

# FY21 and FY22 ODRD Research Initiatives

## Focus Area: Public Health

*Areas of Emphasis: Health Communication, Emergency Preparedness and Response, and Worker Health*

“Public health promotes and protects the health of people and the communities where they live, learn, work and play.” (American Public Health Association, 2020) A critical component is public health research which aims to shed light on the determinants of health including genetic, environmental, and social. The aim of public health research should be to acquire scientific evidence to “propose interventions and policies that improve health and well-being and reduce health inequalities.” (Inserm, 2020) Public health research is needed now more than ever, as our world faces unprecedented challenges to population health (e.g., COVID-19 pandemic).

Since 1946, ORAU has worked to secure national and global health. As we enter a new phase of the ORAU-Directed Research and Development (ODRD) program, we aim to focus our public health research priorities on key areas of emphasis that most align with ORAU business interests and our nation’s most pressing health challenges. Those areas of emphasis include **health communication, emergency preparedness and response, and worker health.**

Health Communication was included in the U.S Department of Health and Human Services’ *Healthy People Objectives* for the first time in 2010. These objectives set data-driven national objectives to improve health and well-being over a ten-year period. Since 2010, the emphasis and scope of health communication objectives has expanded. *Healthy People 2030* includes a health communication goal with seven core objectives/areas of emphasis (general, adolescents, cancer, diabetes, emergency preparedness, healthcare, health IT) and separate objectives focused on health literacy.

Health communication can also bolster ORISE/ORAU programs and projects in helping to communicate research findings to public and professional audiences. This key ORAU programmatic area has become increasingly challenging. Misinformation and falsehoods are often shared widely online. Researchers, clinicians, and public health professionals face growing mistrust in health institutions, science, and the counsel of leading experts. Innovative research is needed to determine new ways to convey scientific evidence in ways that will be received, understood, and acted upon, particularly by those at highest risk for poor health outcomes and lower life expectancy.

*Healthy People 2030* also focuses on promoting the health, well-being, education, and training of the workforce — including the public health and health care workforce and making sure individuals, communities, and organizations are prepared for disasters, disease outbreaks, and medical emergencies. There is increasing demand on our nation’s healthcare and public health systems to prepare for, respond to, and recover from pandemics, natural disasters, terrorism and other unforeseen, disruptive events. The integration of public health, healthcare and emergency management systems before, during and after these events help agencies reduce duplication and meet increased requirements and demands when an emergency occurs.

Research into holistic approaches to enhance community or agency resilience in support of national health security efforts is needed, as is accurate analysis of occupational health issues.

## Focus Area: Data Science and Analytics

*Areas of Emphasis: Machine Learning, Artificial Intelligence*

The continued increasing prevalence of Data Science and Data Analytics has clearly demonstrated their benefits and value across many domains, and generated a large body of scientific and research works. **Machine Learning (ML) and Artificial Intelligence (AI)** techniques are currently being utilized in almost every industry and business, directly or indirectly. ORAU is well positioned to leverage these techniques as a leader in multiple domains, including peer review, participant/employee recruiting and placement, virtual events, health communications, electronic health records (EHR), public and worker health and safety, emergency preparedness, program evaluation, professional training and virtual learning, and environmental assessments.

Additional to these areas of deep knowledge, ORAU benefits from a nationwide consortium of university partners, maximizing opportunities for cross discipline and cross institutional partnerships. This integrator role facilitates additional areas of scientific endeavor, particularly in project and team evaluation, with workflows, procedures, and best practices as additional outputs.

With the broad and flexible nature of these techniques and the scientific strength represented by ORAU and its consortium, several key areas of interest have been identified for advancing or applying the high volume of data science research that is conducted and published:

- Text Based Analytics and Natural Language Processing (NLP) focused on candidate matching and communications reception/response (eg. social media listening and analysis).
- Image analysis and segmentation for healthcare, ecology and environmental disciplines.
- Interdisciplinary and inter-institute team evaluations, workflows, and collaborative tools to better meet the needs of cross reaching multi-disciplinary research teams.
- Workforce protection analysis for hazards, contaminants, and associated exposure health outcomes
- Natural Language Processing (NLP) for candidate matching in peer review and workforce solutions

## Focus Area: Diversity, Equity, and Inclusion Studies

*Areas of Emphasis: Climate and Environmental Justice, Minority Health Disparities, STEM Education, and Effective Career/Workforce Mentoring*

ORAU's vision is to foster a collaborative environment with our university partners to promote novel research that integrates unique diversity, equity, and inclusion perspectives. We seek to work with our university partners to evaluate promising opportunities to study social inequities as they relate to STEM workforce development and education, health care and policy, community and environmental health, emergency preparedness, and health communication topics.

The recent social unrest in our country has sparked a national debate about the many social inequities that persists with relatively little by way of community-based, effective and scalable research devoted to reducing these disparities. These disparities have penetrated almost every aspect of American life including how we manage our national science research agenda. In fact, according to an 2019 NIH Study on research topic bias, "Research topic preference accounts for more than 20% of a persistent funding gap for black scientists applying for National Institutes of Health research project (R01) grants compared to white scientists". More troubling, given the devastation of COVID-19, the Study found that "Research topics with the lowest success rates included health disparities research and patient-focused interventions". The impetus for the scientific community to engage is now.

ORAU has long history of supporting research that impact social equality from developing K-12 STEM education experiences for Appalachian students to working with the CDC on health communication strategies that penetrate communities of color. In continuation of this work, ORAU seeks to engage in research focused on addressing social justice issues with advances in science and technology. ORAU is seeking novel scientific approaches to the following topics:

### **Climate and Environmental Justice**

According to the Environmental Center at the University of Colorado at Boulder, climate justice is a human rights issue, particularly among people of color, low-income, and Indigenous communities. All tend to be disproportionately affected by compromised health, financial burdens, and social and cultural disruptions making them more vulnerable to extreme changes in climate. For example, African Americans disproportionately live in polluted communities, coastal communities, and the Southeast areas increasing vulnerable to tornados and hurricanes.

ORAU welcomes ideas that addresses climate equality and environmental health disparities using air quality, weather, climate change and ecological studies.

### **Minority Health Disparities**

Inequities in health and health care have led to disproportionate coronavirus infections and deaths in African American, Latino, and Native American communities. As the WHO Constitution states "Health is not simply the absence of disease – Health is the proactive management of social factors, healthy eating, healthcare access, health practices and genomic factors". ORAU blends communication, marketing, preparedness, technical training and research skills to develop solutions that inform the public and equip health professionals to respond to the most pressing public health challenges.

ORAU welcomes research that focuses on addressing health disparities among minority populations. Topics to be addressed include innovations in effective health communications, social determinants of health, minority health data science, and health interventions specific to minority communities and associated cultural norms.

### **STEM Education Gap**

ORAU places a high value on equipping elementary, middle and high school teachers with tools and experiences to enhance their classroom instruction. One example is the ORAU partnership with the Appalachian Regional Commission (ARC) to manage the ARC/Oak Ridge National Lab (ORNL) Summer STEM Program. For 30 years, ORAU and the ARC have selected excellent students and teachers from Appalachia to receive a residential science, technology, engineering, math (STEM) learning experience at ORNL. This program promotes teamwork, expose students to college opportunities, and promote pride in the cultural richness and historical importance of the Appalachian region.

ORAU is interested in novel research approaches to engaging underrepresented populations in STEM fields and programs. We're also seeking innovative practices in mentoring and enriching these outreach experiences.

### **Effective Career/Workforce Mentoring**

ORAU oversees a number of STEM- focused internship, fellowship and research programs for federal agencies. The programs heavily depend on mentors and guidance from the host lab or facility. A strong scientific mentoring program will foster an environment where young scientists and engineers succeed in future STEM careers, in addition to strengthening the research programs students serve. This is particularly true for 1<sup>st</sup> generation and minority students.

ORAU is interested in new approaches to fostering a mentoring culture through innovative mentor training programs, evaluation and assessment, and mentor-intern pairing workshops.