Fayetteville State University

COVID -19 Care Coordination

Fayetteville State University has a historical role in supporting vulnerable populations with equity and access within the Cumberland County community. Therefore, the proposed project will continue our track record of meeting the needs of the underserved community by taking a four prong approach by: focusing on immediate COVID-19 testing and Care Coordination; developing a nucleus of a future COVID19 serological testing center equipped with the needed equipment and staffed with trained personnel to operate equipment and perform the needed assays; develop non-invasive, rapid and effective means of risk assessment for COVID-19 in symptomatic patients; and add to the body of Social Vulnerability Index research by examining the COVID-19 impacts on disadvantaged populations in the Cumberland County region.

*COVID-19 Care Coordination*

Social vulnerabilities, including poverty, homelessness, the elderly, racial or ethnic minorities, rural communities, and those with chronic diseases differentiate the impact that exposure to COVID-19 has on the individual within the same geographical area. The vast majority of Fayetteville falls within the highest severity of the Social Vulnerability Index. Cumberland County is well poised to become a future hotspot for COVID-19 due to its high social vulnerability, densely urbanized population, and a health care system that can be easily overwhelmed by the patient surge.

This project seeks to develop and implement strategies to maximize resources, minimize the spread of COVID-19, and collaborate with current community testing initiatives to expand access.

*COVID 19 Testing*

FSU's COVID-19 Care Coordination will partner with community agencies and a local laboratory to meet the following goals:

1. offer COVID-19 viral/antibody testing through a partnership with Pathgroup Lab and Triad Care;
2. coordinate with community agencies to advertise and promote drive through testing on their premises. Targeted community agencies include FSU Student Health Center; Salvation Army, Homeless Shelters and Soup kitchens; The American Red Cross, The Boys and Girls Club, Better Health; The Council on Older Adults, Fayetteville Urban Ministries, Rural Churches, and The National Alliance and Mental Illness Centers;
3. authorize community partners to coordinate recruitment of individuals for testing events;
4. conduct contact tracing as well as prevention/management education via a rented mobile van;
5. validate primary care and medical referral follow-up including telehealth;
6. explore health seeking behaviors related to COVID-19 Testing, after Institutional Review Board approval.

**Principal Investigator**: Sharon Gallagher, DNP, Family Nurse Practitioner, Assistant Professor of Nursing. Her nursing leadership experiences in the acute care hospital include chairing several interdisciplinary committees for significant healthcare issues. During this process, she would identify key stakeholders, ensuring the intermingling of leadership and staff, then review research to validate best practices. As an FNP, she has worked in primary care managing chronic and acute disease while developing and initiating disease management prevention.

Budget:

| | |
|---|---|
| Testing including kits and staff, van rental, supplies | $324,000 |
| PPE | $ 70,000 |
| Advertising and marketing including social media | $ 16,000 |
| Nursing Staff including Care Coordination | $ 40,000 |
| Program Coordination | $ 30,000 |
| Student and faculty stipends | S 30,000 |
| Total | $510,000 |

*Developing the Capacity of Serological Testing*

Laboratory testing for COVID-19 is highly sought and regionally, the test will have significant social and health impacts. Currently, ELISA kits are commercially available, however, personnel with the experience running the assay will be hard to find. We propose the development of a nucleus of a future COVID-19 serological testing center equipped with the needed equipment and staffed with trained personnel to operate equipment and perform the needed assays. Additionally, the development of quantitative and qualitative ELISA tests to measure or detect the presence of both IgM and IgG is highly desirable and will be a long-term goal. Training on commercial ELISA kit will start immediately using mock/artificial human serum/plasma samples. We currently have a state-of-art Tecan ELISA microplate reader, fume hoods, BSL2 biosafety cabin, cell culture incubator, scanning and compound microscopes, and small lab autoclave. The current laboratory will be enhanced to support this project.

**Principle Investigator :** Eid E. Haddad, PhD. Associate Professor of Physiology, DBFS, CHST. During his biotech tenure, he was successful in developing two viral vaccines that gained USDA regulatory licensing here in the US, and for one of them received regulatory approval in >20 countries. Both vaccines were for animal health application. He also worked on vaccine discovery and development for human applications. Serological assays (ELISA, neutralization assays, and HI (influenza)) were routinely performed in his laboratory. As a post-doctoral associate at Pennsylvania State Univ., he successfully developed an ELISA assay for the early detection of *Salmonella* infection in poultry.

Budget

| | |
|---|---|
| Bio-BUBBLE containment enclosure | $30,000 |
| ELISA Microplate reader | $20,000 |
| ELISA Kits, plastic/glassware consumable, pipettors, microplates, and PPE | $30,000 |
| Centrifuges: Ultra-speed, Benchtop, and Microcentrifuge with accessories | $40,000 |
| Stipends for training undergraduates at $500/student/month including 20% PI salary. | $40,000 |
| Total | $160,000 |

*Retinal Net Prototype - Pilot Study*

It is abundantly clear that there is an urgent need to develop non-invasive, rapid and effective means of risk assessment for COVID-19. To achieve this goal, we advocate the development of RetinalNet .05, a prototype medical device artificially intelligent system to detect COVID -19 through both retinal and iris eye imaging. RetinalNet will make use of Convolutional Neural Networks (CNN) - a specific branch of Artificial Neural Networks (ANN) to predict from retinal or iris scans of a patient whether he/she is suffering from COVID-19. This approach has been implemented and evaluated to effectively detect Diabetic Retinopathy from retinal scans. An overall validation accuracy of 91.02% has been achieved over the validation dataset of retinal scans. Furthermore, with the advent of smartphone-based fundus and iris photography to capture retinal and iris scans, the proposed approach is envisioned to be easily accessible to the health-care community world-wide. The use of this technology will provide not only a direct clinical benefit to providers and patients, but provide hospitals, health departments and other testing centers with rapid, inexpensive, noninvasive tests to detect COVID-19, and other diseases. FSU plans to pilot this prototype during the planned COVID -19 testing and examine the correlation between retinal scans and positive test results after Institutional Review Board approval.

**Principal Investigator (PI):** Murat Adivar, PhD is an Associate Professor and Director of FSU's SAP Next Gen Lab. His research areas include optimization techniques and modeling; linear, integer and nonlinear programming; fuzzy decision making; spectral analysis; scattering data theory and data analytics. For this project he will be partnering with Fortem Genus, a North Carolina based Service- Disabled Veteran Owned Small Business.

Budget

| | |
|---|---|
| Product Development | $86,250 |
| Medical Admin | $44,500 |
| Supplies including (1) computer, servers and software | $19,750 |
| Paks including i-examiner system and smart phones | $26,500 |
| Faculty & student stipends | $60,000 |
| Total | $237,000 |

*COVID-19 Social Vulnerability Research*

*The COVID-19* outbreak has created a social and economic crisis among vulnerable populations and considerable research is predicting that the direct and indirect impacts is likely to be long term. Reconstructing the coping strategies, social networks, and institutional and social support systems can provide policy makers with insights that potentially reduce the consequences of this epidemic. The proposed research employs the Social Vulnerability Index as a framework to examine COVID-19 impacts on disadvantaged households in the Cumberland County region.
Social vulnerability refers to the socioeconomic and demographic factors that affect the resilience of communities. The adverse effect of disasters has already been indicated to be greater for socially vulnerable populations. Emerging literature on COVID-19 has reported greater rates of exposure, higher mortality rates, and economic devastation among low-income communities. These impacts, however, are rarely felt evenly across the country, thus highlighting the importance of context in understanding social vulnerability precursors, processes, and outcomes. By examining data at a more granular level, community stakeholders are better positioned to understand and address local implications.

The proposed research identifies the most relevant drivers of social vulnerability for marginalized populations (e.g., race, gender, ethnicity, disability status, income) in Cumberland County to add to the discourse surrounding the impact of COVID-19. Additionally, the impact of COVID-19 to these groups will be examined as it relates to mental and behavioral health. After IRB approval primary data will be collected through questionnaires and interviews using demographic, social, and economic indicators to assess social vulnerability. Data on impact will be collected through surveys that measure psychosocial and behavioral adjustment. The goal is to provide both an individual and socio-cultural perspective based on narratives that explore the challenges emerging as a result of the COVID-19 pandemic.
**Research Team:** The research team will be composed of five faculty members from the Department of Psychology, with diverse experiences through teaching, research, and clinical work.
**Principal Investigator:** Pius Nyutu, Ph.D. is an associate professor and the department chair. He is a licensed psychologist in the state of North Carolina and credentialed as a Health Services Provider-Psychologist. His research is on assessments, prevention, and advancement of mental health of students, minority groups, and underserved populations.
Budget:

| | |
|---|---|
| Faculty Researchers (5) | $65,000 |
| Graduate Assistants (4) | $28,000 |
| Total | $ 93,000 |
| **Total Budget** | **$1,000,000** |

Dissemination of Results

Data and results will be shared with UNC Collaboratory and further disseminated through reports, posters, published papers, and presentations. Positive COVID-19 results will be reported to the state as required. Meetings with community leaders, county officials, health care providers, and community representatives will be scheduled as far as tenable to discuss the results and recommendations in detail. All the data shared will be anonymized and aggregated.