



ORIGINAL ARTICLE

Rural Research Network to engage rural and minority community members in translational research

Pearl A. McElfish^{1*}, Robin Liston², Veronica Smith², Amber K. Norris³, Jordan Weaver⁴, Scott M. Dickson⁵, Michael D. Macechko⁶, Ronald K. Brimberry⁶, Mimo R. Lemdja⁷, Toni L. Middleton⁸, Matthew W. Nix⁹, Katherine A. Irish-Clardy¹⁰, Sandra M. Meredith-Neve², Joshua L. Kennedy², Laura P. James²

¹University of Arkansas for Medical Sciences Northwest, Springdale, AR, United States of America, ²University of Arkansas for Medical Sciences, Little Rock, AR, United States of America, ³University of Arkansas for Medical Sciences East, Helena-West Helena, AR, United States of America, ⁴University of Arkansas for Medical Sciences North Central, Batesville, AR, United States of America, ⁵University of Arkansas for Medical Sciences Northeast, Jonesboro, AR, United States of America, ⁶University of Arkansas for Medical Sciences Northwest, Fayetteville, AR, United States of America, ⁷University of Arkansas for Medical Sciences South, Magnolia, AR, United States of America, ⁸University of Arkansas for Medical Sciences South Central, Pine Bluff, AR, United States of America, ⁹University of Arkansas for Medical Sciences Southwest, Texarkana, AR, United States of America, ¹⁰University of Arkansas for Medical Sciences West, Fort Smith, AR, United States of America

ARTICLE INFO

Article history:

Received: January 9, 2023
Revised: January 30, 2023
Accepted: March 2, 2023
Published online: March 28, 2023

Keywords:

Rural health
Health disparities
Underrepresented populations
Minority health
Research participation

*Corresponding author:

Pearl A. McElfish
University of Arkansas for Medical Sciences
Northwest, 2708 S. 48th St, Springdale, AR
72762, United States of America.
Phone: +1 479 713 8680
Email: pamcelfish@uams.edu

© 2023 Author(s). This is an Open-Access article distributed under the terms of the Creative Commons Attribution-Noncommercial License, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: To address the high prevalence of health disparities and lack of research opportunities among rural and minority communities, the University of Arkansas for Medical Sciences (UAMS) developed the Rural Research Network in January 2020.

Aim: The aim of this report is to describe our process and progress in developing a rural research network. The Rural Research Network provides a platform to expand research participation opportunities to rural Arkansans, many of whom are older adults, low-income individuals, and underrepresented minority populations.

Methods: The Rural Research Network leverages existing UAMS Regional Programs family medicine residency clinics within an academic medical center.

Results: Since the inception of the Rural Research Network, research infrastructure and processes have been built within the regional sites. Twelve diverse studies have been implemented with recruitment and data collection from 9248 participants, and 32 manuscripts have been published with residents and faculty from the regional sites. Most studies were able to recruit Black/African American participants at or above a representative sample.

Conclusions: As the Rural Research Network matures, the types of research will expand in parallel with the health priorities of Arkansas.

Relevance to Patients: The Rural Research Network demonstrates how Cancer Institutes and sites funded by a Clinical and Translational Science Award can collaborate to expand research capacity and increase opportunities for research among rural and minority communities.

1. Introduction

Rural and minority populations face greater health disparities and lower life expectancy [1-8]. Arkansas is one of the most rural and impoverished states in the United States (US) (43.8% rural [9] and 16.1% below poverty [10]), with 111 census tracts in 44 counties designated as persistent poverty areas [11]. The population is diverse with 15.7% Black/African American and 8.3% Hispanic individuals [12]. Among the total population, there is a disproportionate burden of chronic disease and poor health outcomes, and the

state ranks as the fifth highest in the US for age-adjusted cancer mortality rates [13]. Arkansas also has the third highest prevalence of obesity and the fourth highest prevalence of diabetes, ranking 4th in death rates from cardiovascular disease [1-4].

Minority, low-income, and rural populations are underrepresented in research [14,15]. While many published manuscripts attribute the dearth of research among rural and minority populations to a lack of willingness to participate [16,17], some research has demonstrated that minority and rural populations are willing to participate in research but lack the opportunity [17]. Barriers to research participation may be logistical (e.g., geographic distance), participant-based (e.g., mistrust of the research process), or researcher-based (e.g., lack of awareness, lack of cultural humility) [13,17].

Arkansas lacks a practice-based research network. To address the high prevalence of health disparities and lack of research opportunities among rural and minority communities, the University of Arkansas for Medical Sciences (UAMS) developed the Rural Research Network in January 2020. As UAMS is the state's only academic medical center, its tripartite mission of clinical, educational, and research excellence provides a unique opportunity for the institution to lead health research in the state.

The following report describes our process and progress in developing a statewide rural research network, layered on the

existing framework for clinical and educational programming in Arkansas.

2. Methods

The Translational Research Institute, Office of Community Health and Research, and Winthrop P. Rockefeller Cancer Institute at UAMS partnered to create the Rural Research Network in January 2020. The Translational Research Institute houses the UAMS Clinical and Translational Science Award (CTSA) from the National Center for Advancing Translational Sciences (NCATS). The Office of Community Health and Research was established to address health disparities and is supported by numerous awards from the National Institutes of Health (NIH) and Patient-Centered Outcomes Research Institute (PCORI). The Winthrop P. Rockefeller Cancer Institute is a designated center of excellence at UAMS as Arkansas' only academic cancer treatment and research facility and is supported by numerous state and NIH awards. All three research programs are supported by UAMS.

To launch the Rural Research Network, the Translational Research Institute, Office of Community Health and Research, and Winthrop P. Rockefeller Cancer Institute jointly supported the hiring of an executive director and cohort of research coordinators who were then located and integrated within existing UAMS Regional Programs sites to facilitate research study operations and to support pilot funding opportunities (i.e., Translational Research

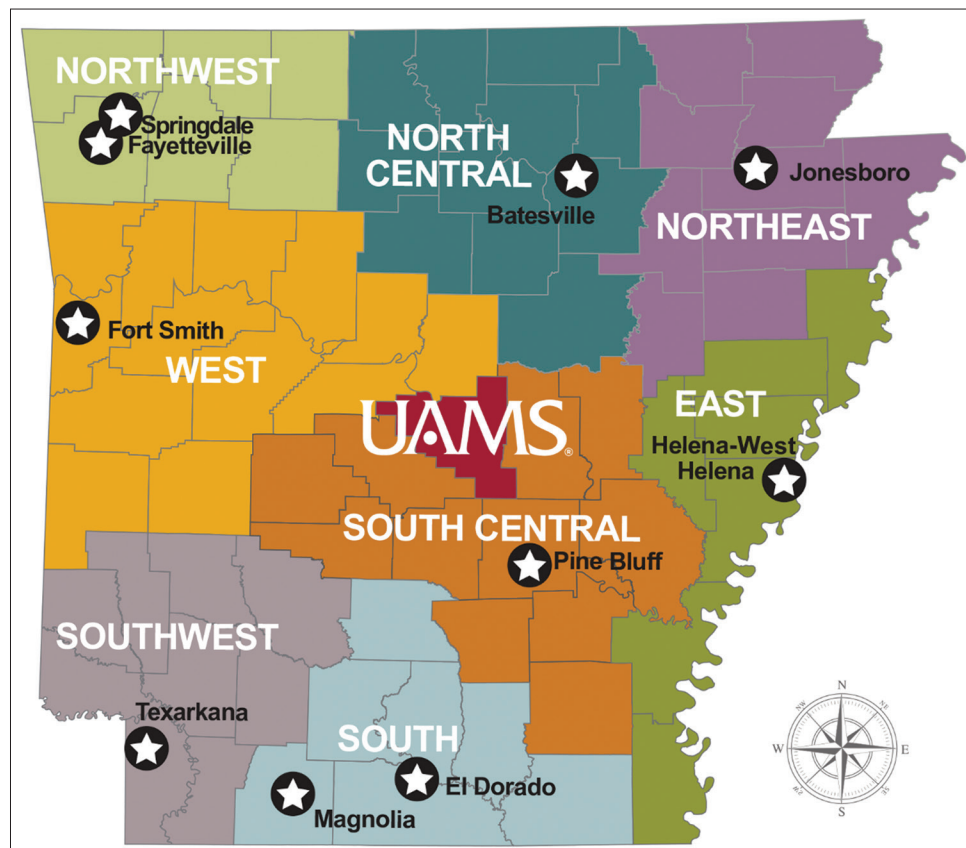


Figure 1. Rural Research Network locations.

Table 1. Summary of studies implemented through the Rural Research Network

Study	Funder	Summary of study aim and method
Impact of COVID-19 Phase 1	Internal Translational Research Institute Pilot Study	Mixed methods (qualitative and quantitative) study to assess the effect of the COVID-19 pandemic on rural Arkansans and to assess vaccine hesitancy [28,37,40,46,48-52] Total, <i>n</i> =1,221
Impact of COVID-19 Phase 2	Internal Translational Research Institute Pilot Study	Mixed methods (qualitative and quantitative) study to assess the effect of the COVID-19 pandemic on rural Arkansans including patients with chronic conditions and telemedicine use [29,31,35,42,43,53-55] Total, <i>n</i> =754
COVID-19 Pediatric Seroprevalence Study: Pediatric Seroprevalence Testing for COVID-19 in Arkansas	Extramural State Grant	Blood sample collected to measure COVID-19 antibody levels in a sample of children having blood drawn in Arkansas and to examine the impact of age, gender, race, and ethnicity on COVID-19 IgG seroconversion [47] Total, <i>n</i> =2,357
COVID-19 Adult Seroprevalence Study: Arkansas Coronavirus Antibodies Seroprevalence Survey	Extramural State Grant	Blood samples collected to estimate the prevalence of SARS-CoV-2 infection in the Arkansas population and to determine whether the prevalence of SARS-CoV-2 infection varies by time, age, gender, race/ethnicity, and regions [36,56] Total, <i>n</i> =1,750
Utilization of a Neuroinformatics Research Platform to Develop Quantitative Tools for Clinical Assessment and Treatment of Parkinson's Disease Patients in Rural Arkansas	Internal Translational Research Institute Pilot Study	Clinical study to develop digital data collection methods for evaluation of cognitive and motor function in Parkinson's Disease patients using current telehealth technologies and to develop biomedical informatics tools for collection, storage, and exploration of clinical and research data [57] Total, <i>n</i> =63
Persistent Poverty Supplement for Cancer Prevention and Control	NIH (P30 supplement: 3P30CA016056)	Mixed methods (qualitative and quantitative) study to characterize cancer-relevant factors in African Americans residing in Arkansas' rural persistent poverty counties Total, <i>n</i> =251
Comparative Effectiveness of Family DSMES and Standard DSMES among Diverse Populations	PCORI (CER-2018C3-14727)	Clinical randomized controlled trial to improve the care and outcomes of people affected by type 2 diabetes by comparing the effectiveness of the Standard Model of care to the Family Model of care and assessing the barriers to implementation and dissemination [26] Total, <i>n</i> =1,100
Home Food Delivery for Diabetes Management in Patients of Rural Clinics	NIH/R01 (5R01NR019487)	Clinical randomized controlled trial to test a food delivery model to address diabetes in rural areas: Determine the effectiveness of an intervention that is scalable and sustainable and promotes patient adherence by mitigating rural food insecure participants' difficulties associated with completing existing interventions Target enrollment, <i>n</i> =400 Enrollment as of publishing, <i>n</i> =196
Parental Hesitation to COVID-19 Vaccinations	NIH (CEAL 6793-02-S016)	Mixed methods (qualitative and quantitative) study to examine the parent's COVID-19 vaccine hesitancy for their children and to identify the feasibility and effectiveness of engaging the Rural Research Network to refer parents and children to the pediatric RECOVER study Total, <i>n</i> =795
Adapting and Pilot Testing Together WISE in Home Visiting	Internal Winthrop P. Rockefeller Cancer Institute Pilot Study	Community-based intervention trial to adapt the WISE program, a USDA-funded nutrition education program designed to improve educator feeding practices and children's intake of carotenoid-rich fruits and vegetables in early childhood education settings, to rural populations Target enrollment, <i>n</i> =50 Enrollment as of publishing, <i>n</i> =49
Comparison of Different Health Care Delivery Methods in a Rural Underserved Population of People with Parkinson's Disease	Internal Translational Research Institute Pilot Study	Clinical study to (1) determine whether remote assessments provide high-quality care to people with Parkinson's Disease closer to their residences and (2) enhance biomedical informatics tools to analyze the complex multimedia data sets that are being collected Target enrollment, <i>n</i> =50 Enrollment as of publishing, <i>n</i> =11
Understanding Cancer Survivor and Caregiver Needs	Internal Winthrop P. Rockefeller Cancer Institute Pilot Study	Mixed methods (qualitative and quantitative) study to (1) document needs of rural and minority cancer survivors and (2) document needs of rural and minority cancer caregivers Target enrollment, <i>n</i> =1,500 Enrollment as of publishing, <i>n</i> =701

WISE: We Inspire Smart Eating; DSMES: Diabetes Self-Management Education

Table 2. Racial breakdown for completed and ongoing studies

Study	Non-Hispanic Caucasian	Black or African American	Hispanic	Pacific Islander	American Indian or Alaska Native	Asian	Other	Multiracial	Don't know/ Not sure/ Refused/Prefer not to answer
Study 1: Impact of COVID-19 Phase 1	918 (75%)	155 (13%)	80 (7%)	3 (0%)	6 (0%)	15 (1%)	3 (0%)	20 (2%)	21 (2%)
Study 2: Impact of COVID-19 Phase 2	525 (70%)	128 (17%)	32 (4%)	10 (1%)	12 (2%)	4 (1%)	1 (0%)	29 (4%)	13 (2%)
Study 3: Pediatric Seroprevalence Testing for COVID-19 in Arkansas	1,305 (55%)	502 (21%)	325 (14%)				218 (9%)		7 (0%)
Study 4: Arkansas Coronavirus Antibodies Seroprevalence Survey	700 (40%)	690 (39%)	122 (7%)	17 (1%)	10 (1%)	15 (1%)	43 (2%)		153 (9%)
Study 5: Utilization of a Neuroinformatics Research Platform to Develop Quantitative Tools for Clinical Assessment and Treatment of Parkinson's Disease Patients in Rural Arkansas	62 (98%)	1 (2%)							
Study 6: Persistent Poverty Supplement for Cancer Prevention and Control		251 (100%)							
Study 7: Comparative Effectiveness of Family DSMES and Standard DSMES among Diverse Populations	418 (38%)	595 (54%)	41 (4%)	1 (0%)	9 (1%)	6 (1%)	9 (1%)	15 (1%)	6 (1%)
Study 8: Home Food Delivery for Diabetes Management in Patients of Rural Clinics	105 (54%)	86 (44%)			1 (1%)	2 (1%)	1 (1%)		1 (1%)
Study 9: Parental Hesitation to COVID-19 Vaccinations	531 (67%)	166 (21%)	53 (7%)	3 (0%)	4 (1%)	21 (3%)	3 (0%)		14 (2%)
Study 10: Adapting and Pilot Testing Together WISE in Home Visiting	21 (43%)	2 (4%)	24 (49%)		1 (2%)		1 (2%)		
Study 11: Comparison of Different Health Care Delivery Methods in a Rural Underserved Population of People with Parkinson's Disease	10 (91%)						1 (9%)		
Study 12: Understanding Cancer Survivor and Caregiver Needs	565 (81%)	89 (13%)	15 (2%)	2 (0%)	7 (1%)	2 (0%)	4 (1%)	12 (2%)	5 (1%)

WISE: We Inspire Smart Eating; DSMES: Diabetes Self-Management Education

Institute's Pilot Award Program, Team Science Champion Award Program, and the Winthrop P. Rockefeller Cancer Institute Rural Research Award Program).

UAMS Regional Programs was established in 1973 to address the shortage and distribution of primary care physicians and to encourage family medicine residents to remain and practice in the rural areas of the state. UAMS Regional Programs began with family medical clinics and residency training programs, established by the Area Health Education Centers mechanism. Since the establishment of its initial framework, UAMS Regional Programs has grown to be a regional system of care encompassing training for nursing, pharmacy, and mid-level and allied health professionals. In addition, the current system serves as a statewide network for health career pipeline programs, continuing professional education, library resources, patient-centered quality care initiatives, and

telehealth connections to cutting-edge medicine. Nine regional programs sites were established in Fayetteville, Springdale, Fort Smith, Jonesboro, Pine Bluff, Texarkana, Magnolia, Helena-West Helena, and Batesville, with an additional site scheduled to open in 2023 in El Dorado. Clinics within these UAMS Regional Programs locations were chosen to serve as participating study sites for the Rural Research Network (Figure 1).

All Rural Research Network sites use the Epic electronic health record which is a component of the Arkansas Research Central Data Repository (AR-CDR). AR-CDR provides researchers with the ability to identify potential research participants using an honest broker mechanism. A certified honest broker provides health information to research investigators in a secure manner regulated and permitted in compliance with the Health Insurance Portability and Accountability Act. The honest broker reviews the data set

and delivers the requested data to the investigator after ensuring the request meets the requirements of the approved protocol. The honest broker adheres to all terms and conditions specified by the institutional review board before releasing the data.

A Rural Research Network Community Advisory Board (CAB) was formed to guide research priorities. The CAB consists of community members from each region and health-care representatives (e.g., physician, pharmacist, and nurse) from each of the UAMS Regional Programs sites. The CAB meets quarterly to review progress on current studies and proposed studies. The CAB has given in-depth feedback on study protocols, recruitment and retention strategies, data collection instruments, and dissemination of results back to the community [17-25]. We have met using interactive video to allow all members to meet from their remote location. Overall, the Rural Research Network is a mechanism to conduct research, and each of the studies has a different degree of community engagement within their individual studies [26].

An overarching Memorandum of Understanding (MOU) was developed and signed by each clinic during the development of the Rural Research Network, and an individual MOU is signed for each individual study. An MOU template was developed to ensure clear understanding between study principal investigators (PI) and the Rural Research Network. The MOU serves to ensure the research conducted within the Rural Research Network will: (1) provide opportunities for UAMS Regional Programs' faculty and residents to engage in the scholarly products that are part of the research (i.e., publications, presentations); (2) engage local communities; (3) improve patient outcomes; and (4) build local (rural clinical site) research infrastructure. An MOU is developed for each study to outline the resources and responsibilities of the principal investigator, the Rural Research Network, and the participating sites.

To collaborate with the Rural Research Network, an investigator initiates consultation with the Rural Research Network's executive director. Consultations assess: (1) alignment with the Rural Research Network priority; (2) scientific merit of the study; (3) resource allocations and budget requirements; and (4) feasibility of implementation within the Rural Research Network. Projects are presented to the Rural Research Network's leadership team and medical and nursing directors of UAMS Regional Programs for further consideration and approval.

Routine meetings with UAMS Regional Programs administrators, clinical service managers, medical directors, and UAMS Regional Programs faculty provide a mechanism for continuous bi-directional communication and discussion. Meetings are designed to provide information about potential studies, updates regarding active studies, and study outcomes upon completion of each study. Outcomes are also disseminated back to the community in collaboration with the CAB [17-25]. Each meeting allows time for discussions and questions from UAMS Regional Programs personnel.

3. Results

Since the inception of the Rural Research Network in January 2020, research infrastructure and processes have been built

within the regional sites. Twelve studies have been implemented with recruitment and data collection from 9248 participants (Tables 1 and 2), and 32 manuscripts [26-57] have been published with residents and faculty from the regional sites.

4. Discussion and Conclusion

The NIH has prioritized the inclusion of rural and underrepresented minority participants in research. In fact, NCATS recently re-iterated the importance of inclusion in clinical and translational research by prioritizing this topic in its 2021 funding opportunity announcements for renewal of CTSA program sites. Specifically, a "commitment to reducing health disparities by addressing the significant burden of conditions that disproportionately affect rural, minority, and other underserved populations" was listed as one of ten essential characteristics of successful CTSA programs. The inclusion of rural and underrepresented minority participants in research ensures that research findings are generalizable to a greater segment of the US population and enhances the overall relevance of the research. Approximately 60 million people, or one in five Americans, live in rural America. While underrepresented minorities comprise a smaller share of the overall rural population compared with urban areas, these groups are often highly concentrated in persistent poverty clusters and have reduced access to health care [58].

While many manuscripts have cited the lack of research among rural and minority participants [14,15], few manuscripts have reported state-oriented solutions. The Rural Research Network provides a platform to expand research participation opportunities to rural Arkansans, many of whom are older adults, low-income individuals, and underrepresented minority populations. This manuscript provides an overview of a Rural Research Network which leverages UAMS Regional Programs family medicine residency clinics within an academic medical center. As many states have rural residency programs, our model and approach provide an important example for other academic health centers to replicate.

Since its inception, the Rural Research Network has implemented 12 studies and recruited and/or collected data from 9248 participants. Notably, 10 of the studies were able to recruit Black/African American participants at or above a representative sample. Furthermore, the studies are diverse and range from mixed methods and survey research, to seroprevalence (blood sample collection), to randomized controlled trial interventional studies. As the Rural Research Network matures, the types of research will expand in parallel with the health priorities of Arkansas, such as by increasing focus on cancer clinical trials, implementation science informed trials, and other new clinical trial designs that support the incorporation of community perspectives and feasibility in clinical trial design (e.g., adaptive trials [59], low touch trials [60], and mixed methods research [61]).

Best practices from the Rural Research Network include locating a strong MOU that ensures the studies (1) provide opportunities for UAMS Regional Programs' faculty and residents to engage in the scholarly products that are part of the research

(i.e., publications, presentations); (2) engage local communities; (3) improve patient outcomes; and (4) build local (rural clinical site) research infrastructure. The Rural Research Network has also helped residents and faculty from the regional sites publish 32 manuscripts [26-57]. Scholarly activity is an important requirement from the Accreditation Council for Graduate Medical Education for residency programs [62].

There are more than 60 CTSA-funded sites and 71 National Cancer Institute (NCI)-Designated Cancer Centers in 36 states and the District of Columbia. The Rural Research Network provides a platform for research participation that aligns with the overarching missions of the Translational Research Institute, Office of Community Health and Research, and Winthrop P. Rockefeller Cancer Institute. Many universities have both awards within their institutions. The Rural Research Network demonstrates how CTSA-funded sites and Cancer Institutes can collaborate to expand research capacity and increase opportunities for research among rural and minority communities. NIH should consider how to further incentivize collaboration between CTSA and NCI-funded institutes to achieve their goal of increasing research among rural and minority communities.

Acknowledgments

None.

Funding

Research reported in this publication was supported by UAMS Translational Research Institute funding awarded through the National Center for Advancing Translational Sciences of the National Institutes of Health (UL1 TR003107 and 5R01NR019487); Community Engagement Alliance (CEAL) Against COVID-19 Disparities (6793-02-S016); and the Patient Centered Outcomes Research Institute (PCORI) (6793-02-S016). The content is solely the responsibility of the authors and does not necessarily represent the official views of the funders.

Conflicts of Interest

The authors declared no conflicts of interest.

References

- [1] Hartley D. Rural Health Disparities, Population Health, and Rural Culture. *Am J Public Health* 2004;94:1675-8.
- [2] United States Census Bureau. New Census Data show Differences between Urban and Rural Populations. United States: United States Census Bureau; 2016.
- [3] Singh G, Siahpush M. Widening Rural-Urban Disparities in Life Expectancy, U.S., 1969-2009. *Am J Prev Med* 2014;46:e19-29.
- [4] Henley SJ, Anderson RN, Thomas CC, Massetti GM, Peaker B, Richardson LC. Invasive Cancer Incidence, 2004-2013, and Deaths, 2006-2015, in Nonmetropolitan and Metropolitan Counties-United States. *MMWR Surveill Summ* 2017;66:1-13.
- [5] U.S. Department of Health and Human Services. HHS Action Plan to Reduce Racial and Ethnic Health Disparities: Implementation Progress Report 2011-2014. Washington, DC: Office of the Assistant Secretary for Planning and Evaluation; 2015.
- [6] Agency for Healthcare Research and Quality. 2021 National Healthcare Quality and Disparities Report. Rockville, MD: U.S. Department of Health and Human Services; 2021.
- [7] National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Board on Population Health and Public Health Practice; Committee on Community-Based Solutions to Promote Health Equity in the United States. *Communities in action: Pathways to health equity*. Washington, DC: National Academies Press (US); 2017.
- [8] Koh H, Graham G, Glied S. Reducing Racial and Ethnic Disparities: The Action Plan from the Department of Health and Human Services. *Health Aff (Millwood)* 2011;30:1822-9.
- [9] United States Census Bureau. Urban and Rural. United States: United States Census Bureau; 2010. Available from: <https://www.datacensus.gov/cedsci/table?q=ruralandtid=DECENNIALCD1132010H2andhidePreview=true> [Last accessed on 2021 May 10].
- [10] American Community Survey. 2019 Poverty Rate in the United States. United States: United States Census Bureau; 2020.
- [11] USDA Economic Research Service. Rural Poverty and Well-Being. United States: USDA Economic Research Service; 2022.
- [12] United States Census Bureau. Quickfacts: Arkansas, United States: United States Census Bureau; 2020.
- [13] Centers for Disease Control and Prevention. United States Cancer Statistics-Mortality: 1999-2017. United States: U.S. Department of Health and Human Services; 2020.
- [14] Clark L, Watkins L, Piña I, Elmer M, Akinboboye O, Gorham M, *et al*. Increasing Diversity in Clinical Trials: Overcoming Critical Barriers. *Curr Probl Cardiol* 2019;44:148-72.
- [15] Bierer B, Meloney L, Ahmed H, White S. Advancing the Inclusion of Underrepresented Women in Clinical Research. *Cell Rep Med* 2022;3:100553.
- [16] Wendler D, Kington R, Madans J, Van Wye G, Christ-Schmidt H, Pratt LA, *et al*. Are Racial and Ethnic Minorities Less Willing to Participate in Health Research? *PLoS Med* 2006;3:e19.
- [17] McElfish PA, Long CR, Selig JP, Rowland B, Purvis RS, James L, *et al*. Health Research Participation, Opportunity, and Willingness among Minority and Rural Communities of Arkansas. *Clin Transl Sci* 2018;11:487-97.
- [18] Purvis R, Abraham T, Long C, Stewart M, Warmack T, McElfish P. Qualitative Study of Participants' Perceptions and Preferences Regarding Research Dissemination. *AJOB*

- Empir Bioeth 2017;8:69-74.
- [19] McElfish PA, Purvis RS, Long CR. Researchers' Experiences with and Perceptions of Returning Results to Participants: Study Protocol. *Contemp Clin Trials Commun* 2018;11:95-8.
- [20] McElfish PA, Purvis RS, Stewart MK, James L, Yearly KH, Long CR. Health Research Funding Agencies' Policies, Recommendations, and Tools for Dissemination. *Prog Community Health Partnersh* 2018;12:473-82.
- [21] Long CR, Purvis RS, Flood-Grady E, Kimminau KS, Rhyne RL, Burge MR, *et al.* Health Researchers' Experiences, Perceptions and Barriers Related to Sharing Study Results with Participants. *Health Res Policy Syst* 2019;17:25.
- [22] McElfish PA, Long CR, James LP, Scott AJ, Flood-Grady E, Kimminau KS, *et al.* Characterizing Health Researcher Barriers to Sharing Results with Study Participants. *J Clin Transl Sci* 2019;3:295-301.
- [23] Purvis R, Long C, Eisenberg L, Hester D, Cunningham T, Holland A, *et al.* First do no Harm: Ethical Concerns of Health Researchers that Discourage the Sharing of Results with Research Participants. *AJOB Empir Bioeth* 2020;11:104-13.
- [24] McElfish P, Purvis R, Scott A, Haggard-Duff L, Riklon S, Long C. The Results are Encouragements to make Positive Changes to be Healthier: Qualitative Evaluation of Marshallese Participants' Perceptions when Receiving study Results in a Randomized Control Trial. *Contemp Clin Trials Commun* 2020;17:100543.
- [25] Purvis R, Long C, James L, Kimminau K, Riklon S, Carlton A, *et al.* Dissemination Protocol for Community-based Participatory Research Partnerships with Marshallese Pacific Islanders in Arkansas. *Prog Community Health Partnersh* 2021;15:369-83.
- [26] Mayberry L, Felix H, Hudson J, Curran G, Long C, Selig J, *et al.* Effectiveness-Implementation Trial Comparing a Family Model of Diabetes Self-management Education and Support with a Standard Model. *Contemp Clin Trials* 2022;121:106921.
- [27] Moore R, Purvis R, Bogulski C, Maddox T, Haggard-Duff LK, Schulz T, *et al.* Learning During COVID-19: Rapid e-Learning Transition at a Regional Medical School Campus. *J Reg Med Campuses* 2021;4:3645.
- [28] Willis DE, Andersen JA, Bryant-Moore K, Selig JP, Long CR, Felix HC, *et al.* COVID-19 Vaccine Hesitancy: Race/Ethnicity, Trust, and Fear. *Clin Transl Sci* 2021;14:2200-7.
- [29] Andersen J, Rowland B, Gloster E, McElfish P. Telehealth Utilization during COVID-19 among People with Diagnosed Mental Health Conditions. *Telemed J E Health* 2022;28:743-6.
- [30] Purvis RS, Hallgren E, Moore RA, Willis DE, Hall S, Gurel-Headley M, *et al.* Trusted Sources of COVID-19 Vaccine Information among Hesitant Adopters in the United States. *Vaccines (Basel)* 2021;9:1418.
- [31] Hallgren E, Willis D, Rowland B, Selig J, McElfish P. Association between Diagnosed Anxiety and Depression and Exposure to Life Stressors during the COVID-19 Pandemic. *J Health Dispar Res Pract* 2021;14:6.
- [32] Hallgren E, Moore R, Purvis RS, Hall S, Willis DE, Reece S, *et al.* Facilitators to Vaccination among Hesitant Adopters. *Hum Vaccin Immunother* 2021;17:5168-75.
- [33] Willis DE, Selig JP, Andersen JA, Hall S, Hallgren E, Williams M, *et al.* Hesitant but Vaccinated: Assessing COVID-19 Vaccine Hesitancy among the Recently Vaccinated. *J Behav Med* 2022;1-10.
- [34] Purvis R, Moore R, Ayers B, Felix H, Riklon S, Andersen J, *et al.* Diabetes Self-care Behaviors and Barriers to Clinical Care during COVID-19 Pandemic for Marshallese Adults. *Sci Diabetes Self Manag Care* 2022;48:35-43.
- [35] Andersen J, Rowland B, Gloster E, Willis D, Hernandez N, Felix H, *et al.* Associations among Self-reported Mental Health, Physical Activity, and Diet during the COVID-19 Pandemic. *Nutr Health* 2022;28:711-9.
- [36] Kennedy J, Forrest J, Young S, Amick B, Williams M, James L, *et al.* Temporal Variations in Seroprevalence of Severe Acute Respiratory Syndrome Coronavirus 2 Infections by Race and Ethnicity in Arkansas. *Open Forum Infect Dis* 2022;9:ofac154.
- [37] Andersen J, Rowland B, Ratcliff S, Felix H, McElfish P. Relationship between Sociodemographic Factors, Perceived COVID-19 Risk, and Engagement with Health Protective Behaviors. *South Med J* 2022;115:340-6.
- [38] McElfish P, Selig J, Scott A, Rowland B, Willis D, Reece S, *et al.* Associations between 5-Year Influenza Vaccination and Sociodemographic Factors and Healthcare Access among Arkansans. *Vaccine* 2022;40:3727-31.
- [39] Willis DE, Andersen JA, Montgomery BE, Selig JP, Shah SK, Zaller N, *et al.* COVID-19 Vaccine Hesitancy and Experiences of Discrimination among Black Adults. *J Racial Ethn Health Disparities* 2022; Online ahead of print.
- [40] Willis D, Long C, Rowland B, Tidwell C, Andersen J, McElfish P. COVID-19 and Food Insecurity in a Vulnerable Rural State. *Dialogues Health* 2022;1:100013.
- [41] Willis D, Schootman M, Shah S, Reece S, Selig J, Andersen J, *et al.* Parent/Guardian Intentions to Vaccinate Children against COVID-19 in the United States. *Hum Vaccin Immunother* 2022;18:2071078.
- [42] Andersen J, Willis D, Hallgren E, McElfish P, Felix H. Physical Activity and Fruit and Vegetable Consumption during the COVID-19 Pandemic for People with Type 2 Diabetes Mellitus. *Prim Care Diabetes* 2022;16:640-3.
- [43] Moore R, Purvis R, Hallgren E, Reece S, Padilla-Ramos A, Gurel-Headley M, *et al.* I am Hesitant to Visit the Doctor

- Unless Absolutely Necessary: A Qualitative Study of Delayed Care, Avoidance of Care, and Telehealth Experiences during the COVID-19 Pandemic. *Medicine (Baltimore)* 2022;101:e29439.
- [44] McElfish P, Rowland B, Scott A, Andersen J, Carl Lee S, McKinnon J, et al. Hesitant Adopters: An Examination of Hesitancy among Adults in Arkansas who have taken the COVID-19 Vaccine. *Clin Transl Sci* 2022;15:2316-22.
- [45] Moore R, Purvis R, Willis D, Worley K, Hervey D, Reece S, et al. The Vaccine Hesitancy Continuum among Hesitant Adopters of the COVID-19 Vaccine. *Clin Transl Sci* 2022;15:2844-57.
- [46] Moore R, Zielinski M, Thompson RJ, Willis D, Purvis R, McElfish P. This Pandemic is Making Me More Anxious about My Welfare and the Welfare of others: COVID-19 Stressors and Mental Health. *Int J Environ Res Public Health* 2021;18:5680.
- [47] Boehme K, Kennedy J, Snowden J, Owens S, Kouassi M, Mann R, et al. Pediatric SARS-CoV-2 Seroprevalence in Arkansas over the First Year of the C-19 Pandemic. *J Pediatric Infect Dis Soc* 2022;11:248-56.
- [48] Felix H, Andersen J, Willis D, Malhis J, Selig J, McElfish P. Control of Type 2 Diabetes Mellitus during the COVID-19 Pandemic. *Prim Care Diabetes* 2021;15:786-92.
- [49] McElfish PA, Willis DE, Bryant-Moore K, Rojo MO, Andersen JA, Kaminicki KF, et al. Arkansas' Preferred COVID-19 Testing Locations. *J Prim Care Community Health* 2021;12:21501327211004289.
- [50] Purvis R, Willis D, Moore R, Bogulski C, McElfish P. Perceptions of Adult Arkansans Regarding Trusted Sources of Information about the COVID-19 Pandemic. *BMC Public Health* 2021;21:2306.
- [51] McElfish P, Purvis R, James L, Willis D, Andersen J. Perceived Barriers to COVID-19 Testing. *Int J Environ Res Public Health* 2021;18:2278.
- [52] Andersen J, Felix H, Su D, Selig J, Ratcliff S, McElfish P. Factors Associated with Arkansans' First use of Telehealth during the COVID-19 Pandemic. *Int J Telemed Appl* 2022;2022:5953027.
- [53] Moore R, Willis DE, Shah SK, Purvis RS, Shields X, McElfish PA. The Risk Seems Too High: Thoughts and Feelings about COVID-19 Vaccination. *Int J Environ Res Public Health* 2021;18:8690.
- [54] McElfish PA, Willis DE, Shah SK, Bryant-Moore K, Rojo MO, Selig JP. Sociodemographic Determinants of COVID-19 Vaccine Hesitancy, Fear of Infection, and Protection Self-efficacy. *J Prim Care Community Health* 2021;12:21501327211040746.
- [55] Purvis R, Ayers B, Rowland B, Moore R, Hallgren E, McElfish P. "Life is Hard": How the COVID-19 Pandemic Affected Daily Stressors of Women. *Dialogues Health* 2022;1:100018.
- [56] Cardenas V, Kennedy J, Williams M, Nembhard W, Zohoori N, Du R, et al. State-Wide Random Seroprevalence Survey of SARS-CoV-2 Past Infection in a Southern US State, 2020. *PLoS One* 2022;17:e0267322.
- [57] Virmani T, Lotia M, Glover A, Pillai L, Kemp A, Iyer A, et al. Feasibility of Telemedicine Research Visits in People with Parkinson's Disease Residing in Medically Underserved Areas. *J Clin Transl Sci* 2022;6:e133.
- [58] Dobis E, Krumel TJ, Cromartie J, Conley K, Sanders A, Ortiz R. Rural America at a Glance. United States: USDA Economic Research Service; 2021.
- [59] Pallmann P, Bedding A, Choodari-Oskooei B, Dimairo M, Flight L, Hampson L, et al. Adaptive Designs in Clinical Trials: Why use them, and how to Run and Report them. *BMC Med* 2018;16:29.
- [60] Arch J, Crespi C, Levin M, Genung S, Nealis M, Mitchell J, et al. Randomized Controlled Pilot Trial of a Low-Touch Remotely-Delivered Values Intervention to Promote Adherence to Adjuvant Endocrine Therapy among Breast Cancer Survivors. *Ann Behav Med* 2022;56:856-71.
- [61] Tariq S, Woodman J. Using Mixed Methods in Health Research. *JRSM Short Rep* 2013;4:2042533313479197.
- [62] Accreditation Council for Graduate Medical Education. Common Program Requirements (Residency). United States: Accreditation Council for Graduate Medical Education; 2022.

Publisher's note

Whioce Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.