



Determine the COVID-19 Experience for Selected Populations in Rural Robeson County, North Carolina and the Likelihood of Changing Future Health Behaviors related to COVID-19 in this Population.

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Introduction

In a very short period of time, the COVID-19 pandemic has caused a significant impact on global health and economies. In the US, the impact has resulted in over 1.5 million people infected, over 100,000 deaths, and the closing of national and local economies. While metro counties have significantly higher cases and deaths per capita, rural counties are experiencing faster growth rates signaling an increase in concern about the impact of the pandemic in rural America. To the extent that rural areas face an increasing impact, they could experience particular challenges with population health interventions due to the existing disparities in healthcare and community resources.

Currently in Robeson County, there have been 680 confirmed cases, 11 deaths, and a prevalence of 52 cases per 10,000 residents. Robeson county is the 8th ranked county for the number of reported cases. Robeson County is 1 of the 9 counties that have over 680 confirmed cases of COVID-19, which collectively account for more than 44% of the State's cases.¹ In addition to the high number of confirmed cases, Robeson County also has a high overall social vulnerability index, with significant vulnerability related to socioeconomic status, household composition/density, Race/ethnicity/language, and housing/transportation.² For instance, the loss of manufacturing and other forms of industry over the last 20 years has transformed many in the working population into work commuters. Anecdotal information suggests that the surge in cases in Robeson County is related to individuals who commute to surrounding counties for employment but reside in Robeson County. The University of North Carolina at Pembroke is the largest employer in the county and the primary 4-year regional institution in the area. A significant number of employees and students, however, are not county residents and commute from distant counties and states that are experiencing their own surges (i.e. Southeastern corridor and adjacent counties in SC). This would suggest that this community's capacity to prepare for and respond to the stress of hazardous events such as disease outbreaks may be insufficient. Robeson County is also home to a large minority population that includes African Americans, Hispanics, and Native Americans. Given the limited amount of resources in this high-risk population, the reported numbers likely under-represent the true incidence of SARS-CoV-2 because many infected individuals would not have sought medical attention regardless of whether they had symptoms. Therefore, the impact of this pandemic is likely to be intensified in the small rural communities within Robeson County both in terms of serology testing and contact tracing.

To date, the majority of diagnostic testing within Robeson County has been limited to individuals that have shown symptoms and referred to a medical facility or individuals that have known exposures to SARS-CoV-2. Previous studies have indicated that hard-to-reach groups and marginalized populations are at greater risk of severe disease and these same groups also tend to have lower rates of immunizations.^{3,4} Little is known about the prevalence of an antibody immune response and determinants of SARS-CoV-2 infection among rural populations in North Carolina. In addition, Robeson County, the largest geographic county in the state with the second highest number of rural citizens in the country, is among the poorest in the state and the Nation. Therefore, to maximize resources needed to serve this high-risk population, individual communities will rely on surveillance data to inform local policy makers. In turn, this data will enable policy makers to create targeted and regionally specific decisions to mitigate the risk of SARS-CoV-2 transmission. In addition, the data from these studies will help community leaders to develop confident strategies to re-open economic drivers such as schools and universities within this region.

Project Overview

The University of North Carolina at Pembroke is uniquely positioned to explore the dynamics of the COVID-19 (caused by the SARS-CoV-2 virus) pandemic in a rural setting and in areas with majority-minority communities. Rural settings, such as Robeson County, North Carolina, present unique challenges in terms of disease transmission and mitigation efforts. Extended family and rural cultural dynamics, the need to travel beyond county boundaries for employment opportunities, strained health care resources, and lack of industry and infrastructure that reliably support remote employment and learning opportunities may negatively impact the population. In addition, the health disparities that already exist in minority populations have been amplified by the recent COVID-19 crisis because of limited access to health care, trust in the current health care system and lack of culturally appropriate intervention and prevention activities. UNCP has a long, rich history of partnering within our service area to facilitate positive change in key areas including economics, education and health. The purpose of this mix-methods study is to understand the COVID-19 experience, and the relationship between the COVID-19 experience and participant profiles, to develop mitigation efforts, including culturally appropriate and acceptable interventions and a high level of vaccine compliance. We are embarking on this two-part project to understand the COVID-19 experience. The project described in this proposal has three overarching goals, two short-term and one long-term. As follows:

Project Goals

1. Short-term: To conduct serology surveillance of SARS-CoV-2 at two different time points in a rural population to determine infection prevalence and understand changes in prevalence and conversion rates over a 3-month period.
2. Short-term: Correlate demographic and profile characteristics (behavioral, mental, and beliefs) from survey data with serology test results for SARS-CoV-2.
3. Long-term: Use the epidemiologic and behavioral characteristics to develop mitigation efforts, including a high-level of vaccination compliance, that are culturally appropriate and acceptable to rural populations.

Research questions:

1. What is the seropositive prevalence of SARS-CoV-2 in three distinct communities (**population?) (UNCP faculty, students and staff, Robeson County Public School faculty, and adults in the public-school communities) within Robeson County in August 2020 (Phase I) and November 2020 (Phase 2)?
2. What changes occur in the prevalence and conversion rates of SARS-CoV-2 between August 2020 (Phase I) and November 2020 (Phase 2) in the same populations.
3. What is the percentage and profile characteristics of the population tested in Phase I that continue with the study and return for re-testing in Phase 2?
4. What is the demographic, profile, and behavioral characteristics of the population tested, that demonstrate seropositive SARS-CoV-2 in Phase I and Phase 2?
5. What is the demographic, profile, and behavioral characteristics of the population tested in phase 2 that convert from seronegative to seropositive for SARS-CoV-2?
6. What is the relationship between profile characteristics of the population tested and their plans to engage in future vaccination efforts?

Part 1 – Surveillance of Highly Pathogenic SARS-CoV-2 in Rural Robeson County, North Carolina

The aim of this part of the study is to conduct a surveillance of SARS-CoV-2 prevalence at two different time points in 2020 (August and November) to determine prevalence rates, prevalence rate changes, and conversion rates of a broad spectrum of the Robeson County population.

Study Design

Study Type: Observational two point in time study

Estimated Enrollment: 3000 participants

Observational Model: Cohort

Time Perspective: Time Series

All participants will be notified of their serology status, however, sero-positive participants will be contacted by the study physicians to discuss the results.

Cohort

UNCP-1: Faculty, Staff, and Students of the University of North Carolina at Pembroke (UNCP)

- UNCP-1(a) – Commuter, Participants who travel into the 28372 (Pembroke) zip code to study or work on the campus of UNCP
- UNCP-1(b) – Non-commuter Students, participants who are designated as on-campus residents or faculty and staff who reside within the city limits of Pembroke

PSRC-1: Faculty and Staff, of the Public Schools of Robeson County (PSRC)

PSRC-2: Parents of students enrolled in PSRC

Sampling Method: Random Sampling

Eligibility Criteria

Ages Eligible for Study: Adults aged 18 years and older

Sexes Eligible for Study: All

Study Population

For UNCP-1 subjects:

- Adults (≥ 18 years old) at the time of collection
- Enrolled students and employed faculty and staff at the University of North Carolina at UNCP

For PSRC-1 subjects:

- Adults (≥ 18 years old) at the time of collection
- Employed faculty and staff of the Public Schools of Robeson County

For PSRC-2 subjects:

- Adults (≥ 18 years old) at the time of collection
- Parents of students enrolled in randomly selected the Public Schools of Robeson County

Exclusion Criteria

- Person unable to express informed consent to participate
- Have had an infectious episode and/or associated symptoms in the 14 days prior to the scheduled visit
- Have been in contact with a confirmed case of COVID-19 within 14 days prior to the date of the visit

Outcome Measures

1. Presence of anti-SARS-CoV-2 antibodies across and in the different study cohorts at two different time points
2. Percentage of asymptomatic individuals with anti-SARS-CoV-2 antibodies at two different time points
3. Conversion rates of individuals across a 3-month time period

References:

1. <https://covid19.ncdhhs.gov/dashboard>, accessed May 27, 2020
2. https://svi.cdc.gov/Documents/CountyMaps/2016/North%20Carolina/NorthCarolina2016_Robeson.pdf, accessed May 27, 2020
3. Vlahov, D., Coady, M. H., Ompad, D. C., & Galea, S. (2007). Strategies for improving influenza immunization rates among hard-to-reach populations. *Journal of Urban Health*, 84(4), 615-631. doi: 10.1007/s11524-007-9197-z
4. Bryan, W. K., Ompad, D. C., Sisco, S., Blaney, S., Glidden, K., Phillips, E., Vlahov, D., Galea, S. & Project VIVA Intervention Working Group (2006). Determinants of influenza vaccination in hard-to-reach urban populations. *Preventive Medicine*, 43(1), 60-70. doi: 10.1016/j.ypmed.2006.03.018.

Part 2 – Cognitive and Affective Influences on Prevention Practices Including Vaccination

The COVID-19 pandemic has caused immense physical, psychological and economic damage worldwide. In the U.S., over 1.5 million people have become infected and 100,000 people have died. It is anticipated that effective control of COVID-19 may not be achieved until the availability of a vaccine. Compliance with recommended mitigation efforts has not been consistent in the general population for a number of reasons. Despite state and national guidance on preventing the spread of COVID-19, many have failed to engage in social distancing and use of masks, as evidenced by myriad images widely available via media outlets. Furthermore, it is unclear the degree to which adults will immunize against COVID-19 once a vaccine is available. For example, the 2018 crude prevalence rates of flu immunizations

for adults 65+ and older in North Carolina, a group significantly at risk for severe consequence of flu infection, were approximately 66% (Source: <https://nccd.cdc.gov>). A general lack of use of prevention practices to reduce virus spread remains a concern. Effective large-scale use of mitigation and eventual vaccination efforts to prevent the spread of COVID-19 present significant challenges due to a number of psychosocial factors. The goal of this study is to identify cognitive and affective influences on adult decision making related to prevention practices including acceptance or rejection of vaccinations. A mix-methods approach will be employed. A battery of measures including a demographic questionnaire, 5C Scale (Betsch et al., 2018), Coronavirus Anxiety Scale (Lee, 2020), and JHU COVID-19 Community Response Survey will be administered during this investigation. The 5C Scale, for example, is a tool developed to measure the psychological antecedents of vaccination behavior. According to Betsch:

Existing validated measures assessing vaccine hesitancy focus primarily on confidence in vaccines and the system that delivers them. However, empirical and theoretical work has stated that complacency (not perceiving disease as high risk), constraints (structural and psychological barriers), calculation (engagement in extensive information searching), and aspects pertaining to collective responsibility (willingness to protect others) also play a role in explaining vaccination behavior.

Demographic and other data collection tools will be administered to participants who complete antibody/serology testing as noted in part 1 of the study. Results yielded from analysis of survey data will be used to develop a protocol for conducting focus groups. Community reporting will occur once all data are collected and analyzed from the first phase/observation period. During the second phase of data collection as noted in part 1, we will again administer data collection tools in an effort to identify differences in cognition and affect. Explanatory design procedures will be then employed to identify participants who will be invited to participate in follow-up individual interviews and focus groups. These methods of data collection will help us develop a better understanding of psychosocial influences that impact cognition and affect related to prevention practices, including immunization compliance and vaccination hesitancy across the adult lifespan. We also aim to use the focus groups to gain additional knowledge of the impact of adult decision-making on the prevention practices of school-aged children enrolled in the Public School of Robeson County. Upon conclusion of data collection and analysis additional community reporting will occur.

A positive by-product of this approach will also provide information to help us better understand current barriers to compliance with recommended mitigation efforts. Effective community health interventions (i.e., vaccination drive and other mitigation efforts) must be driven by the perceptions of the community being served. Beginning the process of understanding psychological antecedents to prevention practices and vaccination among the southeastern North Carolina population, and developing effective recruitment and education programs based on this data, will result in greater adherence to effective prevention efforts and a more effective roll out of a vaccination program later when the vaccine becomes available.

References:

Betsch, C., Schmid, P., Heinemeier, D., Korn, L., Holtmann, C., & Bohm, R. (2018). Beyond confidence: Development of a measure assessing the 5C psychological antecedents of vaccination. *PLoS ONE*, *13*(12), e0208601. <https://doi.org/10.1371/journal.pone.0208601>

Study Design

- Study Type: Qualitative, Observational Cohort
- Model: Mixed Method, Explanatory Design
- Estimated Enrollment: 3000 participants

Project Budget

PERSONNEL	Requested Funds
Co-Principle investigator (UNCP Faculty - TBD) .25 FTE	\$17,886
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Co-Principle investigator (UNCP Faculty - TBD) .25 FTE	\$17,886
Faculty investigator (UNCP faculty – TBD) .15 FTE	\$12,386
Faculty investigator (UNCP faculty – TBD) .15 FTE	\$12,386
Faculty investigator (UNCP faculty – TBD) .15 FTE	\$12,386
Faculty investigator (UNCP faculty – TBD) .15 FTE	\$12,386
Statistician (UNCP faculty – TBD) .10 FTE	\$10,444
Study Coordinator (UNCP - TBD) 0.5 FTE (Salary and Benefits)	\$55,905
Graduate Research Assistant (TBD)	\$6,000
Graduate Research Assistant (TBD)	\$6,000
Community Member Advocate	\$13,976
Total Personnel	\$ 195,527
OTHER DIRECT COSTS	
<i>UNC-CH (Testing/patient unit services)</i>	
Physician (Dave Peden) .05 FTE (Salary and Benefits)	\$6,591
Physician (Amir Barzin) .05 FTE (Salary and Benefits)	\$6,591
Study Coordinator (UNC - TBD) 0.5 FTE (Salary and Benefits)	\$55,905
Medical Assistant (TBD) 0.5 FTE (Salary and Benefits)	\$36,491
Registration Assistant (TBD) 0.5 FTE (Salary and Benefits)	\$36,491
	\$ 142,069
<i>Supplies</i>	
3000 x 2 = 6000 COVID antibody tests	\$104,580
UNC Documentation and database supplies	\$10,000
Supplies, Phlebotomies and Courier Service	\$200,000
Qualitative and Quantitative Data management software, training, and analysis licensing	\$75,000
Travel	\$5,000
Materials and Supplies (Audio/Video/Computers/Lab Equipment)	\$75,000
Focus Group	\$15,000
Other (incentives, patient recruitment, etc.)	\$100,000
Dissemination of Results to community (e.g., broadcasting, printing, dedicated website etc.)	\$65,000
Total Other Direct costs	\$ 649,580
Total Cost	\$ 987,176