

# The Arkansas Lincoln Project: Design of a Novel Interventional Model to Address Cardiovascular Health Disparities in Rural, Underserved Communities of the Arkansas Delta

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## Abstract

Serious health-related disparities continue to disproportionately impact underserved, low-wealth, and minority communities driven by an entanglement of factors. Studies show cardiovascular disease (CVD) prevalence in rural areas is advancing with widespread consequences on the local economies, health care systems, and population. Previous efforts in healthcare and community-based systems to impact rural CVD and CVD-related outcomes have been mostly unsuccessful for various reasons. The Lincoln Project (TLP) in Arkansas was conceived in response to this serious unmet need and with historical shortcomings in mind. TLP adopts a novel community health worker-led neighborhood-based strategy, bridging the gap between social resources, health care services and the rural communities they serve with the goal of rebalancing CVD-based health equity in areas of Arkansas with the most severe health disparities.

**Keywords:** community health worker; cardiovascular risk factor; coronary artery disease; health disparities; health equity

## Existing Challenges

Health disparities are driven by a complex web of economic, social, cultural, and medical influences [1-4], the details of which may vary from location to location, but the consequences uniformly crippling. In the Arkansas Delta Region (ADR) economic prosperity remains largely elusive due to struggles providing the infrastructure, skilled workforce, quality of life, and good-paying jobs needed to maintain and grow the local economy and enabling households to generate enough income to

support their families. The ADR includes 15 counties: Arkansas, Chicot, Clay, Craighead, Crittenden, Cross, Desha, Drew, Greene, Lee, Mississippi, Monroe, Phillips, Poinsett, and St. Francis. These counties cover ~10,600 square miles, with an average of ~39 residents per square mile [5], significantly lower than the national average (56 residents/mile<sup>2</sup>) [6]. From 2020 census statistics<sup>6</sup> 22.4% of ADR residents live in poverty, markedly higher than both the state (15.2%) and national average (11.9%) (Table 1).

	Residents per mi <sup>2</sup>	Median Household Income (\$)	Residents Living in Poverty (%)	CVD Death Rate (per 100,000)	Health Outcome Ranking	Health Factor Ranking
<b>ADR County</b>						
Arkansas	17.3	\$51,186	17.2 %	135.4	47	21
Chicot	15.8	\$35,992	26.8 %	166.9	70	72
Clay	22.8	\$43,723	18.1 %	148.6	59	58
Craighead	157.3	\$51,797	16.8 %	131.8	16	9
Crittenden	79.0	\$47,545	22.9 %	143.1	71	49
Cross	27.3	\$40,587	21.2 %	159.8	65	55
Desha	14.8	\$37,421	22.8 %	241.1	73	73
Drew	20.9	\$46,787	18.4 %	113.8	42	35
Greene	79.2	\$53,821	17.1 %	130.5	23	16
Lee	14.3	\$32,502	36.8 %	162.5	68	74
Mississippi	45.2	\$47,892	21.0 %	181.9	72	68
Monroe	11.2	\$35,833	23.8 %	191.2	74	69
Phillips	23.8	\$35,167	22.1 %	139.4	75	75
Poinsett	30.3	\$36,150	21.2 %	198.3	69	63
St. Francis	35.9	\$37,759	30.1 %	165.3	66	71
<b>ADR Overall</b>	<b>38.9</b>	<b>\$42,227</b>	<b>22.4 %</b>	<b>124.4</b>	<b>N/A</b>	<b>N/A</b>
<b>State Average</b>	<b>38.9</b>	<b>\$51,146</b>	<b>15.2 %</b>	<b>124.4</b>	<b>N/A</b>	<b>N/A</b>
<b>National Average</b>	<b>56.0</b>	<b>\$67,340</b>	<b>11.9 %</b>	<b>79.3</b>	<b>N/A</b>	<b>N/A</b>

**Table 1. Characteristics of the Arkansas Delta Region.** Arkansas Delta (ADR) residents per mi<sup>2</sup> calculated from 2020 census data [5]. Median household income from most recent (2019) information [6]. Cardiovascular (CVD) death rate as reported from 2017-2019 data, male and female of all ethnicities under 75 years of age [6]. Health Outcome & Factor Ranking based on a scale of 1 being the best county and 75 the worst among all 75 Arkansas counties.

Overshadowing these challenges are devastating health disparities highlighted by 73% and 60% of ADR counties falling in the lowest quartile of health outcome and health factor rankings<sup>7</sup>, respectively, of all 75 counties in the state (Figure 1), and an overall CVD-related death rate of citizens under 75 years-old twice that of the national average [6] (Table 1). Cardiovascular disease (CVD) -related disparities continue to disproportionately impact underserved, low-wealth communities despite improvements in management over the past 50 years [8-14], and this phenomenon is certainly evident in the ADR. Over the years, many health

improvement projects, led by dedicated, hard-working people have been implemented in rural regions, including the ADR. Unfortunately, most of these projects were unsuccessful for a number of reasons including the traditional healthcare system being unable or unwilling to develop and maintain community-level interventions targeting specific locales with poor health outcomes; and grossly underfunded Public Health Departments presiding over a cadre of fragmented programs that proved minimally effective [8, 9].



**Figure 1:** The lowest quartile of health outcome rankings<sup>7</sup> of all seventy-five Arkansas counties are highlighted in yellow. Eleven of the eighteen counties that comprise the lowest quartile are in the ADR. The ADR includes fifteen counties with close proximity to the Mississippi River, and are listed in red on the map.

### Development of the Arkansas Lincoln Project

With understanding of previous shortcomings and challenges, The Lincoln Project (TLP) was developed over the last decade as engagement platform and intervention model targeting underserved, low wealth Arkansas communities with health outcomes disparities to address longstanding flaws preventing the rebalancing of rural health equity. TLP focuses on a community health worker (CHW)-based, patient-centered and community-focused care team with a holistic approach equally valuing primary disease prevention and acute medical care. The hypothesis is a successful CVD prevention strategy prioritizing community engagement, access to safe and effective CVD risk reduction, and long-term focus on overall well-being in underserved communities including the ADR will, with time, yield measurable results.

TLP is a coalition of local, county, state, and private sector key stakeholders mobilized through a highly organized and specific CHW-led neighborhood-based strategy, bridging the gap between social resources, health care services and the rural ADR communities they serve. This CHW team is deployed using a geospatial approach targeting the highest risk ADR neighborhoods to assess and address the needs of residents in each household of the target area. TLP CHWs are local community members with focused health care training [15] and form the interface between health care systems and communities to identify and address social needs, improve health care access, quality of care, and cultural competence. In each geospatially identified highest-risk ADR neighborhood, TLP CHWs engage every resident 18 years or older with a holistic approach. Activation of a portfolio of programs and resources (Figure 2) address and manage social and medical factors leading to CVD and out of hospital cardiac arrest (OHCA) while populating a 'living registry' with data enabling the examination of TLP's impact on social

and medical variables and key metrics including health outcomes in the target neighborhoods.

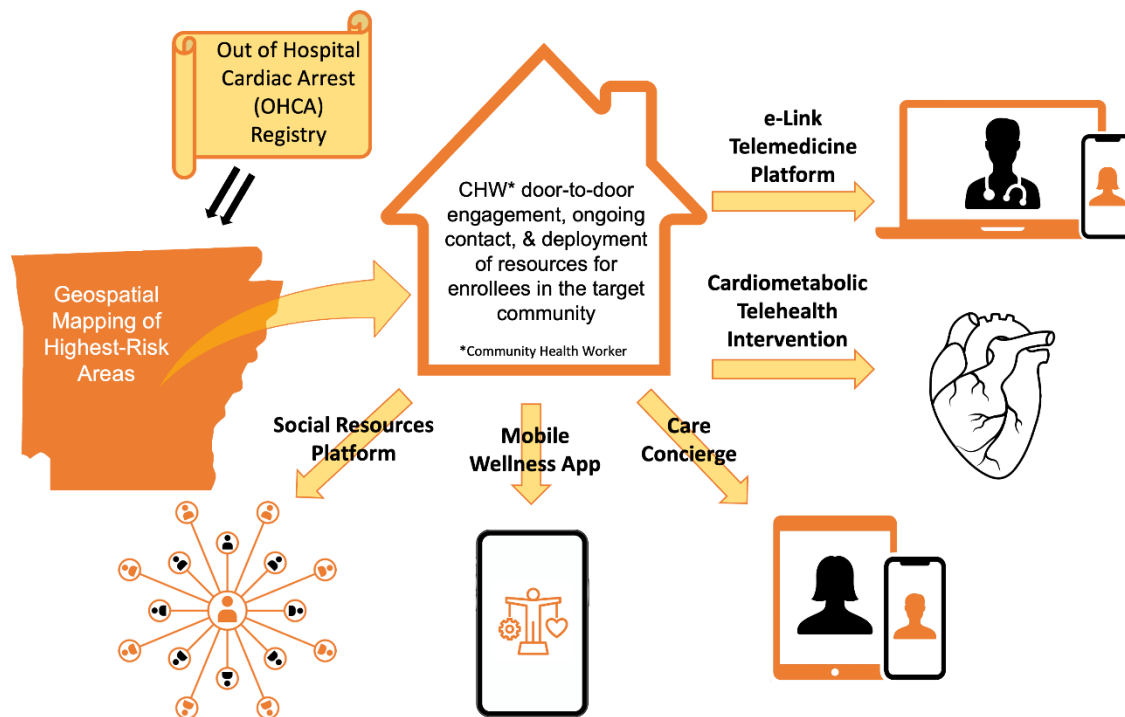


Figure 2. Schematic of The Arkansas Lincoln Project with Current Portfolio

**Figure 2:** The Arkansas Lincoln Project is a coalition of local, county, state, and private key stakeholders mobilized via CHW-led neighborhood-based strategy in in the Arkansas Delta Region.

TLP portfolio is a dynamic collection of programs and resources that changes over time to meet the evolving needs of enrollees. Currently, TLP resident enrollees are offered access to the visceral-fat focused 2-month obesity and CVD-risk reduction program administered by TLP partner 20Lighter [16-19], a care concierge administered by TLP partner HeyRenee [20], receive the Health Science Index (HSI) wellness optimization mobile app, are referred to social services and, where indicated, telemedicine visits with health care providers. Expansion of TLP portfolio continues as new needs are identified by CHWs. By establishing rapport with repeated home visits over a period of at least 6 months, TLP CHWs build meaningful connections with socially isolated ADR residents bringing access to interventions tailored to individual social and health needs with the goal of improving health and wellness, reducing CVD morbidity [21] and mortality including OHCA [10, 11], and ultimately increasing health equity.

The benefit of TLP approach is that it does not limit the study population to a subjectively defined group of patients who have suffered a cardiac arrest. Rather, this risk-based targeting approach incorporates a prospective design by recruiting individuals from an area with historically high rates of out of hospital premature natural death, collecting medical and social data, deploying strategies to directly impact modifiable CVD risk factors and improve wellness, meeting enrollees' social needs, and linking individuals to medical care. TLP's structure, flexibility and focus on local resources allows adaptation within each neighborhood as needs change over time, enabling and encouraging the evolution from individual behavior change to long-term community prevention.

### Implementation of the Lincoln Project

In mid-2021, the TLP established door-to-door community engagement efforts in Phillips County (PC), which has the worst health factors and health outcomes rankings in the state. This initial proof of concept community engagement is critical to inform a broader understanding of local needs enabling future community-driven identification of challenges and establishment of long-lasting complex relationships that allow long term overall transformation of the local health system and improvement of health equity. TLP team leverages extensive expertise in developing community intervention strategies, a successful track record of community outreach and significant interest and enthusiasm of local and regional stakeholders for meaningful change in not only PC, but also the entire ADR.

Although the TLP is based in the University of Arkansas for Medical Sciences (UAMS) Division of Cardiology (DOC), it is important to understand the rationale behind this novel structure. PC, like most ADR counties, lacks the infrastructure necessary to systematically engage its underserved minority communities, identify social and medical needs, and provide goods and services to meet those needs. TLP team members at the UAMS DOC recognize the devastating impact of chronic disease in rural area including communities in the ADR and know a "medical only" solution to the problem will not succeed. PC has made an informed decision to support a community-level intervention, TLP, as a means of primary CVD prevention. The relationship between the community, PC leadership and UAMS allows broad dissemination of the strategy, data,

and outcomes. Additionally, as an Academic Medical Center, UAMS educates the next generation of healthcare leaders, fellows, residents, medical students, nurses, and public health practitioners about community-led research, and these are the practitioners who will continue TLP mission in the years to come.

A high priority of TLP is the infrastructure, efforts and key stakeholders established with this project remain a fixture in the community where long-term engagement is critical for continued improvements in health equity. Project data will be showcased and shared with state political figures, as well as other researchers in local, regional, and national forums in hopes similar programs can be adopted in other minority and underserved areas where severe health disparities are ravaging rural communities as well as areas of social isolation and economic despair.

## The Road Ahead

As TLP progresses over the 6 months, initial evaluation of enrollee engagement and utilization data from social services referrals, the 20Lighter cardiometabolic health program, concierge care by HeyRenee, HSI wellness optimization application, and telemedicine visits will be undertaken. Analysis will also reveal the number of TLP enrollees introduced to the program via word of mouth from family, friends, and neighbors in addition to those residents enrolled after CHW engagement at their doorsteps. To further hone the model and ensure the portfolio of offerings adequately addresses the enrollees' needs, structured interviews with CHWs, enrollees, and community focus groups will help evaluate TLP effectiveness and identify opportunities to improve relevance. This data in aggregate, serves as the first look at overall TLP performance. Qualitative data serves two purposes, first, as an indicator or proxy for as-yet unmeasurable clinical outcomes and second, to collect information on the actual needs and preferences of the target population itself which may vary by location and from the overall assumptions made at TLP outset. The latter is essential in order to refine interventions to promote engagement, ensure alignment with enrollees' needs and priorities, and identify the best method of delivery.

CHWs are typically trusted community members, ideally positioned as a result of the same cultural and linguistic backgrounds and life experiences to provide tailored resources and responsive interventions [15]. TLP is leveraging CHWs as a strategic engagement tool allowing deployment of support and interventions in the rural ADR to enable the evolution from a health care system focusing only on medical care to one that is proactively focused on prevention and social determinants of health. As initial data emerges, assessment of how well-received, cost-effective, and impactful TLP's intervention model is at reducing CVD and CVD risk for low-income, underserved, and racial and ethnic minority communities. Future plans to expand TLP to the entire ADR and other rural counties will be undertaken if the findings support the use of TLP to address CVD and other health disparities in communities where health equity can enable and assist with revitalization critical for future generations.

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**c. Availability of data and material-** No data has been included or analyzed to in this manuscript.

**d. Code availability-** Not applicable.

**e. Ethical Approval-** This manuscript does not include interaction with subjects, it is a discussion of Lincoln Project methodologies.

**f. Authors' contributions-** **J.W.B.:** Methodology, Writing - Original Draft, Writing - Review & Editing, Project Administration, Funding Acquisition **S.D.:** Resources, Project Administration **M.M.:** Conceptualization, Methodology, Visualization **N.C.:** Methodology, Supervision, Project Administration **I.W.P.:** Conceptualization, Methodology, Writing - Original Draft, Writing - Review & Editing, Visualization, Supervision, Project Administration, Funding Acquisition

**g. Consent to participate-** The authors affirm this manuscript does not include interaction with subjects and is not subject to informed consent.

**h. Consent for publication-** Consent to publish has been received from all authors.

## References

1. Mannoh, I., Hussien, M., Commodore-Mensah, Y., Michos, E.D. (2021). Impact of social determinants of health on cardiovascular disease prevention. *Current Opinions in Cardiology*. 36(5), 572-579.
2. Braveman, P.A., Cubbin, C., Egerter, S., Williams, D.R., Pamuk, E. (2010). Socioeconomic disparities in health in the United States: what the patterns tell us. *American Journal of Public Health*. 100 (Suppl 1), S186-96.
3. Thomas, T.L., DiClemente, R., Snell, S. (2014). Overcoming the triad of rural health disparities: How local culture, lack of economic opportunity, and geographic location instigate health disparities. *Health Education Journal*. 73(3), 285-294.
4. Roth, A.R., Denney, J.T., Amiri, S., Amram, O. (2020). Characteristics of place and the rural disadvantage in deaths from highly preventable causes. *Social Science & Medicine*. 245, 112689-112695.
5. U.S. Census Bureau. (2021).
6. Centers for Disease Control and Prevention. *Interactive Atlas of Heart Disease and Stroke*.
7. 2021 County Health Rankings & Roadmaps.
8. Institute of Medicine (US) Roundtable on Health Disparities. Challenges and Successes in Reducing Health Disparities: Workshop Summary. Washington (DC): National Academies Press (US); 2008. Appendix D, Community Approaches to Addressing Health Disparities.
9. Magnan, S. (2017). Social Determinants of Health 101 for Health Care: Five Plus Five. National Academy of Medicine Perspectives. Discussion Paper, National Academy of Medicine, Washington, DC.
10. Gan, Z.S.W., Choi, W., Lin, F.C., Tippett, R., Joodi, G., Pursell, I., Simpson, R.J. Jr. (2019). Factors Underlying Increased Incidence of

- Sudden Unexpected Death in Rural Counties in North Carolina. *Journal of General Internal Medicine*. 34(6), 815-817.
11. Nanavati, P.P., Mounsey, J.P., Pursell, I.W., Simpson, R.J. Jr, Lewis, M.E., Mehta, N.D., Williams, J.G., Bachman, M.W., Myers, J.B., Chung, E.H. (2014). Sudden Unexpected Death in North Carolina (SUDDEN): methodology review and screening results. *Open Heart*. 27;1(1), e000150-e000157.
  12. Cohen, S.A., Cook, S.K., Kelley, L., Foutz, J.D., Sando, T.A. (2017). A closer look at rural-urban health disparities: Associations between obesity and rurality vary by geospatial and sociodemographic factors. *Journal of Rural Health*. 33, 167-79.
  13. Weisgrau, S. (1995). Issues in rural health: access, hospitals, and reform. *Health Care Financing Review*. 17(1), 1-14.
  14. Anderson, T.J., Saman, D.M., Lipsky, M.S., Lutfiyya, M.N. (2015). A cross-sectional study on health differences between rural and non-rural U.S. counties using the County Health Rankings. *BMC Health Services Research*. 15, 441-448.
  15. Sud, S., Pursell, I., Joodi, G., Simpson, R.J. Jr. (2017). Engaging Community Health Workers in the Effort to Prevent Sudden Unexpected Death and Death from Chronic Illness. *Medical Care*. 55(12), 1061.
  16. Dembrowski, G.C., Barnes, J.W. (2020). Resolution of Metabolic syndrome with reduction of visceral adipose tissue in a 47 year old patient with Type 2 Diabetes Mellitus. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*. 14(5), 1001-1004.
  17. Dembrowski, G.C., Barnes, J.W. (2020). Body composition outcomes and visceral fat reduction in weight loss program participants taking antidepressant medication. *Obesity Medicine*. 20, 100291-100296.
  18. Dembrowski, G.C., Barnes, J.W. (2021). Visceral fat reduction and increase of intracellular fluid in weight loss participants on antihypertension medication. *Cardiovascular Endocrinology & Metabolism*. 10(1), 31-36.
  19. Dembrowski, G.C., Barnes, J.W. (2021) Improvement of Visceral Adiposity and Intracellular Fluid in Weight Loss Participants Taking Anti-Diabetic Medication. *Journal of Diabetes & Clinical Practice*. 4(6), 138-143.
  20. HeyRenee. Available at <https://www.heyrenee.co/> Accessed January 20, 2022.
  21. Vaughan, A.S., Schieb, L., Casper, M. (2020). Historic and recent trends in county-level coronary heart disease death rates by race, gender, and age group, United States, 1979–2017. *PLoS One*. 15(7), e0235839- e023585.



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