expertise in virology, medicinal chemistry, biochemistry and viral pathogenesis. The project is funded at \$1.5 million and involves researchers from the School of Medicine, School of Pharmacy and School of Public Health.

Tracking SARS-CoV-2 Across a Range of Municipalities

UNC-CH is also a leader in the field of environmental sciences and one of the COVID-19 projects taps into that expertise. As mentioned earlier in this report the Wastewater Tracking project was originally a modest pilot project for some initial research.

The project has now been expanded with a budget close to \$2 million and involves a team of researchers from UNC-CH, UNCC, UNCW and NCSU. Notably the project also involves technical support from the North Carolina Department of Environmental Quality.

The project is led by the UNC Institute of Marine Sciences and is designed to measure and track COVID-19 pathogens in wastewater across North Carolina. The objective of this research is to determine the presence and persistence of COVID-like viruses in infrastructure and community dynamics of infection.

The research team has been collecting samples from 18 wastewater treatment systems, including Beaufort, Newport, Morehead City, Wilmington, Charlotte, Raleigh, Durham and Cary.

Town of Beaufort Wastewater Treatment Plant (photo courtesy of UNC Research)



Project Spotlight #2

Historically Minority Serving Institutions: *Protecting Public Health On Campus and in the Community*

As noted at the beginning of the report the Collaboratory funded each of the six HMSI's at approximately \$1 million each to engage in a range of activities related to COVID-19.

Elizabeth City State University

ECSU will focus on two approaches in the fight against COVID-19. The university will work to enhance capacity and infrastructure to support COVID-19 response, recovery and resilience for racial and ethnic minority, socially vulnerable and rural communities in northeastern North Carolina by establishing ECSU as a regional site for COVID-19 testing and as the hub for drone delivery, transporting essentials such as PPE and critical medical supplies to the most vulnerable populations in the region.



Elizabeth City State University is expanding its drone program to include delivery of resources related to testing for COVID-19. (photo courtesy of ECSU)

Fayetteville State University

FSU will focus on a four-pronged approach that will include COVID-19 coordinating care and testing for underserved and vulnerable populations; developing a nucleus for a COVID-19 serological testing center; developing noninvasive, rapid risk assessment for symptomatic patients; and adding to the Social Vulnerability Index research for Cumberland County, which will examine the COVID-19 impacts on disadvantaged populations in the region.

North Carolina A&T University

N.C. A&T will fund multi-research projects, addressing COVID-19 studies that include food and animal testing across the state; an affordable fever detection system for K-12; efforts to mitigate mortality rates among older adults in nursing homes and residential care facilities; the design of an anti-viral nanoparticle that can kill the coronavirus; and an economic impact study of the virus in the Piedmont Triad region.

North Carolina Central University

NCCU will create the Advanced Center for COVID-19 Related Disparities (ACCORD) and conduct multidisciplinary research to study the public health and economic impact of COVID-19 in underserved communities in North Carolina. Specifically, the center will facilitate nasal swab testing in seven counties, including Anson, Cabarrus, Durham, Granville, Halifax, Rowan and Vance and leverage outreach programs that focus on culturally sensitive and effective messaging to community groups and organizations.

UNC Pembroke

UNCP will develop an epidemiologic transmission-dynamic model of COVID-19 in rural settings, such as Robeson County, and examine the unique challenges these areas face in terms of dynamics; the need to travel beyond county boundaries for employment opportunities; strained health care resources; and the lack of industry and infrastructure that reliably support remote employment. The university will also study the cognitive and affective influences on prevention practices, including vaccination.

Winston-Salem State University

WSSU is building on a current NIH-funded pilot study on campus that explores the feasibility of training HBCU students as community health workers to deliver evidence-based interventions to address chronic disease. In addition, faculty will engage the Hispanic and African-American communities to better understand the long-term impact on university enrollments and the probability of ongoing social and economic mobility in these communities. A third study will also explore to what extent poverty, disability and minority status relate to COVID-related disparities for vulnerable minority populations in the Piedmont Triad area.

Project Spotlight #3

Taking a Closer Look at the Pandemic's Economic Impact in North Carolina

Much of the research in the portfolio of projects is focused on public health. However, the projects selected also contain several research initiatives that are looking closely at the economic impact of the pandemic and possible solutions. Some of those projects include:

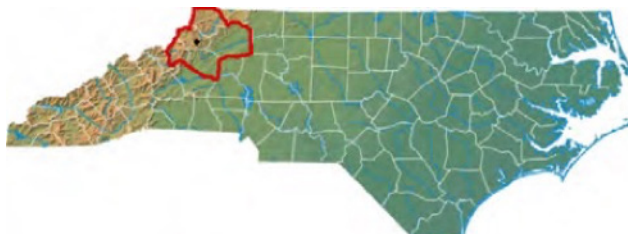
Local Economic Impact on North Carolina Counties

This research, conducted by faculty at UNC-Charlotte, will measure the county-level economic impact of the SARS-COV-2 virus and resultant COVID-19 cases and deaths during the severe economic downturn caused by the mandatory stay-at-home orders enacted during the second quarter of 2020.

Measuring the Economic Impact of COVID-19 Business Related Interruptions on the Regional Economy

This Appalachian State project will conduct a series of economic impact studies to capture the total economic effects of COVID-19-related business interruptions on the regional economy.

The five county region shown here will be the focus of the Appalachian State economic study.



Economic Analysis of COVID-19 for Western North Carolina

The project, being led by Western Carolina University will look at the economic decline in activity due to the pandemic and resulting lockdown in the 23 counties in the western part of the state.

Monitoring North Carolina's Economic Recovery

A research team at UNC-CH plan to establish a real-time database for economic data (e.g., consumer debt burden and delinquency; business start-ups, closures, employees) from cell phones, credit bureaus, and satellite imagery, that is designed to provide policy and decision makers current data.

Commerce with Confidence Simulator

The Digital Health Institute for Transportation is leading an innovative project focused on reopening situations. In order to avoid another wave of public shut-down orders and economic hardships, this study seeks to research, validate, and build a simulation tool that builds models for individualized communities to consult when drafting their own reopening plans with safety and confidence.

Testing the Keys to North Carolina's Economic Recovery

Due to state enforced economic shut-downs, local governments are seeing a stark decline in revenue as a product of reduced retail, tourism, and restaurant activity, as well as an increasing unemployment rate. This study seeks to aggregate the data of two existing data bases at UNC-CH (NC Growth and ncImpact) to measure the effectiveness of government actions and testing in the recovery of the North Carolina economy for individual communities.

Understanding Worker's Transition to Digital Labor Jobs

A research project at UNC-CH is evaluating an economy that previously had a larger portion of the workforce performing "gig" work (e.g., Task Rabbit, Care.com, or Wag dog walking), this project proposes to study the short-term impacts on this workforce now forced to seek digital "gig" work including online freelance or micro-tasking.

The 85 projects supported by the Collaboratory are all at various stages of their research—but all have received their funding and the work has begun in earnest. Each of the projects are required to submit monthly updates on the progress of spending the funds. As required by the legislation all funds are required to be spent by December 30, 2020.

One of the hallmarks of the Collaboratory is the effort made during projects to bring entities together to increase efficiencies and strengthen collaboration and partnerships. The funding of COVID-19 research is another illustration of this approach. In particular the work of the Institute for Convergent Science and Innovate Carolina will be instrumental in bringing together research teams and helping them identify synergies and potential leverage points.

Given the wide range of projects supported by this initiative the expectation is that the Collaboratory and individual research teams will be sharing the outcomes of their work with a number of key stakeholders, in addition to reporting back to lawmakers and state agencies.

For example, these stakeholders that will potentially have interest in the work of the research team include:

- Public health officials and medical experts;
- Economic development officials;
- Local government leaders;
- Community organizations; and
- University representatives

As this research unfolds over the next several months, the Collaboratory will work to share the initial findings and outcomes to state leaders and the public.

APPENDIX I

LEGISLATIVE TEXT

GENERAL ASSEMBLY OF NORTH CAROLINA

SESSION 2019 SESSION LAW 2020-4 HOUSE BILL 1043

AN ACT TO PROVIDE AID TO NORTH CAROLINIANS IN RESPONSE TO THE CORONAVIRUS DISEASE 2019 (COVID-19) CRISIS.

The General Assembly of North Carolina enacts:

PART I. GENERAL PROVISIONS

[...]

AUDIT REQUIREMENT

SECTION 1.8. The State Auditor shall conduct a preliminary financial audit and a final performance audit of the Coronavirus Relief Fund created by this act no later than March 1, 2021.

[...]

PART II. ESTABLISHMENT OF RESERVES AND FUNDS

ESTABLISHMENT OF CORONAVIRUS RELIEF RESERVE

SECTION 2.1. The State Controller shall establish a Coronavirus Relief Reserve (Reserve) in the General Fund to maintain federal funds received from the Coronavirus Relief Fund created under the CARES Act, PL. 116-136, to mitigate the impact of the COVID-19 outbreak in North Carolina. The State Controller shall transfer funds to the Coronavirus Relief Fund established in Section 2.2 of this act only as needed to meet the appropriations set out in this act and only upon request of the Director of the Budget. Funds reserved in the Reserve do not constitute an “appropriation made by law,” as that phrase is used in Section 7(1) of Article V of the North Carolina Constitution.

ESTABLISHMENT OF CORONAVIRUS RELIEF FUND

SECTION 2.2. The Coronavirus Relief Fund (Fund) is established. The purpose of the Fund is to provide necessary and appropriate relief and assistance from the effects of COVID-19, consistent with the provisions of this act and subsequent legislation addressing the effects of COVID-19. The Fund shall be maintained as a special fund and administered by OSBM to carry out the provisions of this act and subsequent acts necessitated as a result of

the COVID-19 outbreak. All funds allocated from the Fund must be used for necessary expenditures incurred due to the public health emergency with respect to COVID-19. Only expenditures incurred during the period that begins on March 1, 2020, and ends on December 30, 2020, are eligible for funding from this Fund.
[...]

PART III. TRANSFER, APPROPRIATIONS, AND ALLOCATIONS

TRANSFER OF FUNDS FROM RESERVES TO RELIEF FUND

SECTION 3.1. Transfer of Funds from Reserves to Relief Fund. – The State Controller shall transfer the sum of one billion two hundred seventy-five million nine hundred eighty-eight thousand twenty-nine dollars (\$1,275,988,029) for the 2019-2020 fiscal year from the Reserve established in Section 2.1 of this act, and the sum of one hundred fifty million dollars (\$150,000,000) for the 2019-2020 fiscal year from the Local Government Coronavirus Relief Reserve established in Section 2.3 of this act, to the Fund established in Section 2.2 of this act.

APPROPRIATION OF FUNDS FROM RELIEF FUND TO OSBM

SECTION 3.2. Appropriation of Funds from Relief Fund to OSBM. – There is appropriated from the Fund to OSBM the sum of one billion four hundred twenty-five million nine hundred eighty-eight thousand twenty-nine dollars (\$1,425,988,029) in nonrecurring funds for the 2019-2020 fiscal year to be allocated and used as provided in Section 3.3 of this act. The funds appropriated in this section shall not revert at the end of the 2019-2020 fiscal year but shall remain available to expend until December 30, 2020.

ALLOCATION OF FUNDS APPROPRIATED TO OSBM

SECTION 3.3. Allocations of Funds. – OSBM shall allocate the funds appropriated in Section 3.2 of this act as follows:
[...]

(23) \$29,000,000 to The University of North Carolina at Chapel Hill to allocate to the North Carolina Policy Collaboratory (Collaboratory) at the University of North Carolina at Chapel Hill. The funds shall be used for (i) the rapid development of a countermeasure of neutralizing antibodies for COVID-19 that can be used as soon as possible to both prevent infection, and for those infected, treat infection, (ii) bringing a safe and effective COVID-19 vaccine to the public as soon as possible, (iii) community testing initiatives, and (iv) other research and activities related to monitoring, assessing, and addressing the public health and economic impacts of COVID-19. The Collaboratory shall facilitate among various entities best practices and strategies to maximize resources and achieve a comprehensive response to COVID-19. The Collaboratory may also assemble an advisory panel of representatives from various entities as necessary to discuss, review, and analyze progress towards meeting those goals and the use of available funds. The Collaboratory shall report on the progress of the development of a countermeasure and vaccine; findings from various community testing initiatives; and other research and activities related to monitoring, assessing, and addressing the public health and economic impacts of COVID-19; and the use of the appropriated funds received pursuant to this subdivision to the Joint Legislative Oversight Committee on Health and Human Services by no later than September 1, 2020. The provisions of Article 3 of Chapter 143 of the General Statutes, G.S. 143-129, and G.S. 116-31.10 shall not apply to the purchase of apparatus, supplies, material, or equipment with any of the funds

allocated under this subdivision.

[...]

SECTION 5.3. Except as otherwise provided, this act is effective when it becomes law. If Senate Bill 704, 2019 Regular Session, is vetoed, this act is repealed. If the veto of Senate Bill 704, 2019 Regular Session, is overridden, this act is reenacted.

In the General Assembly read three times and ratified this the 2nd day of May, 2020.

s/ Philip E. Berger
President Pro Tempore of the Senate

s/ Tim Moore
Speaker of the House of Representatives

s/ Roy Cooper
Governor

APPENDIX II

PROJECT DESCRIPTIONS

The following is a synopsis of the 85 funded projects by the Collaboratory. For more details of each project please visit <https://collaboratory.unc.edu/current-projects/covid-19-research/>.



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL

Adams School of Dentistry

Infrastructure Core Facility

Lead Researcher: Shannon Wallet, Rob Maile, Matthew Wolfgang

Budget: \$523,703

This study is to support the DELTA-CoV2 Translational Facility in providing centralized clinical sample provisioning, providing services such as sample processing and disseminating standardized practices to research communities.

College of Arts and Sciences

Pan-COVID-19 Multivalent Binders to Block Virus Entry

Lead Researcher: Ronit Freeman, Applied Physical Sciences

Budget: \$177,114

Through testing multivalent binders as antiviral therapeutic prevention to infection, this study seeks to generate a library of peptide-antibody fusions, explore viability of peptide binding, create computerized simulations of peptide interactions, and increase peptide and peptoid productions.

Nitric Oxide-Releasing Cyclodextrins for Treating COVID-19 Infections

Lead Researcher: Mark Schoenfisch, Chemistry

Budget: \$900,000

Entering its third phase of testing for a pre-clinical anti-viral drug, this study seeks to establish NO (an antiviral compound that has proved effective in the treatment of pulmonary pathogens and prevents the viral replication needed by pathogens to survive) as a candidate treatment for respiratory infections from COVID-19.

High Capacity Screening

Lead Researcher: Michael Ramsey, Chemistry

Budget: \$377,255

With a highly multiplexed, digital assay platform, this project is able to perform high volumes of COVID-19 tests and generate results in 30-60 minutes to promote contact tracing, effective transmission intervention, and outbreak risk mitigation.

Monitoring North Carolina Economic Recovery

Lead Researcher: Noreen McDonald, City and Regional Planning

Budget: \$287,028

By establishing a real-time database for economic data (e.g., consumer debt burden and delinquency; business start-ups, closures, employees) from cell phones, credit bureaus, and satellite imagery, this project hopes to provide policy and decision makers current data.

Household Internet Traffic Data

Lead Researcher: Jonathan Williams, Economics

Budget: \$15,000

With the partnership of an internet service provider, this study hopes to determine the variation of internet usage by household demographics and state ordered shut-down stages to better inform effective online schooling.

Policy in Polarized Times

Lead Researcher: Marc Hetherington, Political Science

Budget: \$72,950

In a two-part effort, this project studies government relationships with public health and economic outcomes and the most effective public messaging strategies for successful public health policies during a politically polarized crisis.

To Wear or Not to Wear a Face Covering

Lead Researcher: Barbara Fredrickson, Psychology and Neuroscience

Budget: \$98,558

Seeking to understand the public propensities of adhering to novel behaviors in a pandemic, this study hopes to find a correlation between communal virtues and those behaviors.

Eshelman School of Pharmacy

Preclinical Development of a Potent Muco-Trapping Antibody Against SARS-CoV-2 for Inhaled Immunotherapy and Prophylaxis Against COVID-19

Lead Researcher: Sam Lai

Budget: \$798,352

This study seeks to engineer a neutralizing monoclonal antibody against SARS-CoV-2.

Expanding Telehealth Services to Prevent COVID-19 in Rural North Carolina

Lead Researcher: Jon Easter

Budget: \$65,705

This study will increase telehealth implementation through creating four rural NC clinics to expand safe care for vulnerable patients.

Rapidly Emerging Antiviral Drug Discovery Initiative (READDI #4)

Lead Researcher: Tim Willson

Budget: \$215,115

The goal of READDI is to develop antiviral drugs for epidemic and pandemic viruses. Developing these new drugs requires a multidisciplinary effort with expertise in virology, medicinal chemistry, biochemistry and viral pathogenesis.

Rapidly Emerging Antiviral Drug Discovery Initiative (READDI #5)

Lead Researcher: Kenneth Pearce

Budget: \$196,039

The goal of READDI is to develop antiviral drugs for epidemic and pandemic viruses. Developing these new drugs requires a multidisciplinary effort with expertise in virology, medicinal chemistry, biochemistry and viral pathogenesis.

Gillings School of Global Public Health

COVID-19 Mountaire Processing Plant Study

Lead Researcher: Natalie Bowman

Budget: \$698,214

This study's purpose is to examine transmission in food processing workers and their close contacts.

Technical Assistance Using a Total Worker Health (TWH) Approach and Evidence-Based Strategies to Ensure a Safe Return to Work in NC

Lead Researcher: Leena Nylander-French and Laura Linnan

Budget: \$485,895

This study will launch a technical assistance program designed to assist NC businesses with their efforts to respond to the COVID-19 pandemic and ensure safe and healthy re-opening of businesses.

Statewide Sero-surveillance Network

Lead Researcher: Allison Aiello

Budget: \$533,515

This study will provide consultative services to other academic institutions and public health agencies across the state in support of the design and implementation of high-quality sero-studies.

Re-opening schools SARS-CoV-2 Prevention Strategies in North Carolina Schools

Lead Researcher: Kimberly Powers and Allison Aiello

Budget: \$274,919

This study will focus on researching measures to keep students and staff safe from SARS-CoV-2.

The Gillings Center for Coronavirus Testing, Screening, and Surveillance

Lead Researcher: Daniel Westreich

Budget: \$597,641

This study seeks to create a resource center for Coronavirus testing, screening and surveillance.

Antiviral Accelerator: Basic-Emerging CoV Vaccine Development

Lead Researcher: Ralph Baric

Budget: \$465,505

This study will focus on development of a cross-protective vaccine.

High-Throughput Equipment

Lead Researcher: *Ralph Baric*

Budget: \$1,605,928

This study will focus on developing vaccines and therapeutics using techniques that block cellular mechanism of viral activity rather than tailoring to specific viruses.

Rapidly Emerging Antiviral Drug Discovery Initiative (READDI #1)

Lead Researcher: *Ralph Baric*

Budget: \$702,095

The goal of READDI is to develop antiviral drugs for epidemic and pandemic viruses. Developing these new drugs requires a multidisciplinary effort with expertise in virology, medicinal chemistry, biochemistry and viral pathogenesis

Graduate School

I4 (Include, Identify, Investigate, Influence) Boundary Spanners

Lead Researcher: *Suzanne Barbour*

Budget: \$120,000

This project is designed to train graduate student in policy and government with an emphasis on how data can impact policy decisions.

Institutes and Centers

Financial Viability of Critical Health Care Facilities

Lead Researcher: *Gregory Characklis, Center on Financial Risk in Environmental Systems*

Budget: \$116,000

To avoid future financial insolvency and economic hardship for hospitals in the wake of COVID-19 pandemic, this research will bridge the gap between planning for pandemic health care and economic supply and demand efficiency of hospital capacities during an infectious disease period.

Mobility Project

Lead Researcher: *Randa Radwan, Highway Safety Research Center*

Budget: \$928,602

In light of the dramatic change in public mobility from COVID-19 shut-down orders and public closures, this study seeks to understand the effects of mobility on COVID-19 transmission throughout the state of North Carolina and its effect on the transportation industry.

Response of Manufacturing Extension

Lead Researcher: *Nichola Lowe, Center for Urban and Regional Studies*

Budget: \$50,000

Through comparative research of U.S. Manufacturing Extensions Partnership (MEP) in other states, this project seeks to utilize available data of MEP actions to build a database that informs North Carolina's MEP and Department of Commerce to develop evidence-based solutions for economic recovery.

Commerce with Confidence Simulator

Institute for Convergent Science

Budget: \$917,360

In order to avoid another wave of public shut-down orders and economic hardships, this study seeks to research, validate, and build a simulation tool that builds models for individualized communities to consult when drafting their own reopening plans with safety and confidence.

Innovation Intelligence

Lead Researcher: Michelle Bolas, Innovate Carolina

Budget: \$94,162

This project hopes to establish framework support for COVID-19 projects and leverage the ImpactX platform to transform research outcomes to applied solutions.

ICS Collaboration Project

Lead Researcher: Chris Clemens, Institute for Convergent Science

Budget: \$334,300

ICS's project hopes to provide support with its network and resources to projects that were unsuccessful when they initially sought funding in order to reform those project's goals with the convergences of knowledge from multiple disciplines.

Tracking SARS-CoV-2 in the Wastewater Across a Range of North Carolina Municipalities

Lead Researcher: Rachel Noble, Institute of Marine Sciences

Budget: \$1,715,000

Tracking aggregate pandemic infection through wastewater treatment has been proven to be an effective and non-invasive method of understanding the social mobility, individual community variations, and movement of undiagnosed and asymptomatic infections.

This project is a collaboration between multiple universities, including UNC, NCSU, UNC-C, and UNC-W and the N.C. Department of Environmental Quality

NC Department of Environmental Quality Wastewater Research

Lead Agency: Division of Water Resources

Budget: \$85,000

DWR's overall goal is to contribute information to researchers by working with investigators and permittees to coordinate sampling design plans and sampling collection.

Project Management of Legislatively Mandated COVID-19 Research

Project Management Team: Jeff Warren, Laurie Farrar, Steve Wall, Policy Collaboratory

Budget: \$189,891

The project team will actively manage the full slate of 85 studies and any additional studies that may be funded through these COVID-19 research funds including ensuring scopes of work and related timelines are followed and met, required monthly progress and expense reports are tendered, interim progress reports are compiled and distributed to the NCGA.

Case Study of Data Travels

Lead Researcher: Ashok Krishnamurthy, Renaissance Computing Institute (RENCI)

Budget: \$193,252

This project proposes to create a report summarizing the collection and use of COVID-19 data for the public.

Office of Vice Chancellor for Research

Testing and Tracking Transmission of UNC Employees

Lead Researcher: Audrey Pettifor

Budget: \$3,058,084

This study seeks to determine if safety and prevention measures in place on UNC campus are effective at reducing spread of SARS-CoV-2.

School of Education

Supporting Adolescents with Suicidal Thoughts

Lead Researcher: Marisa Marraccini

Budget: \$55,000

This study will develop and disseminate guidelines for mental health professionals navigating providing mental health care for students who are high risk for suicide—which is expected to be a significant group due to school closures and interrupted mental health care during the expected second wave of COVID-19 this fall.

School of Government

Testing the Keys to Economic Recovery

Lead Researcher: Anita Brown-Graham

Budget: \$95,000

Due to state-enforced economic shut-downs, local governments are seeing a stark decline in revenue as a product of reduced retail, tourism and restaurant activity, as well as an increasing unemployment rate. This study seeks to aggregate the data of two existing data bases (NC Growth and ncImpact) to measure the effectiveness of government actions and testing in the recovery of the North Carolina economy for individual communities.

Mitigating Impact on Water and Wastewater Utilities

Lead Researcher: Erin Riggs

Budget: \$50,000

To combat the growing financial pressures of North Carolina's utility sector after the state passed a moratorium on utility shut offs in late March 2020, this project will fund the direct technical assistance and develop further financial tools to aid North Carolina local governments.

Protecting Older Adults

Lead Researcher: Margaret Henderson

Budget: \$90,000

Because COVID-19 particularly impacts elderly adults who are already vulnerable to physical and mental health risks, isolation from resources, and financial exploitation and scams, this project hopes to build Multidisciplinary Teams (MDTs) to coordinate virtual resources and tools for the North Carolina elderly community.

School of Information and Library Science

Workers Transition to Digital Labor Jobs

Lead Researcher: Mohammad Hossein Jarrahi

Budget: \$62,528

In an economy that previously had a larger portion of the workforce performing “gig” work (e.g., Task Rabbit, Care.com, or Wag dog walking), this project proposes to study the short-term impacts on this workforce now forced to seek digital “gig” work including online freelance or micro-tasking.

School of Medicine

Convalescent Plasma Trial

Lead Researcher: Luther Bartelt

Budget: \$1,615,000

This study seeks to understand how COVID-19 positive antibodies in plasma could be used for donation resulting in disease and death prevention.

Therapeutics I: Transitioning/Optimizing New Drugs for Pulmonary Delivery

Lead Researcher: Richard Boucher

Budget: \$607,190

This study is to accelerate drug development for the prevention and treatment of COVID-19 through delivering pulmonary antiviral aerosol compounds to the system.

Therapeutics II: Preclinical Studies of Novel Therapeutic Agents in Mouse Models for Target/Drug Validation, Pharmacokinetic Studies, and Efficacy Using Mouse-Adapted SARS-COV-2 Virus

Lead Researcher: Richard Boucher

Budget: \$781,078

This study will create an in vivo mouse facility to test therapies to treat both phases of COVID-19 disease.

A Vaccine Against COVID-19 that Strongly Induces Three Branches of Immunity

Lead Researcher: Jenny Ting

Budget: \$342,411

This study seeks to develop a vaccine outside of the typical methods implemented to achieve higher efficiency.

BRAVE: Respiratory Virus Tracking (including SARS-CoV2) in NC

Lead Researcher: Dirk Dittmer

Budget: \$717,300

The goal of this study is to enroll every patient in UNC hospitals with flu or respiratory symptoms for SARS-CoV-2 antibody testing.

Vector or Victim: SARS-CoV-2 Infection in Healthcare Workers and Their Household Contacts at the UNC Medical Center

Lead Researcher: Ross Boyce

Budget: \$315,000

This study will quantify the incidence of SARS-CoV-2 infections among healthcare workers and determine how these individuals may contribute to the spread within hospital and community transmission.

Rapidly Emerging Antiviral Drug Discovery Initiative (READDI #2)

Lead Researcher: Nathaniel Moorman

Budget: \$153,310

The goal of READDI is to develop antiviral drugs for epidemic and pandemic viruses. Developing these new drugs requires a multidisciplinary effort with expertise in virology, medicinal chemistry, biochemistry and viral pathogenesis.

Rapidly Emerging Antiviral Drug Discovery Initiative (READDI #3)

Lead Researcher: Mark Heise

Budget: \$233,433

The goal of READDI is to develop antiviral drugs for epidemic and pandemic viruses. Developing these new drugs requires a multidisciplinary effort with expertise in virology, medicinal chemistry, biochemistry and viral pathogenesis.

School of Social Work

Essential Women of Color

Lead Researcher: Rachel Goode

Budget: \$100,000

Because essential workers are disproportionately women of color and disproportionately affected by the COVID-19 pandemic, this study seeks to understand the coping mechanisms essential women workers of color are using to support the well-being of themselves and their families, and discovering the outside supports that would aid these women.

UNC-Chapel Hill subtotal: \$21,989,889



Measuring the Economic Impact of COVID-19-Related Business Interruptions on the Regional Economy of NC

Lead Researcher: Ash Morgan and Jason Hoyle, Center for Economic Research

Budget: \$97,850

This project will conduct a series of economic impact studies to capture the total economic effects of COVID-19-related business interruptions on the regional economy.



Building Regional Infrastructure for Mitigating the Impact of COVID-19 within Racial/Ethnic Minority, Socially Vulnerable, and Rural Communities Project 1: Regional Site for COVID-19 Testing

Lead Researcher: Farrah Ward, Office of the Provost

Budget: See subtotal below

This project will develop the capability for diagnostic testing of SARS-CoV-2 and develop campaigns to support increased awareness of public health practices among vulnerable subgroups.

Building Regional Infrastructure for Mitigating the Impact of COVID-19 within Racial/Ethnic Minority, Socially Vulnerable, and Rural Communities Project 2: Drone Delivery of Needed Resources

Lead Researcher: Farrah Ward, Office of the Provost

Budget: See subtotal below

This project will expand ECSU's existing drone fleet to include long-range high endurance delivery drones to transport personal protective equipment (PPE) and other essentials, including food and medicine.

Elizabeth City State University subtotal: \$1,000,000



COVID-19 Care Coordination Project 1: COVID 19 Testing

Lead Researcher: Sharon Gallagher, College of Health Science & Technology

Budget: \$510,000

This project will partner with community agencies and a local laboratory to offer viral/antibody testing, promote testing, and recruit individuals for testing events.

COVID-19 Care Coordination Project 2: Developing the Capacity of Serological Testing

Lead Researcher: Eid Haddad, College of Health Science & Technology

Budget: \$160,000

This project will develop a nucleus of a future COVID-19 serological testing center equipped with and staffed to perform assays.

COVID 19 Care Coordination Project 3: Retinal Net Prototype – Pilot Study

Lead Researcher: Murat Adivar, College of Health Science & Technology

Budget: \$237,000

This project will develop a prototype medical device artificially intelligent system to detect COVID-19 through both retinal iris eye imaging.

COVID-19 Care Coordination Project: COVID-19 Social Vulnerability Research

Lead Researcher: Pius Nyutu, College of Health, Science & Technology

Budget: \$93,000

The research will identify the most relevant drivers of social vulnerability for marginalized populations in Cumberland County to add to the knowledge surrounding the impact of COVID-19.

Fayetteville State University subtotal: \$1,000,000



NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIVERSITY

Food Animal SARS-CoV2 Testing

Lead Researcher: Radiah Minor, Animal Sciences

Budget: \$247,920

Because some North Carolina counties experiencing the most aggressive COVID-19 outbreaks are significantly involved in food animal production, this study seeks to incorporate SARS-CoV2 testing of food animals into formulating guidelines for mitigating virus transmission.

Affordable IR Fever Detection Systems for K-12 and Higher Education Facilities

Lead Researcher: Raymond Tesiero, Civil, Architecture, and Environmental Engineering

Budget: \$298,137

In light of educational institutions reopening to high volumes of student and staff traffic during an ongoing pandemic, this study seeks to rapidly develop three affordable prototype IR fever detection systems for schools to perform rapid symptom screenings and mitigate virus transmission.

Predictors of and Strategies to Mitigate COVID-19 Cases and Deaths Among the Elderly in Nursing Homes and Residential Care Facilities

Lead Researcher: Stephanie Teixeira-Poit, Sociology

Budget: \$71,428

In a study to determine correlations between quality of pre-COVID-19 care measures and COVID-19 cases and deaths in elderly populations, a large compilation of data sources and data analysis will be used to develop actionable recommendations to facilities providing residential care to the elderly.

Designing an Anti-Viral Nanoparticle Against SARS-CoV2

Lead Researcher: Liesl Jeffers-Francis, Biology

Budget: \$130,400

Because metallic nanoparticles (silver, AgNP; copper, CuNP; and iron, FeNP) have promising properties as an anti-viral coating for surfaces and filters to block COVID-19 binding to its targets and gain entry into host cells, this study seeks to obtain insights for their uses as additive materials to everyday surfaces.

Portal Sensing Platform for Rapid Detection of SARS-CoV2 Virus in Air Through Nanoengineered Surface Enhanced Raman Scattering

Lead Researcher: Lifeng Zhang, Nanoengineering

Budget: \$200,000

This project aims to develop a portal sensing platform to test SARS-CoV2 in the air in three parts: developing electro-spinning netting for COVID-19 testing, engineering the growth of Ag nanoparticles for testing, and generating portal COVID-19 detection with Raman signals.

Economic Impact of COVID-19 in the Piedmont Triad Region

Lead Researcher: Cephas Naanwaab, Economics

Budget: \$48,000

In a project with two objectives, this study seeks to assess the holistic economic impact of COVID on North Carolina's Piedmont Triad Region and formulate models and expectations of a range of government ordered closure levels (from total closure to complete normal operations).

NC Agricultural & Technical State University subtotal: \$995,885



Advanced Center for COVID-19-Related Disparities (ACCORD) Project 1: Facilitate COVID-19 Testing (Anson, Cabarrus, Durham, Granville, Halifax, Rowan, and Vance Counties, NC)

Lead Researcher: Deepak Kumar, Chambers Biomedical Biotech Research Institute

Budget: \$306,254

This project will facilitate COVID-19 testing and study the impact of COVID-19 in underserved communities in medically underserved areas of North Carolina. The project will focus on seven counties.

Advanced Center for COVID-19-Related Disparities (ACCORD) Project 2: Development and Dissemination of Culturally Sensitive Messaging on COVID-19 to Medically Underserved Populations

Lead Researcher: Deepak Kumar, Chambers Biomedical Biotech Research Institute

Budget: \$100,000

Leverage two existing programs to develop materials for COVID-19 messaging in partnership with faith-based organizations.

Advanced Center for COVID-19-Related Disparities (ACCORD) Project 3: COVID-19 Seroprevalence Testing for NCCU Community (Faculty, Staff and Students)

Lead Researcher: Deepak Kumar, Chambers Biomedical Biotech Research Institute

Budget: \$217,000

This project will allow for testing of faculty, staff and students.

COVID-19 Impacts on Community-Based Interventions for Justice-Involved Minority Young Adults: Practitioner and Consumer Prospective

Lead Researcher: Jonathan Glenn, Juvenile Justice Institute

Budget: \$8,525

This project will utilize focus groups of young adults that have been involved with the justice system to identify the impacts of the pandemic on this population subset.

The Pandemic of Stress: Examining the Relations among Occupational Status, Perceived Stress, Self-Rated Health, and Sleep during COVID-19

Lead Researcher: Tanisha Burford, Psychology

Budget: \$10,622

This project will examine the effects of perceived stress among essential and non-essential workers and the impact of the pandemic.

Contact Tracing for COVID-19: Acceptability and Barriers in African American Communities

Lead Researcher: Irene Doherty, Chambers Biomedical Biotech Research Institute

Budget: \$12,040

This project will investigate the barriers and challenges to conducting contract tracing in African-American communities.

COVID-19: Impact on Black Families

Lead Researcher: Nina Smith, Human Sciences

Budget: \$8,500

This project will conduct a health assessment of African Americans living in rural and urban areas throughout North Carolina.

Stress, Coping, Perceptions, and Professional Outlook of HBCU Nursing Students Related to COVID-19

Lead Researcher: Elizabeth Tomlinson, Nursing

Budget: \$13,000

This project will measure the stress and impacts of the pandemic on nursing students at NCCU.

The Role of Food Security in the Social Determinants of Health: Contingent Impacts of COVID-19 in North Carolina

Lead Researcher: Christopher Paul, Public Administration

Budget: \$65,606

This project will evaluate food security issues facing families and communities and the impacts of the pandemic.

Development of a Conjugate Vaccine Against CARS-CoV-2

Lead Researcher: Nathan Wymer, Chemistry and Biochemistry

Budget: \$75,000

This project will optimize research methods related to the development of vaccines.

Drug Repurposing for COVID-19 Using Data Mining and Machine Learning Technologies

Lead Researcher: Weifan Zheng, Chambers Biomedical Biotech Research Institute

Budget: \$53,000

This project will utilize computational models to assess drug development options.

Acceptability and Barriers to COVID-19 Testing, Tracing, and Immunization Among African American Students and Residents of Low-Income Communities

Lead Researcher: Brittany Baker, Nursing

Budget: \$28,790

This project will investigate the challenges of contact tracing at the university level.

Experiences of African-American Caregivers of Children with Autism: Rurality and Resources during the COVID-19 Pandemic

Lead Researcher: Danai Fannin, Communications Disorders

Budget: \$31,263

This project will identify challenges facing those families with children with autism and the impacts of the pandemic.

Global Supply Chain of Medical Equipment: Vulnerability Assessment, Emergency Response Tool and Financial Impact Analysis

Lead Researcher: Kayvan Lavassani, School of Business

Budget: \$30,000

This project will assess the global supply chain of medical equipment and the impacts of the pandemic.

Field-Ready Genetic Coronavirus Test for use in Low-Resource Underserved Populations

Lead Researcher: John Moore, Chambers Biomedical Biotech Research Institute

Budget: \$40,400

This project explores options for testing in underserved populations.

NC Central University subtotal: \$1,000,000

NC STATE UNIVERSITY

Tracking SARS-CoV-2 in the Wastewater Across a Range of Municipalities

Lead Researchers: Rachel Noble, UNC Institute of Marine Sciences and Francis de los Reyes, NC State University

This project is a collaboration between multiple universities, including UNC, NCSU, UNC-C and UNC-W

Budget: \$1,715,000 (with an additional \$85,000 directly from the Collaboratory to fund the NC Department of Environmental Quality to support field sampling and logistics related to this project)

Tracking aggregate pandemic infection through wastewater treatment has been proven to be an effective and non-invasive method of understanding the social mobility, individual community variations, and movement of undiagnosed and asymptomatic infections.

NC State University funding allocation: \$525,000



Back-to-College Challenge: Health Ambassadors for a Coordinated Culture of Safety and Wellness on WNC Campuses

Lead Researcher: Amy Lanou, NC Center for Health & Wellness

Budget: see subtotal below

This project seeks to initiate a Western North Carolina Campus Health Ambassador program rapidly engage college communities in a common COVID-19 transmission mitigation strategy.

Studying the Impact of the Social Bridging Initiative

Lead Researcher: Amy Lanou, NC Center for Health & Wellness

Budget: see subtotal below

This project is designed to research the impact of reducing social isolation through community resources.

Statewide Co-morbidity Analysis

Lead Researcher: Amy Lanou, NC Center for Health & Wellness

Budget: see subtotal below

This project will conduct a statewide study of co-morbidity.

UNC Asheville subtotal: \$611,069



Local Economic Impacts on North Carolina Counties by the COVID-19 Pandemic

Lead Researcher: John Connaughton and Craig Depken, Belk College of Business

Budget: \$108,868

This research will measure the county-level economic impact of the SARS-COV-2 virus and resultant COVID-19 cases and deaths during the severe economic downturn caused by the mandatory stay-at-home orders enacted during the second quarter of 2020.

Tracking SARS-CoV-2 in the Wastewater Across a Range of Municipalities

Lead Researchers: Rachel Noble, UNC Institute of Marine Sciences and Francis de los Reyes, NC State University

This project is a collaboration between multiple universities, including UNC-CH, NCSU, UNCC and UNCW

Budget: \$1,715,000 (with an additional \$85,000 directly from the Collaboratory to fund the NC Department of Environmental Quality to support field sampling and logistics related to this project). Funding allocation: \$60,000.

Tracking aggregate pandemic infection through wastewater treatment has been proven to be an effective and non-invasive method of understanding the social mobility, individual community variations, and movement of undiagnosed and asymptomatic infections.

UNC Charlotte subtotal: \$168,868



UNC GREENSBORO

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Nutrition and COVID-19 in North Carolina

Lead Researcher: Maryanne Perrin and Seth Armah, Nutrition

Budget: \$99,385

The project will examine how dietary patterns and the intake and status of select micronutrients (selenium and zinc) affect the severity of COVID-19 illness in a population of North Carolinians who have been infected with the COVID-19 virus.



Epidemiologic Transmission-Dynamic Modeling of Highly Pathogenic SARS-CoV2 in Rural Robeson County

Lead Researcher: Lisa Mitchell, School of Education

Budget: See subtotal below

This project seeks to develop short- and long-term epidemiologic transmission models for COVID-19 in rural communities and use those models to create guidelines for transmission mitigation efforts.

Cognitive and Affective Influences on Prevention Practices Including Vaccination

Lead Researcher: Lisa Mitchell, School of Education

Budget: See subtotal below

This project is intended to identify cognitive and affective influences on adult decision making related to prevention practices including acceptance or rejection of vaccinations.

UNC Pembroke subtotal: \$987,176



Tracking SARS-CoV-2 in the Wastewater Across a Range of Municipalities

Lead Researchers: Rachel Noble, UNC Institute of Marine Sciences and Larry Cahoon, UNC-Wilmington

This project is a collaboration between multiple universities, including UNC-CH, NCSU, UNCC and UNCW

Budget: \$1,715,000 (with an additional \$85,000 directly from the Collaboratory to fund the NC Department of Environmental Quality to support field sampling and logistics related to this project)

Tracking aggregate pandemic infection through wastewater treatment has been proven to be an effective and non-invasive method of understanding the social mobility, individual community variations, and movement of undiagnosed and asymptomatic infections.

UNC Wilmington funding allocation: \$75,000



Economic Analysis of COVID-19 for Western North Carolina

Lead Researcher: Edward Lopez, Inhyuck Ha, and Sean Mulholland Center for the Study of Free Enterprise

Budget: \$109,878

The project will examine the economic impact of COVID-19 and North Carolina's response on the 23 western counties.



WINSTON-SALEM STATE UNIVERSITY

Evaluating HBCU-Public Health Partnerships for Addressing COVID-19 Response Needs

Lead Researcher: Hayley Jackson-Figueroa, School of Health Sciences

Budget: See subtotal below

This project will evaluate HBCU-public health partnerships for addressing COVID-19 response needs.

Understanding the Economic and Educational Impact of COVID-19 Responses in NC

Lead Researcher: Zagros Madjd-Sadjadi, Center for Study of Economic Mobility

Budget: See subtotal below

This project will work to understand the economic and educational impact of COVID-19 responses in NC.

Understanding the Impact of COVID-19 on Under-Resourced Communities

Lead Researcher: Tammara Thomas, Human Services Studies

Budget: See subtotal below

This project is designed to understand the impact of COVID-19 on under-resourced communities.

Winston-Salem State University subtotal: \$1,000,000

APPENDIX III

MEDIA COVERAGE

MEDIA COVERAGE OF COLLABORATORY COVID-19 RESEARCH

“UNC Receives Millions in State Funding to Continue COVID-19 Research”

<https://chapelboro.com/news/unc/unc-receives-millions-in-state-funding-to-continue-covid-19-research>

Chapelboro, May 4, 2020

“Here’s How UNC is Spending \$29 Million in Coronavirus Research”

<https://www.newsobserver.com/news/local/article243420746.html>

The News and Observer, June 10, 2020

“UNC Board of Governors HMSI Committee Receives \$6 M in Funding to Fight COVID-19”

<https://www.northcarolina.edu/news/unc-board-of-governors-hmsi-committee-receives-6m-in-funding-to-fight-covid-19/>

UNC System Press Release, June 11, 2020

“NC Central study to focus on COVID-19 in underserved communities”

<https://abc11.com/coronavirus-in-nc-covid-19-underserved-communities-central/6248931/>

WTVD, June 15, 2020

“UNC-A gets \$610,000 to fight COVID-19”

<https://wlos.com/news/local/unca-gets-610000-to-fight-covid-19>

WLOS, June 15, 2020

“Fayetteville State to offer free testing for COVID-19”

<https://www.fayobserver.com/story/news/coronavirus/2020/07/07/fayetteville-state-to-offer-free-testing-for-covid-19/41717703/>

Fayetteville Observer, July 7, 2020

“From livestock to nanoparticles: COVID-19 research runs the gamut at NC universities”

<https://www.wral.com/coronavirus/from-livestock-to-nanoparticles-covid-19-research-runs-the-gamut-at-nc-universities/19197691/>

WRAL, July 21, 2020

“North Carolina Policy Collaboratory distributes \$29 million for COVID-19 research”

<https://www.unc.edu/posts/2020/07/22/north-carolina-policy-collaboratory-distributes-29-million-for-covid-19-research/>

UNC-Chapel Hill Press Release, July 22, 2020

“Sewage Sampling May Preview Virus Trends”

<https://www.coastalreview.org/2020/08/sewage-sampling-may-preview-virus-trends/>

Coastal Review Online, August 6, 2020

“COVID-19 research examines health and mobility across North Carolina”

<https://www.hsrc.unc.edu/news/announcements/covid-19-research/>

UNC News, August 18, 2020

Organizations working to help meet demand for convalescent plasma at Triangle hospitals

<https://www.cbs17.com/community/health/coronavirus/organizations-working-to-help-meet-demand-for-convalescent-plasma-at-triangle-hospitals/>

CBS-17, August 24, 2020

“Regional economic impact of pandemic examined by the Center for the Study of Free Enterprise”

<https://www.wcu.edu/stories/posts/News/2020/08/regional-economic-impact-of-pandemic-examined-by-center-for-the-study-of-free-enterprise.aspx>

WCU Press Release, August 25, 2020

APPENDIX IV

MEMBERSHIP OF COVID ADVISORY RESEARCH TEAM

MEMBERSHIP OF COVID ADVISORY RESEARCH TEAM

Duke University

Dr. Bart Haynes

Director, Human Vaccine Institute, Dept. of Medicine

Dr. Chris Woods

Co-Director, Hubert-Yeargan Center for Global Health and Professor, Departments of Medicine and Pathology

East Carolina University

Dr. Peter Schmidt

Vice Dean, Brody School of Medicine and Associate Vice-Chancellor for Medical Affairs

Dr. Ronny Bell

Chair, Department of Public Health

Dr. C. Suzanne Lea

Associate Professor, Department of Public Health

Campbell University

Dr. Britt Davis

Vice-President for Institutional Advancement

Dr. Robin King-Thiele

Associate Dean for Post-Graduate Affairs

Dr. Terri Hamrick

Associate Dean of Research, Wallace School of Osteopathic Medicine

Wake Forest University

Dr. John Sanders

Professor, Infectious Diseases; Chief of Infectious Diseases, Internal Medicine at WF Baptist Health

Dr. David Herrington

Professor, Cardiology

Dr. Anthony Atala

Chair and Institute Director, Wake Forest Institute for Regenerative Medicine (WFIRM)

UNC-Chapel Hill

Dr. Chris Clemens

Senior Associate Dean for Research and Innovation

Dr. Penny Gordon-Larsen

Associate Dean for Research, Gillings School of Global Public Health

Dr. Blossom Damania

Vice Dean for Research, UNC School of Medicine

Dr. Shannon Wallet

Associate Dean for Discovery and Innovation, Adams School of Dentistry

Dr. Kim Brouwer

Associate Dean, Eshelman School of Pharmacy

Dr. Leah Devlin

Professor of the Practice, Gillings School of Global Public Health

Dr. Jeff Warren

Executive Director, NC Policy Collaboratory

Nate Knuffman

Interim Vice-Chancellor for Finance and Operations

NC Department of Health and Human Services

Dr. Zack Moore

State Epidemiologist, NC Public Health

Dr. Aaron Fleischauer

Career Epidemiology Field Officer, NC Public Health

Dr. Amanda Fuller Moore

Pharmacist, NC Public Health

Beth Dittman

Environmental Program Consultant, NC Public Health

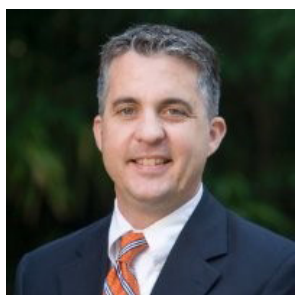
Dr. Crystal Lee Pow Jackson

Environmental Program Consultant, NC Public Health

ACKNOWLEDGMENTS

The development, selection and implementation of the projects outlined in this report has involved hundreds of faculty, staff and students at UNC-Chapel Hill and across the UNC System. The Collaboratory staff and board recognize the valuable contributions made by many to catalyze and undertake the research projects described in the report.

Collaboratory Staff



Dr. Jeff Warren,
Executive Director



Laurie Farrar,
Budget and Finance



Steve Wall,
Outreach Director



Hope Thomson,
Graduate Research Assistant

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Historically Minority Serving Institutions Advisory Committee

UNC Board of Governors Member Darrell Allison was instrumental in facilitating the discussion among the following HMSI representatives who worked with the Collaboratory to identify projects.

Dr. Farrah Ward, *Provost, Elizabeth City State University*

Dr. Afua Arhin, *Dean, College of Health, Science and Technology, Fayetteville State University*

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Dr. Erin Lynch, *Associate Provost of Scholarship, Research and Innovation, Winston-Salem State University*

Dr. Camile Klutz-Leach, *Vice Chancellor and Chief of Staff, Winston-Salem State University*

Mountain Area Health Education Center

The partnership project with the Mountain Area Health Education Center (MAHEC) was made possible through the work of Amy Lanou (UNC-Asheville), Sheri Denslow (UNC-Chapel Hill) and Jason Wingert (MAHEC).

Design

Layout, graphics and design for this report was conducted by Kyle McKay with UNC-Chapel Hill.

Website

Website curation of the COVID-19 projects is managed by Gary Wilhelm with UNC-Chapel Hill.

Editing

NC Policy Collaboratory interns Brooke Bauman, Claire Bradley and Zoe Wadge provided assistance in the drafting of this report.

For more information visit: <https://collaboratory.unc.edu/>

NC Policy Collaboratory