

FINAL REPORT

to:

North Carolina Policy Collaboratory
at the University of North Carolina at Chapel Hill

submitted by:

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INTRODUCTION

This project was implemented by Dr Nikhil Kaza, Dr Nichola Lowe, and Dr Noreen McDonald in the Department of City and Regional Planning at the University of North Carolina at Chapel Hill. It was supported by the North Carolina Policy Collaboratory with funding from the North Carolina Coronavirus Relief Fund established and appropriated by the North Carolina General Assembly.

Purpose

The purpose of this project was to make a wide range of timely and relevant data easily available so that decision-makers can visualize the impacts of COVID-19 on different locations and socio-economic groups across North Carolina.

Overview

To do this, the project created [*Carolina Tracker*](#), a data dashboard that combines information from many types of sources (public records, private research, passive mobile data, and others) into a user-friendly format. More than 30 data topics were selected in the fields of employment, spending, travel, housing, and society. These selections were based on their temporal availability (daily, weekly, or monthly), state-wide comprehensiveness at the county level, and relevance for decision makers in urban/regional planning and economic development. Many of these data sources are not conventionally used in planning. By developing automated data streams to quickly obtain, clean, and present the data in a ready-to-use format, this project democratizes data access for use by the public and policy makers. The project produced exploratory analytical articles that demonstrate how this data can be combined to assess the impact of the pandemic on different regions and socio-economic groups, and it created a knowledge base for ongoing research.

In **Project Activities** below, this report will outline the three goals that constitute the project's purpose and explain the tools and strategies through which these goals were achieved. **Project Findings** is divided into two parts, the first of which provides a sample of key data findings that are highlighted in analytical articles and will be explored in further research. The second section identifies technical findings, which describes problems that arose in the process of creating a data dashboard and shares how we addressed those issues. Finally, **Project Resources** reports on the personnel, partnerships, and financial support that made this project possible, as well as documenting next steps to secure additional funding that will enable further research and ongoing maintenance of the Carolina Tracker.

PROJECT ACTIVITIES

This section lists the primary project activities in terms of their relationship to the project's purpose, which is organized around three goals.

Goal 1: Visualize and explore impacts of COVID-19 across North Carolina.

Activities

1. Collected information from six domains of information (employment, spending, travel, destinations, housing, and society).
2. Developed consistent, compelling, and easily understood metrics for interpreting the data (normalized rate, change from baseline, and total numbers).
3. Created a user-friendly dashboard interface that visualizes the same information in multiple ways (time series, map, dot plot, and overview text).

Goal 2: Provide timely and relevant information for decision-making.

Activities

1. Shared data sources, clean datasets for download, and the code used for data processing to democratize data access and enable further research/exploration.
2. Automated data streams to quickly assemble more than thirty public, private, and passive data sources to capture real-time trends.
3. Provided regular data updates as information is available (daily, weekly, and monthly).
4. Pursued opportunities to publicize the tracker and its usefulness in a variety of settings.

Goal 3: Demonstrate the variation of impacts on different groups.

Activities

1. Used consistent county-based aggregations and state-level summaries for all datasets.
2. Developed cross-cutting categorical groupings of counties to see broader trends (geographic regions, prior median income, prior unemployment, and metropolitan designations).
3. Provided demographic/sectoral breakdowns where possible.
4. Demonstrated storytelling and analysis that dives deeper into disaggregations (e.g. [unemployment insurance claimants by sex and race](#)), comparing across datasets (e.g. [house sales and new permits](#)), and data that isn't on the dashboard (e.g. analyzing [childcare employment](#) in addition to childcare enrollment trends).
5. Participated in outreach activities such as press [interviews](#), newspaper [articles](#), [op-eds](#), and webinars to promote the use of the data.

PROJECT FINDINGS

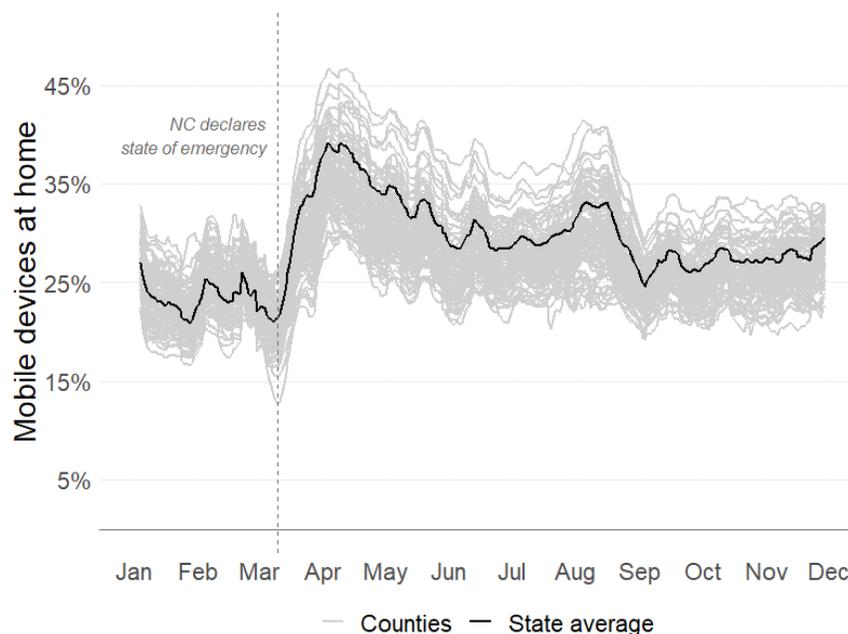
Because the purpose of this project was primarily to facilitate data access for decision makers, our findings include not only surprising and expected trends in the accumulated *data* itself but also practical findings regarding the *techniques* that are needed to assemble and present a wide range of data into an interactive and easy-to-use dashboard format.

Data findings

Preliminary findings in our collected data include several notable trends, which are grouped into three categories: (1) temporal trends that are associated with the timing of a known policy change or event, (2) slow-onset effects that emerged several months after the initial impact in March 2020, and (3) expected trends that either did not emerge or returned to normal levels after a brief change.

Most datasets assembled on the Carolina Tracker demonstrate some degree of impact in March/April 2020 following the declared state of emergency. One of the most notable of these is the percent of people staying at home, which we measured using passive location data from mobile devices through Safegraph. The expected pattern was to see a decline in the rate of staying at home after subsequent phased re-openings occurred; however, these did not appear. Instead, the clearest decline in staying at home occurred during August, when schools and universities resumed their fall sessions (see **Figure 1**). Other datasets have patterns associated with known policy changes, including a decline in [enrollment and employment at childcare facilities](#) that began in October 2020 after subsidies to closed facilities ended. Finally, the rate of [evictions dropped to almost zero](#) during the establishment of eviction moratoria, although evictions continued in some areas.

Figure 1: Rate of staying at home in North Carolina in 2020



The second type of data finding are those that appear to have a slow onset of cumulative effects, with little change in the trend immediately following March 2020. Data findings in this category include a steadily [rising rate of office vacancies](#), as well as [increasing racial disparities of unemployment insurance](#) claimants as black and other non-white workers file initial claims at disproportionately high rates over time.

Finally, the expected trends in some topics either did not emerge or returned to pre-pandemic levels after a brief fluctuation. Total vehicle miles traveled (VMT) dipped drastically in March 2020, only to [resume normal seasonal variation](#) by June that continued throughout the remainder of 2020. Likewise, sales and use tax had a relative decline in April-June 2020 compared to the same time in 2019, but this was subsequently replaced by a relative increase over the year before. Finally, despite widespread speculation about the beneficial effects of decreased activity on air quality, there were no discernable effects on the air quality index of particulate matter (PM 2.5).

Technical findings

Through this project, we found that a successful dashboard must address two primary types of challenges: (1) compiling and displaying many different types of information in a way that is accurate, meaningful, and easy to understand, and (2) providing detail about the specific differences of observed data across places, times, and people affected without obscuring or overwhelming the broader trends.

To present many different types of information consistently and accurately, we adopted the following strategies:

- Developed three standard types of indicators (rate, total, and percent change) that can be flexibly applied to many topics.
- Displayed the same information in multiple formats (line graph, map, dot plot, and text) to aid comprehension and interpretation.
- Experimented with multiple breakpoints and categories when developing summarizing groups to avoid masking internal variation and exaggerating incidental differences.

The second problem was made more complicated by the breadth of our project's scope. Using a single format, the Carolina Tracker presents over thirty datasets with spatial resolution from counties down to individual addresses and temporal resolution from monthly down to daily data, as well as a wide variety of additional breakdowns by socio-economic demographics and sectoral components. Any presentation must therefore balance simplifying these details without providing so broad an overview as to be meaningless. To address these problems, we used a variety of techniques, including the following:

- Standardized the spatial display to a single geography (counties)
- Provided state-level averages alongside county-level detail
- Developed cross-cutting categories to group counties and analyze demographic and geographic trends
- Smoothed visual presentation of daily data with rolling averages so that trends are more readily apparent
- Provided ready-to-use data downloads of microdata with complete breakdowns to allow for users' further exploration

PROJECT RESOURCES

The success of this project depended on the effective collaboration of a highly motivated team of *personnel* from both within and outside the University of North Carolina at Chapel Hill. The project collaborated extensively with external agencies and other *partners* to both obtain and share information. All project *expenses* were reported in a timely and transparent manner, and additional *funding* opportunities are being explored to continue supporting this relevant resource for timely information.

Personnel

Over the course of the grant period, this project employed 14 individuals who contributed skills and expertise to implement project activities and achieve the project goal. The roles and academic affiliations of these employees are listed in **Table 1**.

Table 1: Project personnel

NAME	ROLE	ACADEMIC AFFILIATION
Faculty (3)		
Noreen McDonald	Principal Investigator	Faculty, DCRP at UNC-Chapel Hill
Nikhil Kaza	Co-Principal Investigator	Faculty, DCRP at UNC-Chapel Hill
Nichola Lowe	Co-Principal Investigator	Faculty, DCRP at UNC-Chapel Hill
Permanent staff (1)		
Kathy Uber	Accounting Technician	Staff, DCRP at UNC-Chapel Hill
Temporary staff (4)		
Kaitlin Heatwole	Research specialist	Graduate alum, DCRP at UNC-Chapel Hill
Carson Sievert	Dashboard designer	External consultant
Ashton Watkins	Website designer	Undergraduate alum, UNC-Chapel Hill
Ben White	Website designer	External consultant
Post-doctoral researchers (3)		
Abigail Cochran	Research fellow	DCRP at UNC-Chapel Hill
Donald Planey	Research fellow	DCRP at UNC-Chapel Hill
Olivia Wang	Research fellow	DCRP at UNC-Chapel Hill
Graduate students (3)		
Kshitiz Khanal	Research assistant	PhD student, DCRP at UNC-Chapel Hill
Xijing Li	Research assistant	PhD student, DCRP at UNC-Chapel Hill
Ethan Sleeman	Research assistant	MCRP student, DCRP at UNC-Chapel Hill

Partnerships

In addition to personnel, the project relied extensively on developing relationships with a wide range of federal, state, and private agencies as well as centers, schools, and institutes within University of North Carolina to obtain comprehensive and meaningful data, share analytical strategies, and disseminate findings. These agencies are listed along with the type of relationship in **Table 2**.

Table 2: Summary of project partnerships

AGENCY	RELATIONSHIP
Public, federal (4)	
US Bureau of Labor Statistics	Data source
US Census Bureau	Data source
US Department of Treasury	Data source
Federal Reserve of Cleveland	Data source
Public, state (8)	
NC Administrative Office of Courts	Data source
NC Department of Commerce	Data source
NC Department of Health/Human Services	Data source
NC Department of Public Safety	Data source
NC Department of Transportation	Data source
NC Department of Treasury	Data source
NC Pandemic Recovery Office	Dissemination
NC State Bureau of Investigation	Data source
Private (14)	
Costar Suites	Data source
Craigslist	Data source
Descartes Labs	Data source
Greenwich HR	Data source
IHS analytics	Data source
Landgrid	Data source
New York University Jail Data Initiative	Data source
NC Prisoner Legal Services	Data source; Dissemination
Opportunity Insights/Womply	Data source
Purple Air	Data source
Redfin	Data source
Smith Richardson Foundation	Dissemination
Safegraph	Data source
SAS Analytical Software	Dissemination
Streetlight	Data source
University of North Carolina at Chapel Hill (6)	
Carolina Population Center	Dissemination
Highway Safety Research Center	Analysis partner
Injury Prevention Research Center	Analysis partner
Odum Institute	Analysis partner
School of Government / ncIMPACT	Data source; Dissemination
School of Law	Data interpretation

Expenses

This project was supported by the North Carolina Policy Collaboratory with funding from the North Carolina Coronavirus Relief Fund, which was established and appropriated by the North Carolina General Assembly. A summary of project expenses is provided in **Table 3**; for complete details, see Attachment C-2.

Table 3: Summary of project expenses

CATEGORY	AMOUNT
Total Budget	\$ 287,278.00
Personnel	\$ 181,517.75
Contractor, Consultant	\$ 31,631.37
Supplies/Equipment	\$ 19,113.31
Data acquisition	\$ 45,969.88
Other	\$ 81.64
Total Expenses	\$ 278,313.95

Additional funding

No additional funding applications have yet been submitted. However, we plan to apply for additional funds for both ongoing project maintenance and topical research from agencies summarized in **Table 4**.

Table 4: Planned sources for future funding applications

AGENCY	AMOUNT
Ongoing project maintenance/overhead	
NC Governor's Pandemic Recovery Office	\$ 150,000
Spencer Foundation's field-initiated research grants	\$ 125,000 - \$250,000
Topic-specific research grants	
Smith Richardson Foundation	TBD
Z Smith Reynolds	TBD
Goldenleaf	TBD

CONCLUSION

This project successfully created Carolina Tracker, an interactive data dashboard that combines public and private datasets to present a comprehensive overview of the economic, travel, housing, and social impacts of the COVID-19 pandemic on communities across North Carolina. This resource has already been used by state and regional decision makers and has also been the impetus for developing and strengthening dozens of collaborative partnerships within and beyond the University of North Carolina at Chapel Hill. Ongoing operations of the Carolina Tracker through 2021 and beyond will continue to provide invaluable information about the correlations of policies and events with economic and individual behaviors, and the data made available by this project will be used for substantive research in a range of academic and practical fields.