

Technical Brief 1 – September 1, 2020

Initial COVID-19 Mobility Data Trend Analysis in NC

The Issue

As of September 1, 2020, the total confirmed COVID-19 cases in North Carolina exceeded 167,000 cases, and 2,702 people have died from this virus. The current pandemic has touched the lives of all North Carolinians, and initial research shows that the way people move in the state has changed rapidly in response to the dynamic pandemic.

This Technical Brief is part of a research study that seeks to understand the interrelationships amongst public health policies, executive actions, mobility changes, traffic safety, and the transmission and impacts of COVID-19 in NC.

A major objective of the study, led by the UNC Highway Safety Research Center, is to inform policy decisions and decision makers in the state, specifically considering potential resurgence(s) of infections due to cyclical outbreaks in the near and long-term future.

This Technical Brief presents initial findings related to mobility and health trends in NC due to the pandemic, and references national peer-reviewed studies involving the intersection of mobility and COVID health impacts.

Investigating NC Mobility and Health Trends

The initial analysis investigated the following questions:

1. Have emergency declarations, stay at home order, and general news and events reduced movement within NC? Is this slowing the spread of COVID-19?
2. What are the differences in mobility between urban and rural counties and how do these trends vary through time?

Mobility Trends - Initial Findings

Significant impact on travel after NC State of Emergency Declaration in March 2020.

- Statistically significant impacts¹ on motorized travel responses were found in urban, suburban, and rural counties following NC’s March 10, 2020, **State of Emergency Declaration** (using estimates of vehicles miles of travel (VMT) developed by **Streetlight** and rural-suburban-urban designations assigned by **NC Rural Center**).
- By March 17, 2020, urban, suburban, and rural VMT dropped by 62%, 52%, and 46%, respectively (*Figure 1*). The response of urban travel was both faster and longer when compared to the other two county types.

Minor impact on travel after Executive Stay at Home Order, returned to “normal” by mid-June 2020.

- Following the March 27, 2020, Executive Stay at Home Order to stay at home, there was a minor impact on rural, suburban, and urban county travel levels.
- Rural, suburban, and urban counties returned to pre-emergency declaration travel levels in mid-June.

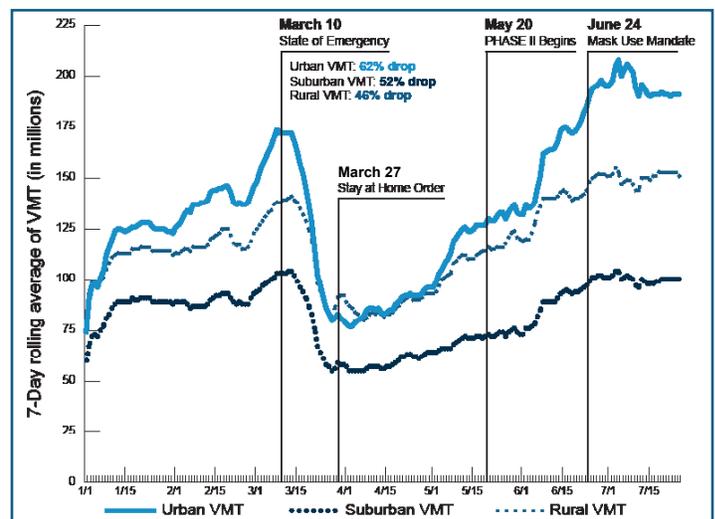


Figure 1. NC Statewide Vehicle Miles Traveled (VMT) Trends for Urban, Suburban, and Rural Areas, Data Source: Streetlight



Mobility trends begin to stabilize in July 2020.

- Beginning in early July 2020, daily VMT levels began to stabilize. This trend was only statistically significant for urban counties. It is unclear if this trend will continue and if it is related to the increasing number of COVID-19 cases observed in NC during the period June-July 2020 (Figure 2).

Decrease in trips to work contributed to travel trends more in urban areas, less so in suburban and rural areas.

- Urban work trips showed a significant drop due to the pandemic, starting on March 10, 2020. This is based on the examination of trips made specifically for work using anonymized cell phone trip data captured by Teralytics (Figure 3).
- Suburban and rural work trips had a lower response to the pandemic.

Health Trends - Initial Findings

In the numbers: Between March 3, 2020 (the date of the first confirmed COVID-19 case in NC), through July 25, 2020, there were 111,366 confirmed COVID-19 cases and 1,801 confirmed COVID-19 deaths in NC.

More COVID-19 deaths in rural areas in NC than urban and suburban areas.

- Cumulative counts of rural COVID-19 deaths have exceeded urban and suburban deaths, other than for a brief period early in the pandemic (Figure 4).
- As of July 25, 2020, the number of rural deaths (N=795) was 41% higher than urban deaths (N=564) and 80% higher than suburban deaths (N=442).

Statistically significant increase in COVID-19 fatalities in all areas of NC after Phase II began, statewide stay-at-home order relaxed.

- While not easily seen in the Figure 4, there was a statistically significant increase in the slope of fatality counts for all three county designations after the initiation of Phase II (i.e. "Safer-at-Home"), which relaxed the statewide stay-at-home order.

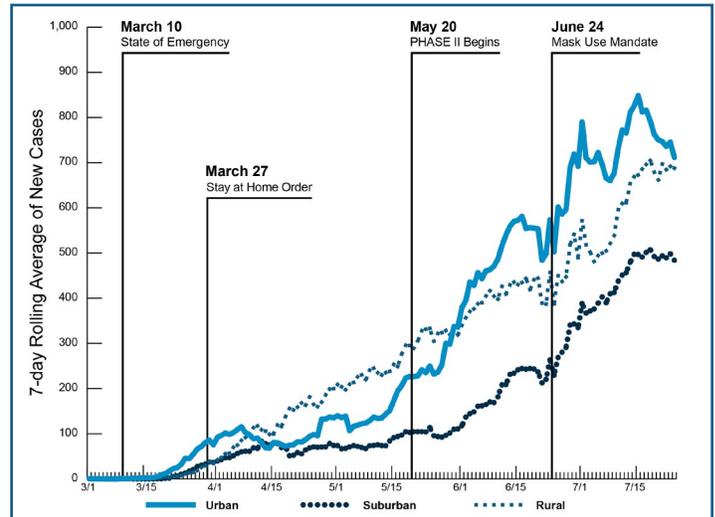


Figure 2. 7-Day Rolling Average of New NC COVID-19 Cases by Urban, Suburban, and Rural Counties, Data Source: New York Times

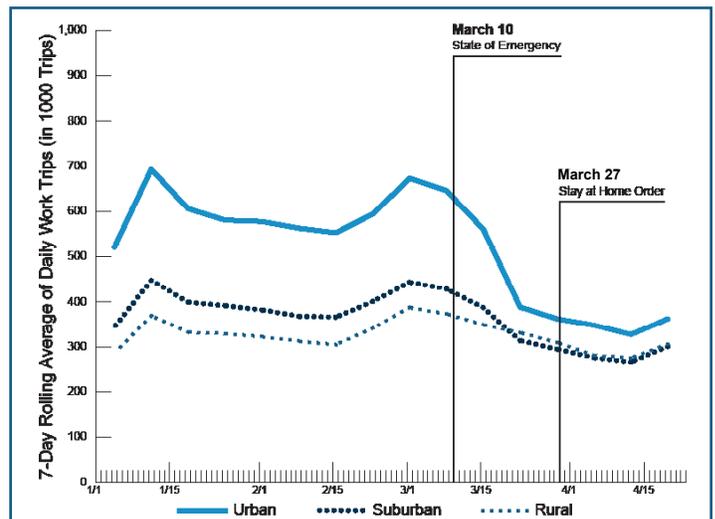


Figure 3. NC Statewide Work Trip Trends for Urban, Suburban, and Rural Areas: January 1, 2020-April 21, 2020, Data Source: Teralytics



Average new COVID-19 case trends vary, however average new case counts in urban and rural areas are higher than suburban areas.

- On average, for the period March 1-July 25, 2020, the 7-day rolling averages of new confirmed COVID-19 case counts for urban, suburban, and rural counties were N=295, N=152, and N=269, respectively (Figure 1).
- The total number of confirmed COVID-19 urban case counts (N=45,642) was higher than for rural (N=41,845), and suburban counties (N=23,879). However, the 7-day rolling average of new rural case counts exceeds urban counts for the period April 10-May 30, 2020.
- Although rural areas have smaller populations, they have substantially higher COVID-19 death counts and only slightly lower case counts than in urban centers.

Rural areas have a 50% higher COVID-19 case fatality ratio compared with urban centers (Table 1).

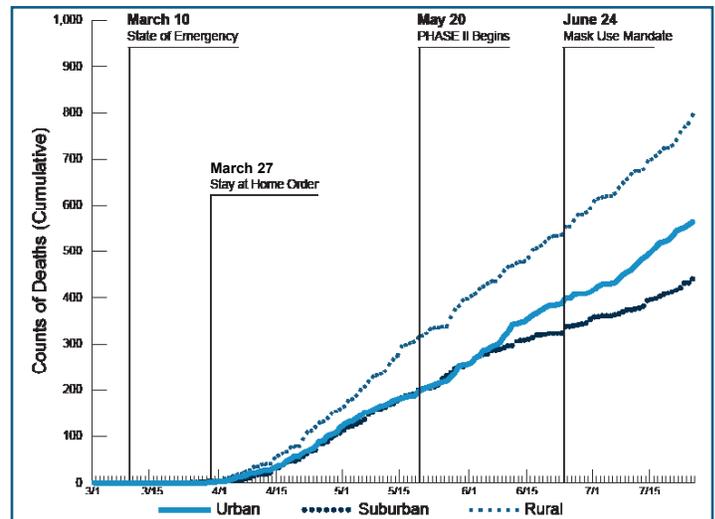


Figure 4. Cumulative Counts of Confirmed NC COVID-19 Deaths by Urban, Suburban, and Rural Areas, Data Source: New York Times

Table 1. NC Case Fatality Ratio – COVID-19 (March 1 – July 25, 2020)

	Urban		Suburban		Rural	
Number of deaths	564	Ratio: 1.24%	442	Ratio: 1.85%	795	Ratio: 1.90%
Number of cases	45,642		23,879		41,845	

Expanded Discussion and Comparing NC to National Trends/Research

These initial findings are consistent with national research showing that state-wide shelter in place orders (SIPOs) may have slowed the transmission of COVID-19 in the 22 states where they were enacted and enforced.² Additionally, multiple factors may have contributed to these trends, including statewide Legislative or Executive measures (e.g. **mask mandates, business and community guidelines**) and/or other initiatives taken by local communities, businesses, healthcare centers, schools, universities, and the public to reduce the transmission of COVID-19.

Further, the local composition of work may drive the differential effects of SIPOs between urban, suburban, and rural counties in NC. In the U.S., 37% of jobs can be done at home, and lower-wage labor markets have even fewer jobs that can be done remotely.³ Also, Black and Hispanic

people in the U.S. are less likely to be able to work from home and more likely to live in a household with members who cannot work at home (64.5% of Hispanic adults and 56.5% of Black adults, compared with 46.6% of whites).⁴ Accordingly, SIPOs are associated with a reversal in mobility patterns along the income gradient, whereby the highest-income quintiles (i.e., those most likely to be able to work remotely) went from being the most mobile to the least, while those in the lowest income quintiles saw lesser decreases in mobility, in part, due to their higher likelihood of being essential workers.^{5,6}

Future briefs will continue to investigate and communicate differences in urban, suburban, and rural travel trends and their relation to the ongoing pandemic.



Citations

- 1 Joinpoint regression analysis was used to identify statistically significant ($p < 0.05$) inflection points.
- 2 Lyu, W., & Wehby, G. L. (2020). Shelter-In-Place Orders Reduced COVID-19 Mortality and Reduced the Rate of Growth in Hospitalizations. Health Affairs (Project Hope), 101377hlthaff202000719. <https://doi.org/10.1377/hlthaff.2020.00719>
- 3 Dingel, J. I., & Neiman, B. (2020). How many jobs can be done at home? Journal of Public Economics, 189, 104235. <https://doi.org/10.1016/j.jpubeco.2020.104235>
- 4 Selden, T. M., & Berdahl, T. A. (2020). COVID-19 And Racial/Ethnic Disparities in Health Risk, Employment, And Household Composition. Health Affairs (Project Hope), 101377hlthaff202000897. <https://doi.org/10.1377/hlthaff.2020.00897>
- 5 Weill, J. A., Stigler, M., Deschenes, O., & Springborn, M. R. (2020). Social distancing responses to COVID-19 emergency declarations strongly differentiated by income. Proceedings of the National Academy of Sciences of the United States of America. <https://doi.org/10.1073/pnas.2009412117>
- 6 Brough, R., and Freedman, M., and Phillips, D. (2020), Understanding Socioeconomic Disparities in Travel Behavior during the COVID-19 Pandemic (June 1, 2020). University of California, Irvine Department of Economics Working Paper Series, 2020, Available at SSRN: <https://ssrn.com/abstract=3624920> or <http://dx.doi.org/10.2139/ssrn.362>

About the Project

The NC COVID-19 Mobility and Health Impacts Study is investigating COVID-19 data trends in NC. Led by the [UNC Highway Safety Research Center](#), this project brings together an impressive team of multidisciplinary research partners from across the UNC System, including UNC-CH's Cecil G. Sheps Center for Health Services Research, Gillings School of Global Public Health, Odum Institute for Research in Social Science, and the NC State University Department of Statistics, to research the interrelationships of public health policies, mobility changes, and the transmission of COVID-19 to inform policy decisions in North Carolina. This project is supported by the North Carolina Policy Collaboratory at the University of North Carolina at Chapel Hill with funding from the North Carolina Coronavirus Relief Fund established and appropriated by the North Carolina General Assembly.



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