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THE ECONOMIC CASE FOR INVESTING IN MATERNAL HEALTH

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Amir Masoud Forati

Amir Masoud Forati is an experienced geospatial data scientist with a focus on health research. He has a strong background in data science, machine learning, visualization, time series analysis and spatial analysis. He serves as a health researcher with Heartland Forward.

With a Doctoral degree in geography from the University of Wisconsin Milwaukee, Amir has conducted research on precision epidemiology, population health and the opioid crisis. He has also worked as a lecturer, research assistant and has industry experience in utility data analytics and precision agriculture. With his diverse background and expertise in health research, data science and geospatial analysis, Amir continues to make valuable contributions in leveraging data-driven insights to address pressing health challenges and shape community responses.



Maria Rodriguez-Alcala

Maria Rodriguez-Alcala applies a holistic approach to health and wellness and as program director takes a proactive angle aiming to balance the reactive model that still dominates in the Heartland. She previously worked for University of Missouri as a researcher, instructor and, more recently, as a field faculty in Extension. She also worked in Sao Paulo, Brazil for Icone - an applied economics-based think tank and Washington State University. Her multi-disciplinary background, combined with her international, statewide and, more recently, local community-level experiences, allows Maria to bring unique tools to the table to help change the approach on how to improve health in the mid-states.

When compared to the coast states and other developed economies, it is clear to her that innovative ideas and strategic partnerships are needed. She has a B.S. in applied economics from Texas A&M University, M.S. in applied economics from University of Missouri, and a PhD in Sustainable Development from University of Missouri. When asked about why she chose to stay in the Heartland, she says that after living for many years in Missouri, hiking in the Ozarks, and building relationships at the community level, her heart belongs here.



William Trolinger

Will Trolinger is a research analyst for Heartland Forward and joined the “think and do” tank after serving as an intern. He graduated from the College of STEM at the University of Arkansas Fort Smith (UAFS) with a degree in computer science and has a particular interest in AI. While at UAFS, he balanced his academic career while playing on the baseball team in the positions of short stop and second base. Will was born and raised in Fayetteville, Arkansas.



Romi Sigsworth

Romi Sigsworth is a research consultant. She primarily consults for the ENACT Organised Crime Program and the Justice and Violence Prevention Program of the Institute for Security Studies (ISS) based in Pretoria, South Africa. Prior to this, she was the gender specialist at the ISS and a senior researcher at the Centre for the Study of Violence and Reconciliation in South Africa. She has an M.St. in Women's Studies from the University of Oxford.



Dave Shideler

David Shideler serves as the chief research officer for Heartland Forward's research team which includes visiting senior fellows Richard Florida and Maryann Feldman. With a mission to help improve the economic performance in the heartland and change the narrative of the middle of the country, the original research efforts focus on four key pillars: innovation and entrepreneurship, human capital, health and wellness and regional competitiveness.

Shideler joined Heartland Forward after more than a decade at Oklahoma State University, serving as a professor and Community and Economic Development Specialist in the Department of Agricultural Economics. In these roles, he oversaw projects in community and rural development and small business development, and published peer-reviewed research articles on the economic impacts of internet access, incentive programs, and local food production.

Shideler holds a Ph.D. in Agricultural, Environmental and Development Economics and an M.A. in Economics from the Ohio State University, an M.S. in Agricultural Economics from the Pennsylvania State University, and a B.S. in Community and Rural Development from Clemson University.



Avery Nims

Avery recently joined Heartland Forward while in pursuit of her bachelor's degree in Statistics from the University of Illinois at Urbana-Champaign with a minor in Political Science. As a lifelong resident of Chicagoland, she is invested in maximizing the well-being of heartland residents in evidence-based ways. She is passionate about the arts and served as a director of her school's branch of The Fashion Network, a fashion-centered magazine and social organization. She has also worked extensively in community outreach for local leaders.

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ABOUT HEARTLAND FORWARD

Heartland Forward is a think and do tank dedicated to being a resource for states and local communities in the middle of the country. We do this by studying broad economic trends and building data-driven and community-tested partnerships, programs and policies to address the needs of the heartland - all while helping to change the narrative about the middle of the country and kick-starting economic growth.

The views expressed in this report are solely those of Heartland Forward.



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EXECUTIVE SUMMARY

ES TABLE 1: TOTAL ECONOMIC IMPACTS DUE TO UNDESIRABLE PREGNANCY-RELATED OUTCOMES* - ARKANSAS, LOUISIANA, MISSISSIPPI, OHIO AND U.S., 2020

	TOTAL ANNUAL ECONOMIC IMPACT	SHARE OF GDP
Arkansas	\$1,804,028,192	1.3%
Mississippi	\$3,466,341,829	1.5%
Louisiana	\$1,981,315,694	1.7%
Ohio	\$6,988,313,818	1.0%
U.S.	\$165,326,562,967	0.8%

* Pregnancy-related outcomes includes death of mother and/or child, low birth weight and preterm birth.

Undesirable outcomesⁱ from pregnancy, such as the death of the mother and/or child, low birth weight or preterm births, are both a human and economic burden in the United States (U.S.) with Arkansas ranking at or near the bottom of all states. Based upon our calculations, the direct medical and related-nonmedical expenses, in combination with the broader indirect economic losses (human capital, reduced work hours and productivity), cost the U.S. and Arkansas economies \$165.3 billion (0.8% of GDP) and \$1.8 billion (1.3%), respectively, in 2020.

In the context of the U. S., the persistence of preventable deaths of mothers and children represent not only a profound human tragedy but also a substantial economic inefficiency. That our research indicates a significant proportion of these outcomes were preventable through existing, cost-effective strategies underscores a missed opportunity for health system improvement and cost savings.

By preventing just half of these avoidable outcomes, the U. S. could realize savings of approximately \$78.6 billion annually equating to 0.36% of the nation's GDP. Specific to Arkansas, such preventative measures would translate to an annual economic savings of \$872 million, or 0.63% of the state's GDP. These savings could underwrite more than 11,000 full scholarships for nursing students annually or fund the establishment of two modern 500 bed hospitals

each year. These examples vividly illustrate the dual benefit of strategic health interventions: dramatically enhancing maternal and infant health while simultaneously yielding significant economic savings.

These dire pregnancy outcomes are both a reflection and harbinger of existing and worsening disparities in access to the health system with social and behavioral health determinates. Poor care coordination within the fragmented, siloed health system permits too many mothers and babies be overlooked. There is a lack of information available for best practices across providers and effective collaboration. For example, the U.S. ranks 66th out of 197 countries in maternal death rates; it ranks 11th and 12th for maternal and infant death rates, respectively, out of 15 nations with a GDP over \$1 trillion; and 13th among those same countries in preterm births. This places the U.S. behind Brazil, Mexico and Russia.

Medical and Non-medical Costs

Of course, mothers, along with their families, bear the personal and financial suffering of pregnancy-related death, preterm births and low birth weight. Due to specialized care required for pregnancies with likely complications, many women from rural and smaller communities must travel long distances to access preventative services.

ⁱⁱ Undesirable outcomes, used throughout this report, refer to adverse birth outcomes such as preterm birth and low birth weight.

There are four primary drivers of these high medical costs:

- the number of unplanned pregnancies, particularly among young women;
- mental health challenges, including substance abuse;
- metabolic syndrome, worsened by obesity, diabetes and hypertension; and
- lack of availability and access to maternal health resources (health insurance coverage)

There are higher non-medical costs associated with seeking care outside a mother's county of residence. The opportunity cost of time spent traveling, transportation and lodging expenses and potentially higher medical costs disproportionally impact low-income Black, Hispanic and American Indian/Alaska Native (AIAN) families. Alternatively, these minority groups might find these costs prohibitive and limit their choices to local providers, regardless of discernable differences in quality of care, negatively affecting birth outcomes.

Women from low-income populations may lack basic knowledge on their own physiology, nutrition and reproductive processes. Low health literacy and behavioral risks such as smoking, alcohol consumption and pre-pregnancy body mass index (BMI) compound the complexities. These populations also are burdened with a greater prevalence of the primary drivers of high medical costs associated with undesirable birth outcomes—further exacerbating the disparity in impact.

Our research reveals a strong relationship between a mother's risk of death and the number of prenatal care visits: if a woman receives 10 or more prenatal care visits during pregnancy, the risk falls from one

in three to almost one in five women. Access and proximity to maternal health care are critical elements in keeping mother and baby healthy. A key need is increasing the number of Medicaid-accepting obstetrician-gynecologists (OB-GYNs) for women with limited financial means. Access to postpartum care and services, both physical and mental services, could materially reduce undesirable birth outcomes.

Across the U.S., Black mothers experience the highest rate of undesirable birth outcomes. In Louisiana and Mississippi, 26.73% and 25.85% of Black mothers, respectively, experience undesirable birth outcomes—approximately 10 percentage points above white mothers in those states. However, in Arkansas the highest prevalence of undesirable birth outcomes is observed among Native Hawaiian and Other Pacific Islander mothers at 28.5%. These minority groups require more complex perinatal treatment and need greater access to maternal health care providers. Additionally, culturally sensitive and specific health interventions are necessary for these communities.

There are enormous differences in costs between a healthy and undesirable birth outcome. The average medical cost of a healthy, full-term baby in the U.S. is \$6,400—a reasonable figure in the vast health care system. However, these medical costs skyrocket to \$238,000 for an extreme preterm birth. Even low weight births and moderate preterm births are associated with higher costs — \$114,000 and \$74,000, respectively. These incremental costs reflect higher neonatal care, potential development challenges and chronic health conditions caused by them. The annual non-medical costs of births outside a mother's county of residence and costs of preterm and low weight births totaled \$63.4 billion and \$0.64 billion in the U.S and Arkansas, respectively, in 2020.

ES TABLE 2: COST OF OUT-OF-COUNTY CHILDBIRTH AND PRETERM AND LOW WEIGHT BIRTHS - ARKANSAS, LOUISIANA, MISSISSIPPI, OHIO AND U.S., 2020

	ANNUAL NON-MEDICAL COSTS OF OUT-OF-COUNTY CHILDBIRTH	ANNUAL SAVINGS FROM PREVENTING PRETERM AND LOW WEIGHT BIRTHS (LWB)	COMBINED POTENTIAL SAVINGS
ARKANSAS	\$37,507,176	\$597,936,917	\$635,444,093
MISSISSIPPI	\$41,344,263	\$751,222,049	\$792,566,312
LOUISIANA	\$57,867,140	\$1,253,842,484	\$1,311,709,624
OHIO	\$84,329,100	\$2,109,972,459	\$2,194,301,559
U.S.	\$6,046,934,915	\$57,068,178,315	\$63,115,113,230

Workforce Economic Impacts

Safeguarding the health and life of the mother and child during and after pregnancy are the primary objective of maternal health care. Maternal health has demonstrative impacts on the workforce as it directly affects women’s ability to participate in the labor force through either employment or business ownership or contributing in informal ways (volunteering, supporting their family, etc.). Further, healthy birth outcomes prepare the next generation to live fulfilling lives and be productive workers.

The lost wages from the premature death of moms and infants are a large economic cost. The years of potential life lost for mothers occur when they are in their prime working period. The lost potential human capital from mothers’ deaths in the U.S was \$9.14 billion and \$0.16 billion for Arkansas on average for 2018-2020. The lost potential human capital attributable to infants passing away is even greater due to higher death rates and the loss of their entire working lifetimes. We estimate the lost potential human capital of the next generation at \$90.4 billion for the U.S. and near \$1.0 billion for Arkansas. While the value of an individual substantially exceeds their lost wages in the workplace, these figures allow us to benchmark the annual costs to the economy.

When mothers and children survive complications at birth, there are additional impacts restraining a women’s ability to participate in the workplace. Mothers may be forced to experience increased absenteeism, and even when are able to show up for work, they may perform below par through no fault of their own—a circumstance called “presenteeism.” Moreover, there will be higher disability claims. In total, the U.S. and Arkansas could have saved \$1.31 billion and \$13.96 million, respectively, in 2020.

Rethinking the Approach to Maternal Health Care

We interviewed many medical and health professionals from a variety of occupations while undertaking this analysis. They provided us with several practitioner perspectives that a quantitative-based research approach may not reveal. Our interview respondents made many insightful recommendations on the current challenges and changing the approach to improve maternal health care. Those are contained in the full report. Several have been mentioned above. Respondents also raised several barriers to a more collaborative perinatal model. Among them:

- Resistance by medical doctors who were trained to favor the existing, more medicalized model.
- A fear of risk and complications in pregnancy and delivery.
- The sometimes antagonistic relationship between doctors, midwives and doulas that arises precisely from a lack of collaboration.
- A lack of understanding of the modern role of midwives.
- Non-existent or low reimbursement rates for doulas and community health workers (which prevents them from earning a living wage).
- Current hospital policies that do not include midwives and doulas.

Awareness, education and facilitated conversations are needed to navigate these barriers and build trust between all the stakeholders.

ES TABLE 3: ESTIMATED AVERAGE ANNUAL LOSS OF POTENTIAL HUMAN CAPITAL DUE TO MATERNAL AND INFANT MORTALITY - ARKANSAS, LOUISIANA, MISSISSIPPI, OHIO AND U.S., 2018-2020

	ANNUAL LOST POTENTIAL HUMAN CAPITAL (MATERNAL)	ANNUAL LOST POTENTIAL HUMAN CAPITAL (INFANT)	TOTAL ANNUAL LOST POTENTIAL HUMAN CAPITAL
ARKANSAS	\$165,595,573	\$973,571,429	\$1,139,167,002
MISSISSIPPI	\$162,967,072	\$995,057,143	\$1,158,024,215
LOUISIANA	\$239,193,606	\$1,867,914,286	\$2,107,107,892
OHIO	\$331,191,146	\$4,393,828,571	\$4,725,019,717
U.S.	\$9,141,927,036	\$90,365,960,000	\$99,507,887,036

ES TABLE 4: PRODUCTIVITY LOSS DUE TO PRETERM AND LOW BIRTH WEIGHT - ARKANSAS, LOUISIANA, MISSISSIPPI, OHIO AND U.S., 2020

	ANNUAL COST OF MEDICAL-RELATED DISABILITIES DUE TO PRETERM BIRTHS	ANNUAL COST OF MEDICAL-RELATED ABSENTEEISM DUE TO PRETERM BIRTHS	TOTAL LOSS IN WORKPLACE PRODUCTIVITY DUE TO PRETERM BIRTHS
ARKANSAS	\$2,007,997	\$4,972,409	\$6,980,405
MISSISSIPPI	\$2,486,725	\$6,157,886	\$8,644,612
LOUISIANA	\$4,348,228	\$10,767,531	\$15,115,758
OHIO	\$6,938,162	\$17,180,994	\$24,119,157
U.S.	\$188,977,267	\$467,965,033	\$656,942,300

Heartland Forward's Action Plan

Consistent with our mission to be a resource for state and local governments, Heartland Forward will work alongside our partners to address maternal health gaps through the following programming:

1. Support and advocate for Community Health Workers (CHWs) through a public education campaign around the importance of CHWs, while collaborating with the [Heartland Health Caucus](#), policymakers, providers, insurers, industry leaders and other key stakeholders to expand the CHW presence within the maternal health care space.
2. Expand access to telehealth through the Connecting the Heartland initiative to accelerate the adoption of affordable high-speed internet and digital skills, particularly in rural and underserved areas, while simultaneously leveraging the strength of the Heartland Health Caucus to inform policymakers about the importance of thoughtful and less-restrictive telehealth regulations. More on Heartland Forward's telehealth policy recommendations can be found [HERE](#).
3. Address workforce shortages across the health care industry. The American health care system is experiencing a profound shortage of qualified caregivers, which has affected multiple areas of medicine including maternal care. One recommendation is to consider an expansion of the Missouri pilot to other states and communities with a focus on increasing access and reimbursements for doulas and midwives. Additional policy recommendations from Heartland Forward on health care workforce shortages can be found [HERE](#).
4. Increase transparency in data collection and evaluation. Heartland Forward strives to shine a light on opportunities for resources to enhance available care options and increase the accessibility of maternal care. Heartland Forward's Action Plan will be distributed to community partners, providers, insurers, policymakers and other key stakeholders throughout the 20 heartland states.

This report makes the case that maternal health care is a paramount workforce issue facing states. We desire to increase mother's access to quality maternal health care through practical policy solutions.

INTRODUCTION

Maternal health, like other health topics, reflects a complex set of personal choices and decisions out of the control of individuals regarding provider locations, treatment options, insurance coverage, social and cultural norms, etc. *This mixed-methods report attempts to bring new insights into the conversation of maternal health by estimating the economic implications resulting from poor maternal health outcomes and exposing accessibility as a key factor driving these outcomes.* Consider the following statistics:

- The United States (U.S.) ranks 66th of 197 countries for maternal deaths per 100,000 live births (i.e., maternal mortality rate).
- Among countries with gross domestic product (GDP) greater than \$1 trillion, the U.S. ranks 11th for maternal deaths per 100,000 live births and 12th for infant deaths per 100,000 live births.
- The U.S. ranks 85th of 103 countries for preterm births (gestation less than 37 weeks) and 13th of 15 countries with GDP over \$1 trillion.

We cannot address all the issues involved in maternal mortality and the highly correlated negative effects on children, so one filter we used to focus our research is geography: Arkansas, Louisiana, Mississippi and Ohio. Since health care access is closely tied to state policies, a state-level analysis affords us the opportunity to explore access to and costs of pregnancy and postpartum health care and understand how different approaches to maternal and infant health care across them might explain the variation in outcomes. Arkansas, Mississippi and Louisiana were selected for this research, because, in the heartland region we cover, they rank highest in the U.S. for maternal mortality rate. Ohio was selected because it was the heartland state closest to the U.S. average for maternal mortality.

Our study employs mixed methods to analyze maternal health care accessibility and the economic impacts of various birth outcomes, blending statistical and geographical analyses using secondary data with interviews of local, regional and national experts on maternal health care. By aggregating information from state medical boards, hospital locations, Medicaid services, mental health resources, national birth statistics and economic data on healthcare spending, our approach identifies determinants of maternal health outcomes, maps health care provider accessibility, and evaluates the economic ramifications of birth outcomes. The quantitative analysis is complemented by context and expert opinions from maternal health care providers, bringing a human dimension and clarification to the policy and practice of maternal health care.

The Center for Disease Control and Prevention estimates that over 80% of pregnancy-related deaths are preventable.¹ Our focus is on the profound impacts caring for moms today has on a state's current and future workforce; maternal health care is an economic and workforce development issue. We estimate how maternal health care investments today can benefit today's workforce and it's productivity, as well as the next generation of workers.

Improving health care for women during and after pregnancy does not just impact the workforce. We also provide estimates of the medical costs associated with different birth outcomes borne by a combination of the mother/her family, insurance, government and the health care provider. Nationally, this could yield savings of more than \$8 billion dollars.

Establishing the relevance of this issue, we then turn to understanding the maternal health systems in Arkansas, Louisiana and Mississippi and how to enhance the care provided to mothers and their children. Our analysis suggests that access to providers is a key driver to improve outcomes observed in these states.

Access, for the purposes of this report, includes not only proximity to health care providers and facilities, but also the ability of individuals to utilize these services, such as transportation, child care workplace flexibility to attend preventive and prenatal visits, health literacy, comprehension of and capacity to navigate the complex medical system and trust the providers. Through interviews with clinical and non-clinical providers working with rural, less resourced and/or underrepresented populations, as well as using our numerical analyses, we find that these social determinants of health represent sizable barriers preventing women from receiving appropriate care.

We conclude our report describing a new perspective on maternal health care, one that we believe empowers women with better health care but reduces the economic burden on state economies. The new perspective entails:

1. utilizing alternative providers like community health workers, doulas and midwives to lessen access barriers for pregnant women, especially closing the distance between providers and patients;
2. training programs and opportunities to increase the health care workforce, especially for members of the underrepresented populations;
3. alternative delivery methods such as telehealth access to specialty care; and
4. promoting transparency and flexibility in medical treatment while supporting states to ensure they can track and work off the most reliable data and research.



THE ECONOMIC IMPACTS

Maternal health care is primarily about protecting the health and life of mother and child during and after pregnancy. Secondly, maternal health care also has sizable impacts on the workforce by ensuring that women are able to work, whether through the formal (employment or business ownership) or informal (volunteering, supporting their family, etc.) economies. It also ensures that their children are healthy and able to similarly contribute as part of the next generation of workers.

Our discussion begins with the economic effects of poor maternal health to illustrate the significant benefits associated with health care investments during pregnancy and childbirth. Higher medical and non-medical expenses and lost wages reflect lost potential and resources that could be otherwise allocated. The largest share of these represent workforce implications from low-quality or inaccessible maternal health care. We then discuss how preterm birth and low birth weights, highly correlated with maternal mortality and morbidity,

create added burden for parents throughout their child’s lifetimes. Lastly, we turn to discuss the direct costs of medical and non-medical costs associated with maternal health care. Data limitations prevent a full discussion of these direct costs, though we are able to estimate illustrative examples that reinforce the narrative that poor maternal health is costly.

Workforce Impacts

According to data from 2018 to 2020, the economic impact of mothers dying while pregnant in the U.S. is significant. Over this period, the total years of potential life lost (YPLL) due to premature death amounted to 113,953 years. These years often represent prime working years for women, translating to a lost potential human capital valued at around \$27.43 billion for the nation. When distributed proportionally based on maternal deaths in Arkansas, the lost potential human capital due to premature deaths during pregnancy reaches nearly half a billion dollars.

TABLE 1: ESTIMATED LOST POTENTIAL HUMAN CAPITAL DUE TO MOTHERS DYING DURING PREGNANCY - SELECTED STATES AND U.S., 2018-2020

	2018	2019	2020	2018-2020
STATE	LOST POTENTIAL HUMAN CAPITAL (USD)	LOST POTENTIAL HUMAN CAPITAL (USD)	LOST POTENTIAL HUMAN CAPITAL (USD)	LOST POTENTIAL HUMAN CAPITAL (USD)
ARKANSAS	\$143,097,425	\$165,657,028	\$188,032,265	\$496,790,684
LOUISIANA	\$206,696,281.42	\$239,282,374.56	\$271,602,160.85	\$717,586,543.99
MISSISSIPPI	\$140,826,037.89	\$163,027,551.90	\$185,047,626.08	\$488,905,117.88
OHIO	\$286,194,851.19	\$331,314,057.08	\$376,064,530.41	\$993,581,368.60
U.S.	\$7,899,886,448	\$9,145,319,766	\$10,380,574,895	\$27,426,000,000

Source: Authors’ calculations using data from <https://www.cdc.gov/nchs/maternal-mortality/mmr-2018-2021-state-data.pdf> and estimates from (White et al., 2022)

These numbers are compelling. While the value of an individual is worth far more than just their income, this estimate suggests the contribution these women would have made to the economy should they have lived - a sobering sum. Since mothers who die from childbirth are young, and often face many years of work left in their lives, these numbers add up quickly. Furthermore, each year's estimate in the table above relates only to the mothers that passed in the given year, so as more mothers die as a result of childbirth or pregnancy complications, this number will only continue to grow.

There is also lost potential human capital that results from an infant's death during childbirth. As with the estimation of the numbers above, the table below contains the values for our focus states and the U.S. for the sum of the lifetime income earned across all children that died within one year of birth. These numbers are larger than those for the moms because there are more children lost and their entire working potential is lost. In Arkansas, for example, this value in 2020 was just under \$1 billion.

TABLE 2: ESTIMATED LOST POTENTIAL HUMAN CAPITAL DUE TO INFANTS DYING AT OR WITHIN ONE YEAR OF CHILDBIRTH - SELECTED STATES AND U.S., 2014-2020

STATE	2014-2020	2014-2020
	SUM OF LOST POTENTIAL HUMAN CAPITAL	AVERAGE OF LOST POTENTIAL HUMAN CAPITAL
ARKANSAS	\$6,815,000,000	\$973,571,429
LOUISIANA	\$13,075,400,000	\$1,867,914,286
MISSISSIPPI	\$6,965,400,000	\$995,057,143
OHIO	\$30,756,800,000	\$4,393,828,571
U.S.	\$659,381,800,000	\$1,847,007,843

Source: Authors' calculations using data from CDC National Vitality Statistics Service Natality data and estimates from (Robinson et al., 2019)

The enduring economic repercussions of undesirableⁱⁱ birth outcomes such as preterm birth affect both parents and children. Preterm births and low birth weight can trigger long-term health and psychological challenges for the children, requiring additional time and effort by parents and limiting their ability to work. Simultaneously, undesirable birth outcomes present formidable challenges for children, demanding heightened health care and educational support to address developmental and chronic health issues.²

Beyond the estimation of lost potential human capital resulting from the premature death of mothers, undesirable pregnancy-related outcomes, even when both the mother and child survive, can still affect workforce participation. Using preterm births,

we estimate the additional economic impact on families and employers, primarily through workplace productivity loss and indirect costs. These costs stem from increased absenteeism, disability claims and the need for extended parental leave to care for the preterm infant. As health care systems and policymakers strive to address the challenges of preterm births, understanding the broader economic implications, including the impact on workplace productivity and indirect costs, is crucial for developing comprehensive strategies to mitigate these outcomes.

ⁱⁱ Undesirable outcomes, used throughout this report, refer to adverse birth outcomes such as preterm birth and low birth weight.

Preterm birth is associated with an additional 4.2 workdays lost and \$1,045 in costs during the year following a child's birth due to medical-related absenteeism and 2.8 extra workdays lost and \$422 in costs due to disability (refers to the inability or reduced capacity of a parent, usually the mother, to return to work due to health complications or caregiving needs related to a preterm birth), compared to full-term births.³

Across the U.S., the average yearly cost attributed to workplace productivity loss due to preterm birth cases reached \$656,942,300: \$188,977,267 annually due to disability and \$467,965,033 annually from medical-related absenteeism.

A closer examination of specific states further illustrates the varied economic impact of preterm births across different regions. In Arkansas, the average yearly cost of workplace productivity loss was calculated at \$6,980,405. Mississippi incurred losses of \$8,644,612, while Louisiana faced \$15,115,758 in productivity losses. Ohio reported higher averages at \$24,119,157.

TABLE 3: ESTIMATES OF PRODUCTIVITY LOST DUE TO PRETERM BIRTHS - ALL STATES IN THE U.S., 2014-2020

STATES	ANNUAL PRETERM BIRTH-RELATED DISABILITY	ANNUAL PRETERM BIRTH-RELATED ABSENTEEISM	TOTAL ANNUAL PRETERM BIRTH-RELATED WORKPLACE PRODUCTIVITY LOSS
VERMONT	\$205,032.00	\$507,721.00	\$712,752.00
WYOMING	\$237,104.00	\$587,141.00	\$824,244.00
NEW HAMPSHIRE	\$447,682.00	\$1,108,596.00	\$1,556,277.00
ALASKA	\$464,863.00	\$1,151,142.00	\$1,616,005.00
MAINE	\$503,928.00	\$1,247,879.00	\$1,751,808.00
RHODE ISLAND	\$517,854.00	\$1,282,364.00	\$1,800,219.00
MONTANA	\$568,012.00	\$1,406,570.00	\$1,974,582.00
NORTH DAKOTA	\$570,243.00	\$1,412,094.00	\$1,982,336.00
DELAWARE	\$616,120.00	\$1,525,700.00	\$2,141,820.00
SOUTH DAKOTA	\$628,961.00	\$1,557,498.00	\$2,186,459.00
WASHINGTON, D.C.	\$704,137.00	\$1,743,657.00	\$2,447,794.00
HAWAII	\$879,388.00	\$2,177,631.00	\$3,057,018.00
IDAHO	\$958,844.00	\$2,374,389.00	\$3,333,234.00
NEW MEXICO	\$1,114,261.00	\$2,759,248.00	\$3,873,509.00
WEST VIRGINIA	\$1,126,318.00	\$2,789,105.00	\$3,915,423.00
NEBRASKA	\$1,307,055.00	\$3,236,664.00	\$4,543,718.00
CONNECTICUT	\$1,563,570.00	\$3,871,874.00	\$5,435,445.00
IOWA	\$1,703,976.00	\$4,219,561.00	\$5,923,536.00
KANSAS	\$1,715,430.00	\$4,247,925.00	\$5,963,355.00
OREGON	\$1,775,776.00	\$4,397,360.00	\$6,173,136.00
NEVADA	\$1,912,625.00	\$4,736,239.00	\$6,648,863.00
ARKANSAS	\$2,007,997.00	\$4,972,409.00	\$6,980,405.00
UTAH	\$2,260,835.00	\$5,598,513.00	\$7,859,348.00
MISSISSIPPI	\$2,486,725.00	\$6,157,886.00	\$8,644,612.00

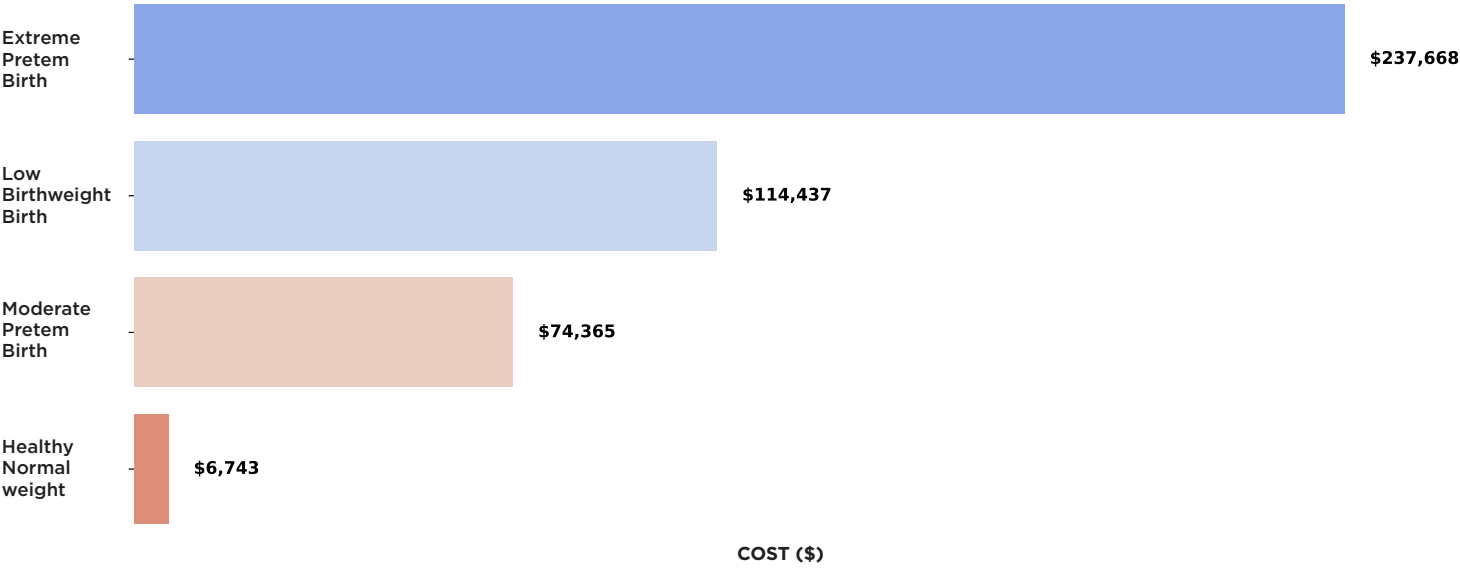
STATES	ANNUAL PRETERM BIRTH-RELATED DISABILITY	ANNUAL PRETERM BIRTH-RELATED ABSENTEEISM	TOTAL ANNUAL PRETERM BIRTH-RELATED WORKPLACE PRODUCTIVITY LOSS
OKLAHOMA	\$2,799,367.00	\$6,932,082.00	\$9,731,449.00
WISCONSIN	\$2,832,524.00	\$7,014,189.00	\$9,846,714.00
KENTUCKY	\$2,849,947.00	\$7,057,333.00	\$9,907,280.00
MINNESOTA	\$2,939,230.00	\$7,278,425.00	\$10,217,655.00
MASSACHUSETTS	\$2,950,503.00	\$7,306,341.00	\$10,256,845.00
COLORADO	\$3,005,303.00	\$7,442,042.00	\$10,447,345.00
SOUTH CAROLINA	\$3,078,369.00	\$7,622,976.00	\$10,701,346.00
MARYLAND	\$3,507,905.00	\$8,686,637.00	\$12,194,542.00
WASHINGTON	\$3,582,117.00	\$8,870,408.00	\$12,452,525.00
ALABAMA	\$3,701,724.00	\$9,166,591.00	\$12,868,314.00
INDIANA	\$3,893,553.00	\$9,641,618.00	\$13,535,171.00
MISSOURI	\$3,949,438.00	\$9,780,006.00	\$13,729,443.00
ARIZONA	\$4,045,714.00	\$10,018,415.00	\$14,064,129.00
LOUISIANA	\$4,348,228.00	\$10,767,531.00	\$15,115,758.00
VIRGINIA	\$4,660,689.00	\$11,541,279.00	\$16,201,967.00
NEW JERSEY	\$4,693,062.00	\$11,621,445.00	\$16,314,507.00
TENNESSEE	\$4,875,607.00	\$12,073,482.00	\$16,949,089.00
MICHIGAN	\$5,512,827.00	\$13,651,432.00	\$19,164,259.00
PENNSYLVANIA	\$6,285,449.00	\$15,564,678.00	\$21,850,127.00
NORTH CAROLINA	\$6,407,949.00	\$15,868,026.00	\$22,275,976.00
OHIO	\$6,938,162.00	\$17,180,994.00	\$24,119,157.00
ILLINOIS	\$7,226,449.00	\$17,894,879.00	\$25,121,327.00
GEORGIA	\$7,436,122.00	\$18,414,094.00	\$25,850,217.00
NEW YORK	\$10,274,434.00	\$25,442,615.00	\$35,717,049.00
FLORIDA	\$11,925,177.00	\$29,530,356.00	\$41,455,534.00
CALIFORNIA	\$18,041,344.00	\$44,675,840.00	\$62,717,184.00
TEXAS	\$20,939,339.00	\$51,852,154.00	\$72,791,492.00
U.S.	\$188,977,267.00	\$467,965,033.00	\$656,942,300.00

Source: Authors’ calculations using estimates from Patel, et al. (2024). <https://doi.org/10.1097/AOG.0000000000005404>

The enduring impact of being small for gestational age (SGA; similar to low birth weight, but measured as having a birth weight in the lowest decile for gestational age) on a child’s cognitive development, regardless of birth timing, suggests a diminished IQ into adulthood.⁴ Additionally, studies emphasize

reducing undesirable birth outcomes can significantly enhance human capital, leading to improved educational achievements and higher lifetime earnings for individuals, thereby highlighting the broad economic and developmental benefits of such interventions.⁵

FIGURE 1: COST DISPARITY BETWEEN HEALTHY AND UNDESIRABLE BIRTH OUTCOMES, U.S., 2020



Source: Beam, et al. (2020). <https://www.nature.com/articles/s41372-020-0635-z>

Medical Costs

The cost disparity between healthy full-term births and undesirable outcomes is significant. Based on the analysis of a large national claims database,⁶ average medical costs for a healthy, full-term (37 or more weeks of gestation) baby is about \$6,743, a relatively manageable figure. Extreme preterm births (less than 28 weeks of pregnancy), however, cost \$237,668. Even moderate preterm (between 32 and 34 weeks of pregnancy) and low birth weight (infant born weighing 5.5 pounds, 2500 grams, or less) births demand substantial financial resources, amounting to \$74,365 and \$114,437, respectively. These figures highlight the direct costs associated with infant care associated with preterm and low birth weight births.

Using these values, we are able to estimate costs associated with preterm births and low birth weight in our focus states. Table 4 presents these values. In addition to the total medical cost associated with preterm births and low birth weight, the table provides cost estimates associated with reducing

these outcomes by 50%, as well as a per birth estimate that states could use for internal planning. While the potential savings underscore the economic and health benefits of reducing the incidence of these undesirable outcomes, achieving zero preterm births and low birth weight is not feasible due to innumerable factors, including genetic, environmental, social and health care related variables.

In Arkansas:

- The estimated annual cost of undesirable birth outcomes is around \$878 million.
- The state could save an estimated \$300 million a year with a 50% reduction in preterm births and low birth weight.
- This translates to savings of \$16,490 per prevented preterm births and/or low birth rate.

In Mississippi:

- The potential annual savings could reach approximately \$376 million if preterm births and low birth weight were reduced by 50%.
- This translates to savings of roughly \$20,586 for each low birth weight and preterm birth avoided.

In Ohio:

- The state could save an estimated \$1.1 billion by decreasing preterm births and low birth weight.
- For every preterm birth and/or low birth weight prevented, the state could save approximately \$15,434.

Louisiana:

- The state could save over \$600 million with a 50% reduction in preterm and low birth weight births.
- The savings per low birth weight and preterm birth are estimated to be around \$20,437.

Nationally:

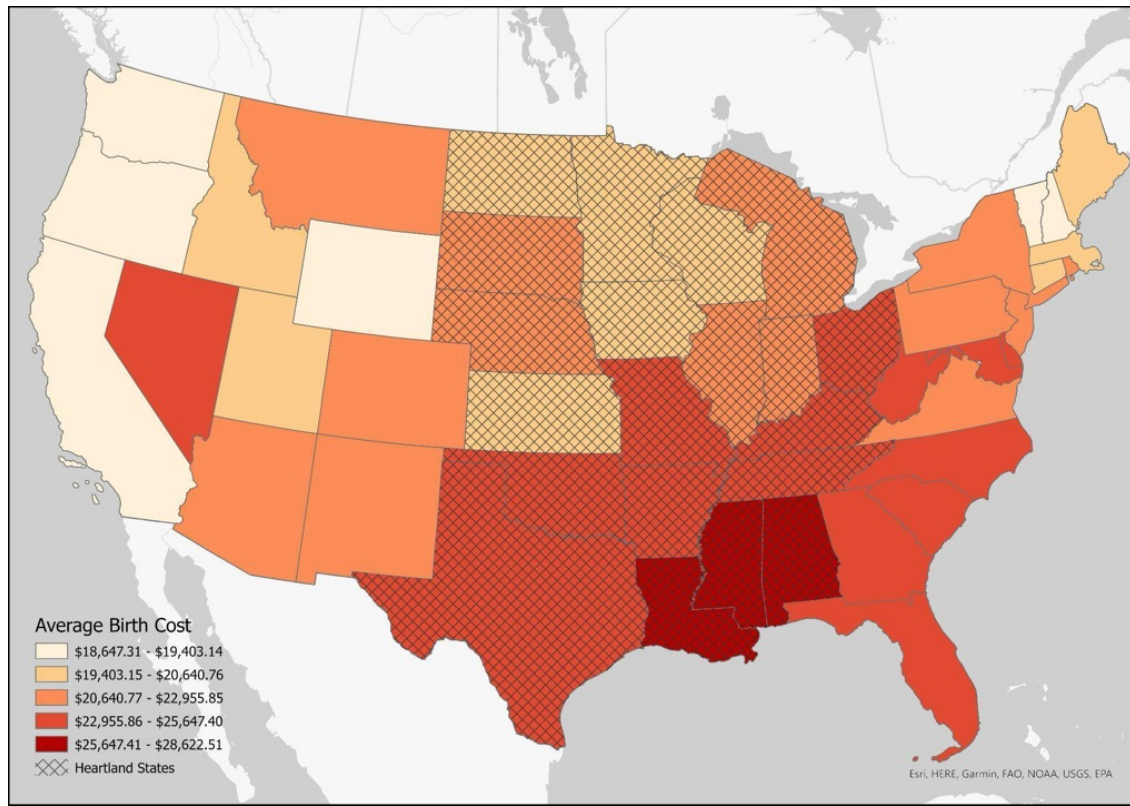
- Undesirable birth outcomes, including extreme and moderate preterm births and low birth weight, accumulate to approximately \$63.9 billion in health care costs across the United States.
- The potential national savings are staggering: approximately \$28.5 billion could be saved if preterm births and low birth weight instances were reduced by 50%.
- The per-birth savings in the U.S. are estimated at \$14,768 for each preterm birth and low birth weight birth prevention.

TABLE 4: ESTIMATED SAVINGS FROM PREVENTING PRETERM BIRTHS AND LOW BIRTH WEIGHT - SELECTED STATES AND U.S., 2014-2020

STATE	SAVINGS FROM 50% REDUCTION OF PRETERM BIRTHS AND LBW	AVERAGE SAVINGS PER CASE
VERMONT	\$31,783,749	\$11,677
ARKANSAS	\$298,968,458	\$16,490
MISSISSIPPI	\$375,611,024	\$20,586
LOUISIANA	\$626,921,242	\$20,437
OHIO	\$1,054,986,230	\$15,434
U.S.	\$28,534,089,158	\$14,768

Source: Authors’ calculations using CDC National Vitality Statistics Service Natality data, and study from Beam et al. (2020).

FIGURE 2: AVERAGE BIRTH COSTS BY STATE, 2014-2020



Source: Authors' calculations using CDC National Vitality Statistics Service Natality data, and study from Beam et al. (2020).

Non-Medical Costs

Many women travel outside of their county of residence for perinatal care and delivery (what we will call out-of-county childbirth). Unfortunately, our data does not allow us to know the underlying reason for this travel, since it could represent a need for more specialized care or it could represent the absence of medical providers in the mother's home county. These costs vary across states and ethnicities and represent tangible costs often paid out-of-pocket by the mother or her family.

To quantify the economic impact of giving birth outside of the mother's county of residence, we estimated the minimum average costs of transportation to prenatal visits and added the value of the mother's time traveling and receiving care. These non-medical costs associated with perinatal care vary significantly from state to state, painting a picture of regional inequalities and the challenges faced by families seeking maternity care.

The chart below shows families in Arkansas face an average non-medical cost of approximately \$634.52 for births outside of the mother's county of residence, amounting to a total cost of \$37.5 million. Louisiana and Mississippi have average costs at \$623.55 and \$524.29 respectively, with total state costs reaching \$57.9 million and \$41.3 million. Ohio presents a lower average cost of \$477.44, yet due to a higher number of cases, the total cost soars to \$84.3 million.

In contrast, Rhode Island has the lowest average cost of \$177.55 for out-of-county births, for a total cost of \$1.5 million. Arizona stands out with the highest average non-medical cost at \$2,394.30, contributing to a total state cost of \$53.7 million. These figures indicate the unique challenges families face due at least in part to the geography of or the distribution of health care facilities within the state.

TABLE 5: TOTAL AND AVERAGE NON-MEDICAL COSTS FOR PREGNANCY CARE AND DELIVERY IN SELECTED STATES, 2014-2020

STATE	TOTAL NON-MEDICAL COST OF BIRTHS OUTSIDE A MOTHER'S COUNTY OF RESIDENCE	AVERAGE NON-MEDICAL COST OF BIRTHS OUTSIDE A MOTHER'S COUNTY OF RESIDENCE
ARIZONA	\$53,749,186.00	\$2,394.30
ARKANSAS	\$37,507,175.89	\$634.52
LOUISIANA	\$57,867,139.86	\$623.55
MISSISSIPPI	\$41,344,263.45	\$524.29
OHIO	\$84,329,100.12	\$477.44
RHODE ISLAND	\$1,535,904.78	\$177.55
U.S.	\$3,023,467,457.51	\$876.59

Source: Authors' calculations using CDC Natality dataset and travel distances computed using OSRM.

The average non-medical cost for perinatal care across the U.S. is \$876.59, culminating in an astounding cumulative cost of \$3 billion. This national perspective underscores the high cost of births occurring outside the mother's county of residence,

reflecting a wide spectrum of regional health care infrastructures, availability of specialized maternity services and the varying distances families must travel for quality care.



ACCESSIBILITY

Our analysis indicates that accessibility issues are a major contributor to pregnancy-related deaths of moms. While proximity to care is of utmost importance, other factors that prevent women from seeking care contribute to the high costs of pregnancy-related deaths. Some of these factors include limitations around access to transportation, child care or the ability to take time off from work, while other barriers are less tangible like health illiteracy, a lack of trust and the inability to navigate bureaucratic systems to secure services and benefits.

Accessibility of Maternal Health Resources

The availability and accessibility of pregnancy, delivery and post-pregnancy health care resources play a critical role in shaping health outcomes. In this section, we discuss the location and distribution of the following maternal health resources:

- obstetrician-gynecologists (OB-GYNs) and OB-GYNs accepting Medicaid,
- federally qualified health centers (FQHCs), and
- specialized mental health services catering to the prenatal and postnatal period.

Our analysis delves into the multifaceted nature of maternal health care, highlighting the necessity for a diverse array of resources to effectively cater to the needs of mothers and their babies.

OB-GYN care is paramount, offering a comprehensive spectrum of services in the perinatal stages of pregnancy, delivery and postpartum.

Medicaid-accepting OB-GYNs are essential in making crucial health care services accessible to women with limited financial means, thereby removing economic barriers to essential care. In the analysis, OB-GYNs accepting Medicaid and availability of FQHCs for low-income populations were included as separate categories because of their significant impact on health care accessibility.

Focusing on Arkansas, Louisiana, Mississippi and Ohio, the objective is to illuminate the inequities in maternal health care accessibility and propose precise strategies for enhancement.

FQHCs deliver health care in underrepresented communities, providing opportunities to expand on primary and maternal health services. (While we recognize other health care structures exist to meet these needs, we focus only on FQHCs due to data availability).

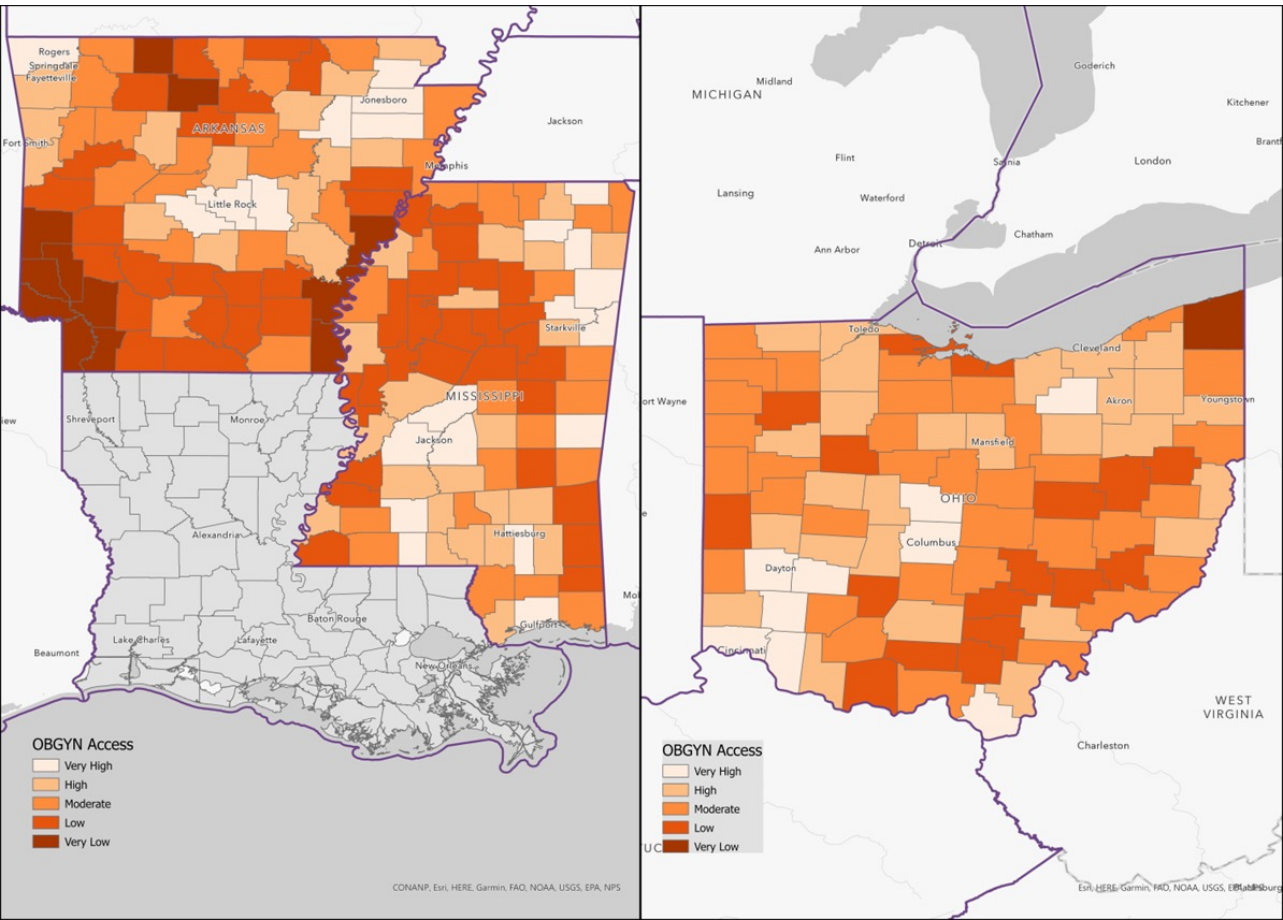
The significance of well-furnished hospital infrastructure, particularly in maternity areas, is undeniable to ensure safe childbirth and adeptly manage potential delivery complications.

Mental health services tailored for the unique needs of pregnant and postpartum women are indispensable in supporting their mental and emotional health during this transformative period. Additionally, timely and appropriate mental health care can bolster physical health, offering long-term wellness benefits.

Our thorough approach to analyze these varied aspects underscores the necessity of a multifaceted and collaborative strategy, both at the state and local levels, to meet the health needs of mothers and infants.

To assess maternal health care resources, we utilize a framework that incorporates both the patient, who as the decision-maker seeks to minimize her overall costs and the location of the resources themselves. The model presents a more accurate depiction of health care access scenarios since it incorporates facility capacity, so it accounts for potential patient waiting time as well as distance in determining access to perinatal resources.

FIGURE 3: ACCESSIBILITY OF OB-GYNS BY COUNTY, SELECTED STATES, 2023



Source: Provider data from AR, MS, OH State Medical Boards, Access calculated using OSRM and RAAM Saxon, J., & Snow, D. (2020).

OB-GYNs

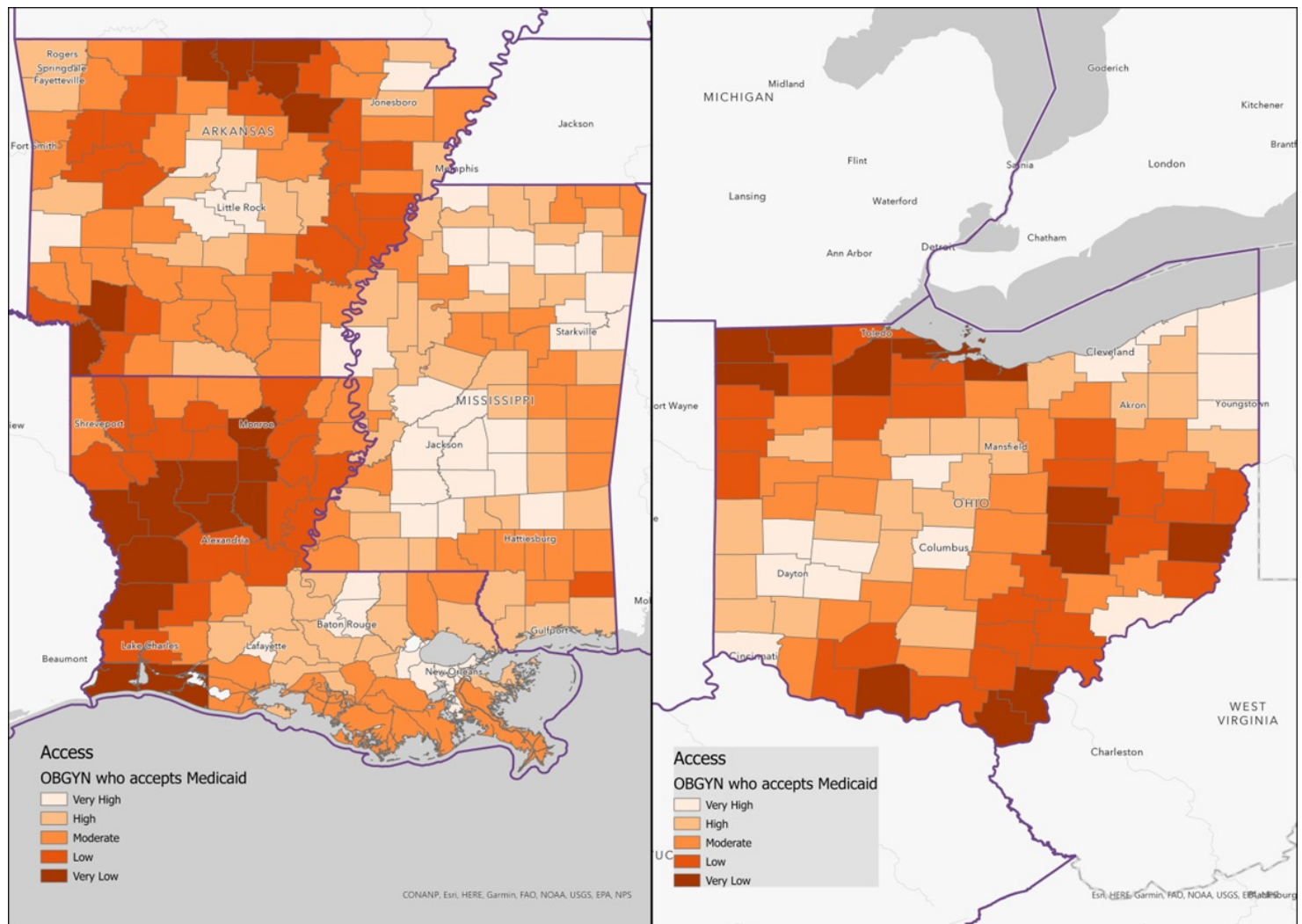
Our analysis of maternal health resources across the four focused states uncovers important disparities and challenges in the availability and accessibility of OB-GYN care. Through the examination of data on the availability of OB-GYNs, both general and those accepting Medicaid, highlight a clear picture of the health care landscape mothers navigate.

Figures 3 and 4 present a detailed and varied picture of OB-GYN availability across the studied states. In Arkansas, the rate is particularly low at approximately 1.96 OB-GYNs per 100,000 people, indicating a strong lack of maternal care providers. Addressing this shortage presents an opportunity to enhance

pregnancy outcomes and improve the overall health of women. Mississippi reports a higher rate of around 10.5, while Ohio shows a comparatively better situation with about 12.4.

The availability of Medicaid-accepting OB-GYNs is even lower across our focus states, indicating greater barriers faced by Medicaid recipients. Both Louisiana and Arkansas have about 0.4 OB-GYNs accepting Medicaid per 100,000 people, with Ohio displaying a similar rate of around 0.37. Mississippi, although slightly better, still presents a low rate of about 0.54. It is important to recognize a limitation in our study: the statistics for Louisiana only include OB-GYNs who accept Medicaid, as data on all licensed physicians was not available.

FIGURE 4: ACCESSIBILITY OF OB-GYNs ACCEPTING MEDICAID BY COUNTY, SELECTED STATES, 2023



Source: Provider data from Centers for Medicare & Medicaid Services, Access calculated using OSRM and RAAM Saxon, J., & Snow, D. (2020).

These findings emphasize the significant challenges Medicaid recipients face in accessing OB-GYN care. The anticipated decrease in OB-GYN availability nationally, with a projected shortfall of 5,170 full-time equivalents by 2030,⁷ highlights a critical opportunity to enhance access to care, especially for Medicaid recipients.

The limited access to OB-GYNs accepting Medicaid was also highlighted in interviews. Low rates of Medicaid reimbursements for OB-GYNs, coupled with the higher risks associated with Medicaid patients means that smaller and/or rural providers are struggling to provide perinatal care for rural

and other underserved women, according to interviewed providers.⁸ For example, most OB-GYNs accepting Medicaid provide obstetrics care but not gynecological care due to differences in reimbursement rates and additional administrative burden on providers seeing Medicaid patients. This has implications to access crucial preventive care and effective contraception options.

"Due to the low reimbursements for the less fortunate and Medicaid patients, physicians have a harder time seeing everyone."

— Andrew Cole and Phillip Gullic, OB-GYNs, OB-GYN Clinic, Conway (AR)

“There are not enough physicians buying into some things, like spending a lot of time with patients, educating them...we have a small staff trying to take care of a lot of people.”

— Constance Chapman, OB-GYN, Family Practice and Obstetrics- Mainline Community Health Center, Monticello (AR)

It is also difficult to recruit or retain quality providers in rural or other underserved communities because they want to live in places with different amenities and greater range of employment opportunities.

Because the highest maternal health risks lie among the low-income population, low reimbursements over the years add to the cumulative effect of negative outcomes. This adds to the cycle of increased maternal care costs down the road due to the lack of preventive care that is most pronounced in this population and/or medical care being neglected during initial stages of chronic conditions.

Access to Postpartum Services

Women also struggle to access postpartum care and services. Postpartum extends from birth to at least 12 months after birth. OB-GYNs, midwives and doulas explained women are encouraged to leave the hospital as quickly as possible after giving birth because insurance will not cover postpartum hospital stays of longer than 48 hours. Some of these women are going back to conditions that are not ideal, while coping with the physical exhaustion of labor and delivery as well as the demands of having a newborn. According to health care providers interviewed, those who are uninsured or on Medicaid will receive and/or attend very few – if any – postpartum appointments during a very vulnerable and at-risk period, both physically and mentally.

Among those who do have access, the first postpartum appointment is usually only three weeks after delivery, which may be too late for women facing greater risks. Women who do not access postpartum care, including contraception, may become pregnant again with even more complications, creating long-term issues for moms and their children.

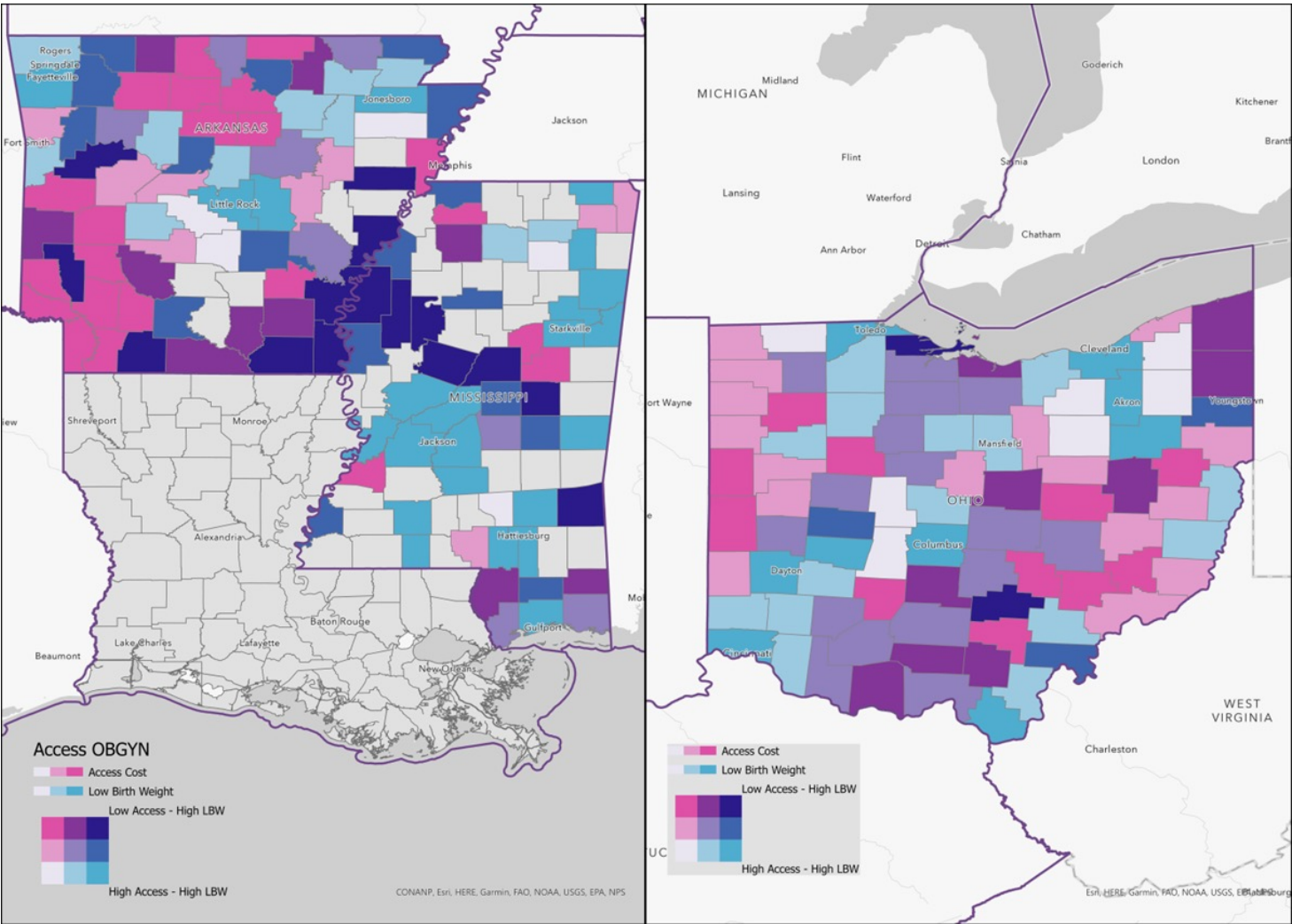
Offering OB-GYNs **Medicaid** reimbursements at market rates would help keep the OB-GYNs serving rural and other underserved areas in business. This can be complemented by expanding training for and access to midwives as well as primary care and family practitioners offering OB-GYN care. Providing scholarships and loan forgiveness can help recruit and retain the maternal health care workforce. Because our health care system relies on insurance, reducing administrative barriers for low-income moms to enroll and remain in Medicaid is critical for access but also to reduce high health care costs in the future.

OB-GYN service accessibility and undesirable birth outcomes

Figure 5 shows the relationship between undesirable birth outcomes and access to OB-GYN services which are pivotal in pinpointing regions where limited access to essential maternal health services coincides with higher incidences of low birth weight and preterm births. The maps highlight Arkansas, Ohio and Mississippi, while excluding Louisiana due to data constraints.

Areas marked in dark red indicate zones with scarce OB-GYN access, darker shades of blue denote high rates of undesirable birth outcomes and dark navy blue represent regions with both limited OB-GYN access and a high prevalence of undesirable birth outcomes. These three areas often correlate with elevated poverty rates and concentrations of marginalized populations. This visual representation highlights the overlap between health care accessibility and socio-economic challenges.

FIGURE 5: COINCIDENCE OF OB-GYN AND LOW WEIGHT BIRTHS BY COUNTY - SELECTED STATES, 2023 (PROVIDERS), 2014-2020 AVERAGE (LOW BIRTH WEIGHT)

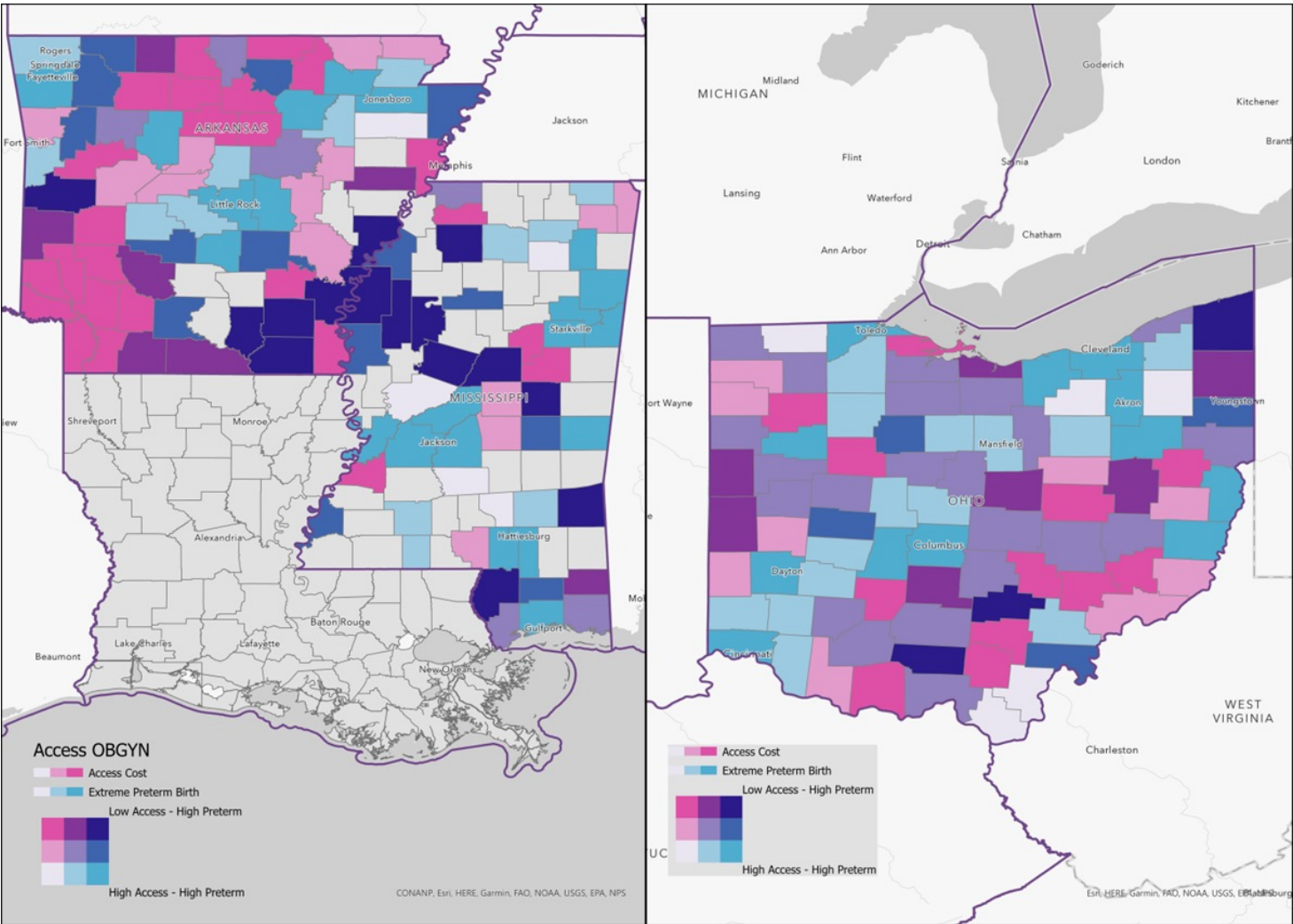


Source: Provider data from Centers for Medicare & Medicaid Services, Access calculated using OSRM and RAAM Saxon, J., & Snow, D. (2020). Low Birth Weight Data From CDC Natality dataset

Additionally, the maps offer insights into the prevalence of preterm births in relation to OB-GYN accessibility. Preterm births, which are a significant factor in newborn health outcomes and can influence long-term well-being, also present an opportunity for economic optimization. In Arkansas, for example, the proactive management of preterm births offers a potential for an annual benefit of \$503 million, against the backdrop of current expenditures of about \$534 million.

Areas with limited access to OB-GYNs witness higher rates of extreme preterm births, due to inadequate monitoring and management of high-risk pregnancies. In regions where prenatal care is scarce, there are significant opportunities to enhance maternal and infant health, such as introducing critical interventions like medications to delay labor and specialized care for mothers. Proactive measures like these can notably improve outcomes, reducing the incidence of preterm births and fostering economic benefits by alleviating potential healthcare expenditures. The maps also provide a starting point in identifying where states need to focus and prioritize action.

FIGURE 6: COINCIDENCE OF OB-GYNs AND RATES OF EXTREME PRETERM BIRTH BY COUNTY - SELECTED STATES, 2014-2020 (AVERAGE LOW BIRTH WEIGHT) AND 2023 (OB-GYNs)



Source: Provider data from Centers for Medicare & Medicaid Services, Access calculated using OSRM and RAAM Saxon, J., & Snow, D. (2020). Low Birth Weight Data From CDC Natality dataset

Federally Qualified Health Centers

Our analysis of maternal health care resources unveils key insights into the pivotal roles Federally Qualified Health Centers (FQHCs)⁹ play in ensuring accessible and effective health care. We dissect the availability and distribution of these resources and examine their impact on maternal health care. Our findings also highlight disparities and challenges that need to be addressed to ensure safe, accessible and quality maternal care.

We prioritized FQHCs because they serve both rural and underserved areas. Further studies should include Rural Health Clinics (RHCs) and other types of providers serving rural and urban underserved areas, like those providing home visits for instance. The potential services FQHCs could offer for moms and babies should apply to RHCs and similar medical organizations. In locations where there are health care services available, like FQHC or RHC, perhaps an option is to add/expand perinatal care, since they already have the capacity to take Medicaid and uninsured patients.



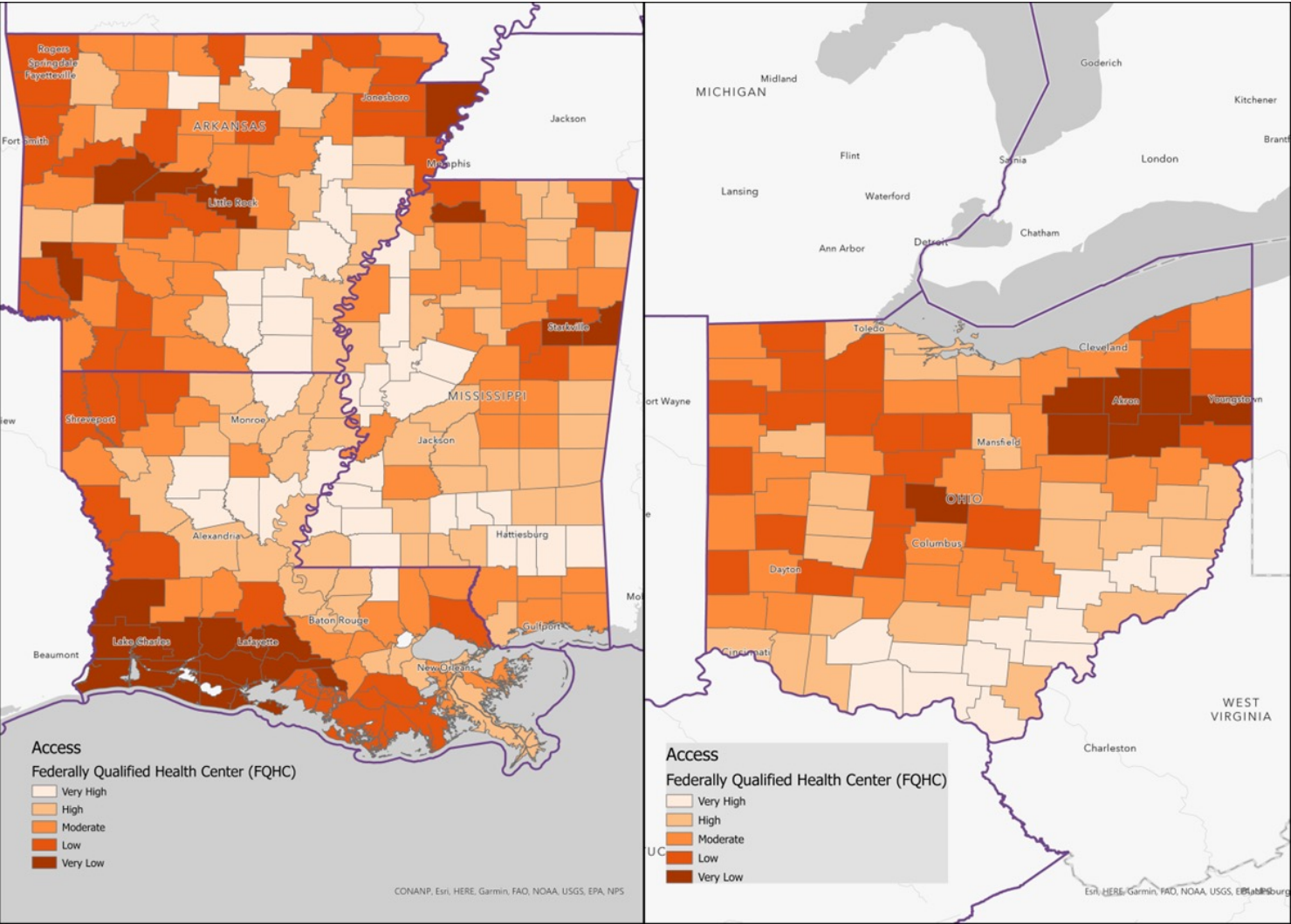
FQHCs bridge significant gaps in health care accessibility for rural and urban underserved residents. They served over 9.6 million rural residents in 2022.¹⁰ Because these centers primarily serve the Medicaid and uninsured population, they are strategically crucial to the care of high risk moms. Not all FQHCs offer perinatal care, but their capacity to serve low-income families puts them in a unique position to include or expand and improve maternal health services.

The landscape of FQHCs reflects broader disparities in health care infrastructure and resources across states. Ohio's FQHC presence, at about 4.29 per 100,000 people, is notably more modest compared to states like Arkansas, Louisiana and Mississippi. The rates in these states are approximately 7.57, 9.55 and 10.30 per 100,000 people respectively. This distribution not only highlights regional differences but subtly suggests that in places like Ohio, the reliance on FQHCs might be moderated by the presence of other healthcare provisions, such as a higher proportion of OB-GYNs accepting Medicaid. The prevalence of FQHCs in states with limited

access to OB-GYN services underscores their potential role to expand access to perinatal care. The interviews conducted, however, found that FQHCs usually pay lower wages and therefore struggle to retain staff because they depend on low Medicaid and Medicare reimbursements. They also serve many patients whose reimbursements are rejected after the service is provided or who are uninsured and unable to pay. The health care workforce turnovers may impact continuity of care as well as maintaining trust among a population that is already distrustful of the health care system.

FQHCs (and RHCs, not included in our analysis) provide a unique opportunity to expand maternal health care services in rural and other underserved areas. Lowering the administrative barriers to enrolling and remaining in Medicaid would help the financial stability of FQHCs.

FIGURE 7: ACCESSIBILITY OF FQHCS BY COUNTY, SELECTED STATES, 2023



Source: Provider data from Area Health Resources Files; Health Resources and Services Administration, Access calculated using OSRM and RAAM Saxon, J., & Snow, D. (2020).

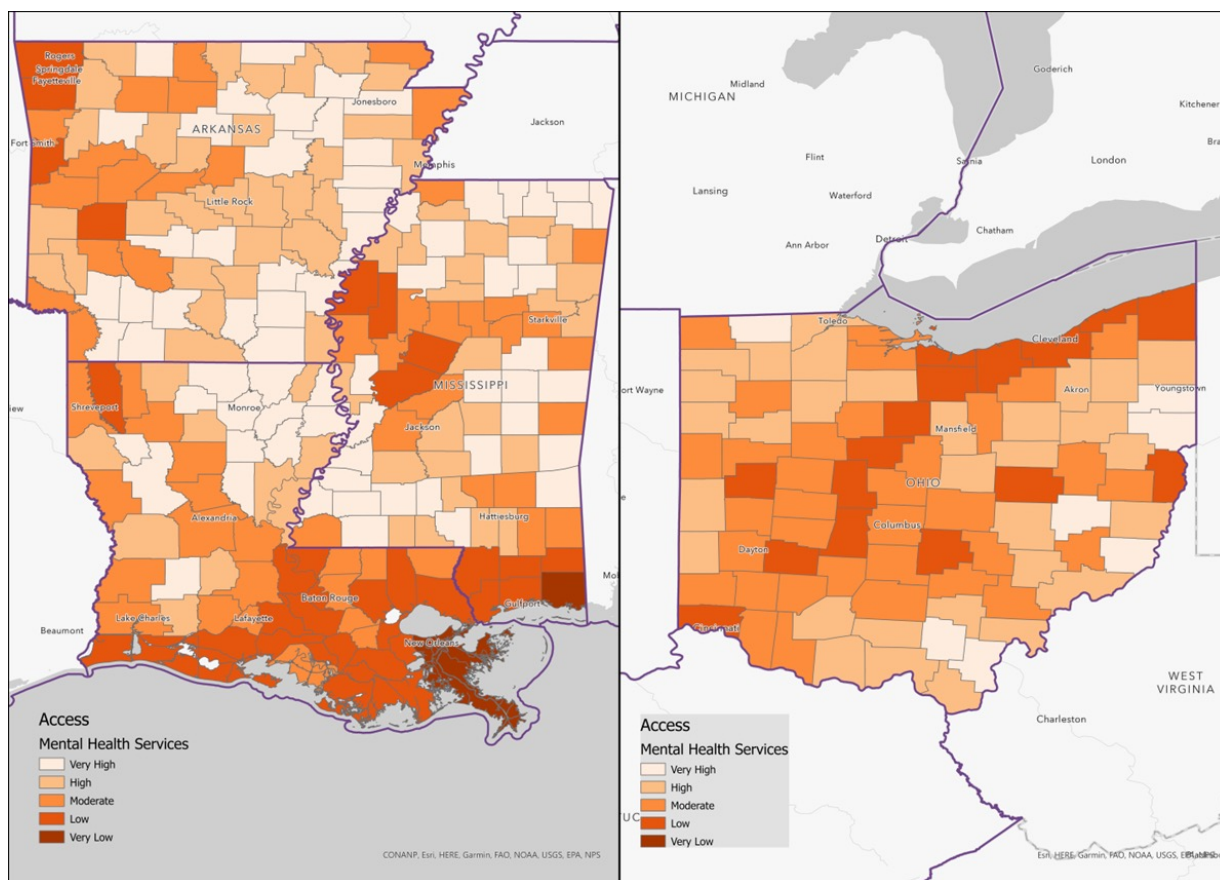
Specialized Mental Health

Maternal Mortality Review Committees (MMRCs) highlight mental health conditions, including suicide and overdose related to substance use disorder, as the leading underlying causes of maternal mortality, accounting for more than 23% of pregnancy-related deaths between 2017 and 2019.¹¹

Our examination reveals variations in the availability of mental health centers across the four states, underscoring a general shortfall in mental health services that matches what the respondents shared.

Louisiana manifests the most pronounced deficiency, with only about 2.64 mental health centers per 100,000 people. In contrast, Mississippi and Arkansas exhibit slightly higher rates, at approximately 3.85 and 4.28 centers per 100,000 people, respectively. Ohio shows a more favorable situation, with around 4.37 centers per 100,000 people. These statistics not only highlight the general lack of mental health services across the four states but also align with the broader national context where only 26% of the population’s mental health care needs are met, a situation even more acute in rural areas.¹²

FIGURE 8: ACCESSIBILITY OF MENTAL HEALTH SERVICES BY COUNTY, SELECTED STATES, 2023



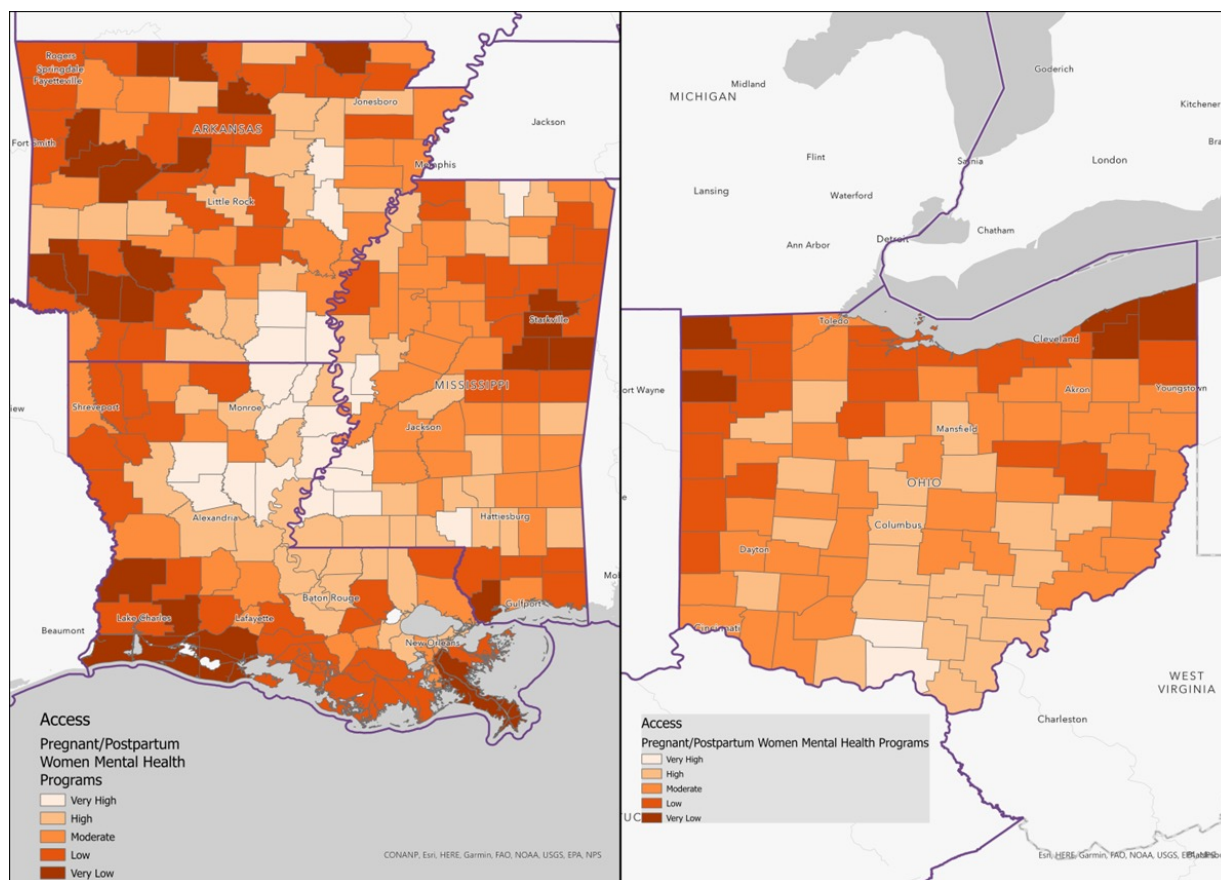
Source: Provider data from Substance Abuse and Mental Health Services Administration, Access calculated using OSRM and RAAM Saxon, J., & Snow, D. (2020).

In terms of specialized mental health programs for pregnant and postpartum women, the landscape is mixed. Arkansas offers about 18.66 such programs per 100,000 people, while Mississippi provides slightly more, at around 20.33 programs per 100,000 people. Louisiana has a higher provision of approximately 24.54 programs, suggesting better support for maternal mental health compared to the former states. However, Ohio stands out with the most support, offering around 28.22 specialized mental health programs per 100,000 people. The higher rate of specialized programs in Ohio suggests a more comprehensive approach to addressing mental health needs for moms, which could lead to improved outcomes for mothers and infants. On the other hand, the lower rates in Arkansas, Mississippi and Louisiana

point to a significant gap in services, underlining the need for increased investment in specialized mental health programs for pregnant and postpartum women in these regions and/or the expansion of effective support groups.

While we should prioritize expansion of maternal mental health specialists, not all cases require therapists, including cases that are less complex and/or do not involve substance use. Doulas could play a bigger role here, as they can support groups already on the ground. Examples like lactation services came up in interviews as a type of support group that goes beyond teaching moms how to breastfeed. Moms connect and support each other in these groups, which can make a huge difference.

FIGURE 9: ACCESSIBILITY OF MENTAL HEALTH SERVICES THAT INCLUDE A PROGRAM FOR PREGNANT WOMEN BY COUNTY, SELECTED STATES, 2023



Source: Provider data from Substance Abuse and Mental Health Services Administration, Access calculated using OSRM and RAAM Saxon, J., & Snow, D. (2020).

Respondents agreed that both health care providers and pregnant or postpartum women need education on what maternal mental health encompasses; the impact of mental health conditions on maternal health outcomes; and the service options available, especially to women who are uninsured or on Medicaid.

“I partner with a community organization called the Arkansas Birthing Project, which provides sister friends for pregnant women to help guide them through their pregnancy. It’s more of a social support intervention, all on a volunteer basis and up until the baby’s first year of life, and they celebrate those milestones with them...sometimes the social support can serve as an advocate for them.”

— Sarah Rhoads, Professor of Nursing and Department Chair of Department of Community and Population Health, University of Tennessee Health Science Center (which does outreach in Arkansas and Mississippi)

In the current situation, where an increasing demand for overall mental health services overlaps with a shortage of mental health providers, more screening alone will not solve maternal mental health problems. We will need to find alternatives to in-person therapy to solve this issue, like expanding access to telehealth and expanding support groups. While telehealth can play an important role for women with barriers to accessing mental health care, one of the interviewees cautioned that some women did not want to speak to someone they did not know over the phone, so establishing trust first needs to be considered. Support groups of all kinds in maternal health have proven to help women, not only with the specific need they target. As a result, support groups are a powerful tool to relieve pregnant and postpartum women from many common mental health challenges they face.

“Connection is everything. Women need connection, they need support. They need other people to talk to.”

— Jamie Starling, Licensed, Professional Counselor, New Path Mental Health and Wellness, Little Rock (AR)

Addressing the disparities in program availability is essential to ensuring all mothers, regardless of their race or ethnicity, have access to the mental health support they need. This approach is not only vital for fostering healthier families and stronger communities but also aligns with recommendations from the Arkansas Maternal Mortality Review Committee to prioritize interventions that can save lives and reduce health disparities.¹³

“In mental health, the challenges go beyond postpartum depression. ... There is lots of systemic mistrust and lack of access equity.”

— Becca Alexander, Senior Manager of Statewide Operations, POEM (Perinatal Outreach and Encouragement for Moms) (OH)

By enhancing the availability and accessibility of mental health programs, there is an opportunity to positively impact maternal health outcomes and contribute to the prevention of pregnancy-related deaths.

Increasing mental health screenings for perinatal women is a first step towards improving understanding of mental health conditions and ascertaining who needs which services. Beyond that, expanding access to mental health services is critical.

Interview respondents indicated there is limited understanding of the full spectrum of maternal mental health, which spans from the prenatal to the postpartum period, among both health care providers and the public.

A lack of awareness and understanding about mental health risks is common among women facing pregnancy and postpartum.

“I think there's still a misunderstanding about the full spectrum of perinatal mental health beyond postnatal depression. But especially in the postnatal period where there is lack of sleep, increased stress, figuring out a new routine. If you are susceptible to depression and anxiety, you're going to be at risk postpartum.”

— Erin Ryan, Director of Policy Advocacy & External Affairs, Groundwork Ohio (OH)

Before pregnancy, poor mental health can be caused by or related to anxiety, depression, mental health disorders, long-term stress and past or ongoing trauma. Respondents noted that for high-risk moms, many of these are associated with poverty, substance abuse, divorce, frequent moving, domestic violence, racism and incarcerated family members.

Pre-existing mental health conditions are often not addressed due to a lack of awareness, stigma and lack of access to mental health care services. These services are still a luxury when it comes to the moms that need it most. Pre-existing mental health conditions that have not been addressed properly and timely may then escalate with higher stress levels that arise from being pregnant and having a baby.

“Just accessing the right resources is stressful in itself for low-income women and therefore compounding the mental and behavioral risks. The difficulty of navigating insurance, of finding quality providers that take Medicaid, finding the right support group. Accessing mental and behavioral care has historically been a very privileged service.”

— Becca Alexander, Senior Manager of Statewide Operations, POEM (Perinatal Outreach and Encouragement for Moms) (OH)

Respondents highlighted various barriers to mental health care access for pregnant and postpartum women, including a scarcity of mental health care providers, high therapy and medication costs (including Medicaid coverage), limited time off work for therapy and enduring stigma around mental health conditions. Telehealth has tremendous potential for meeting mental health treatment needs, so long as women can afford access to high speed internet and know how to use it.

“One of the most common things I see is that moms do not have the support system they need and they are low income, they have to work and so there’s a lot of pressure for them to return to the workforce. In rural areas it is common to not talk about mental health issues and so it’s not understood that postpartum depression can last for a long time. Many already had mental health issues that were never addressed before they had their kids. There’s also a stigma to mental health and in rural areas no one talks about this.”

— Jamie Starling, Licensed Professional Counselor, New Path Mental Health and Wellness, Little Rock (AR)

During pregnancy and postpartum, poor mental health can impact a woman’s ability to access care. Many women are struggling to just get by in their daily lives without the additional responsibility (or burden) of addressing perinatal care. Among those who manage to attend perinatal appointments, mental health conditions often interfere with compliance with their doctors’ recommendations.

For the few moms who do get screened for mental health, there are scarce resources on how to address any concerns identified. So, screening is only the first step in this process but is not enough. Furthermore, women who are informed they need mental health services when unable to access them may have increased stress levels and lose trust in the system.

Recently, postpartum depression has garnered increasing recognition as a critical indicator of maternal mental health concerns. Despite this growing awareness, postpartum depression is still not adequately addressed. Based on respondents’ feedback, the necessary providers and resources are in short supply. In the postpartum period, women

should be regularly monitored for postpartum depression, as well as other mental health conditions and routinely given information on mental health at their physical health checkups.

Other mental health conditions also prevalent during postpartum receive even less attention. During the postpartum period, poor mental health, which includes substance abuse, can be exacerbated by no or inadequate maternity leave. Inadequate parental leave, coupled with the pressure to resume work, financial strains stemming from low-wage employment or unemployment, insufficient support networks and substance abuse leave women unable to develop healthy coping mechanisms or healthy bonds with their babies and families, further aggravating their mental health conditions and disempowering them in the workforce.

Several respondents pointed out that miscarriage and infant loss carry mental health challenges for mothers, including grief, stigma, guilt and shame. Women experiencing miscarriage and infant loss need extra mental health support but often fall through the cracks in both maternal and mental health care, leaving their needs unaddressed. Addressing these often overlooked situations proactively can enhance mental health outcomes, contributing positively to a woman’s well-being over the long term.

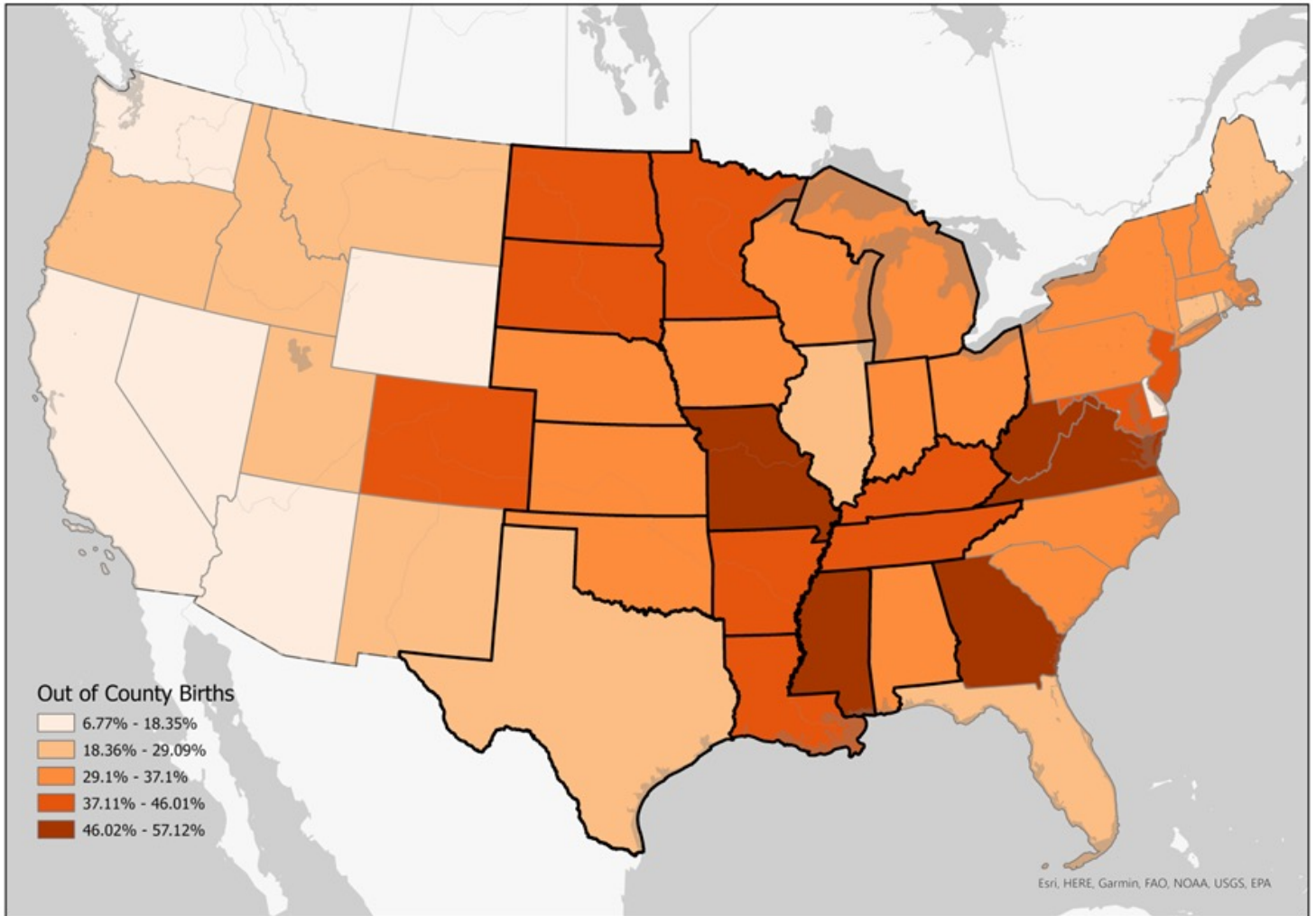
Proximity and Related Challenges

The journey a mother takes for maternal care and childbirth often crosses county lines, a reality that speaks volumes about the gaps in localized health care services. In the U.S., nearly 1 in 3 births occur outside the mother’s county of residence. This pattern provides a narrative about the complexities of health care accessibility, the interplay of social and economic factors and the lengths to which expectant mothers go to secure the best possible care.

“The birthing journey today for many moms is a journey of risk.”

— Joe Thompson
President and CEO, Arkansas Center for Health Improvement (AR)

FIGURE 10: AVERAGE SHARE OF LIVE BIRTHS OCCURRING OUTSIDE OF THE MOTHER'S COUNTY OF RESIDENCE, U.S., 2014-2020

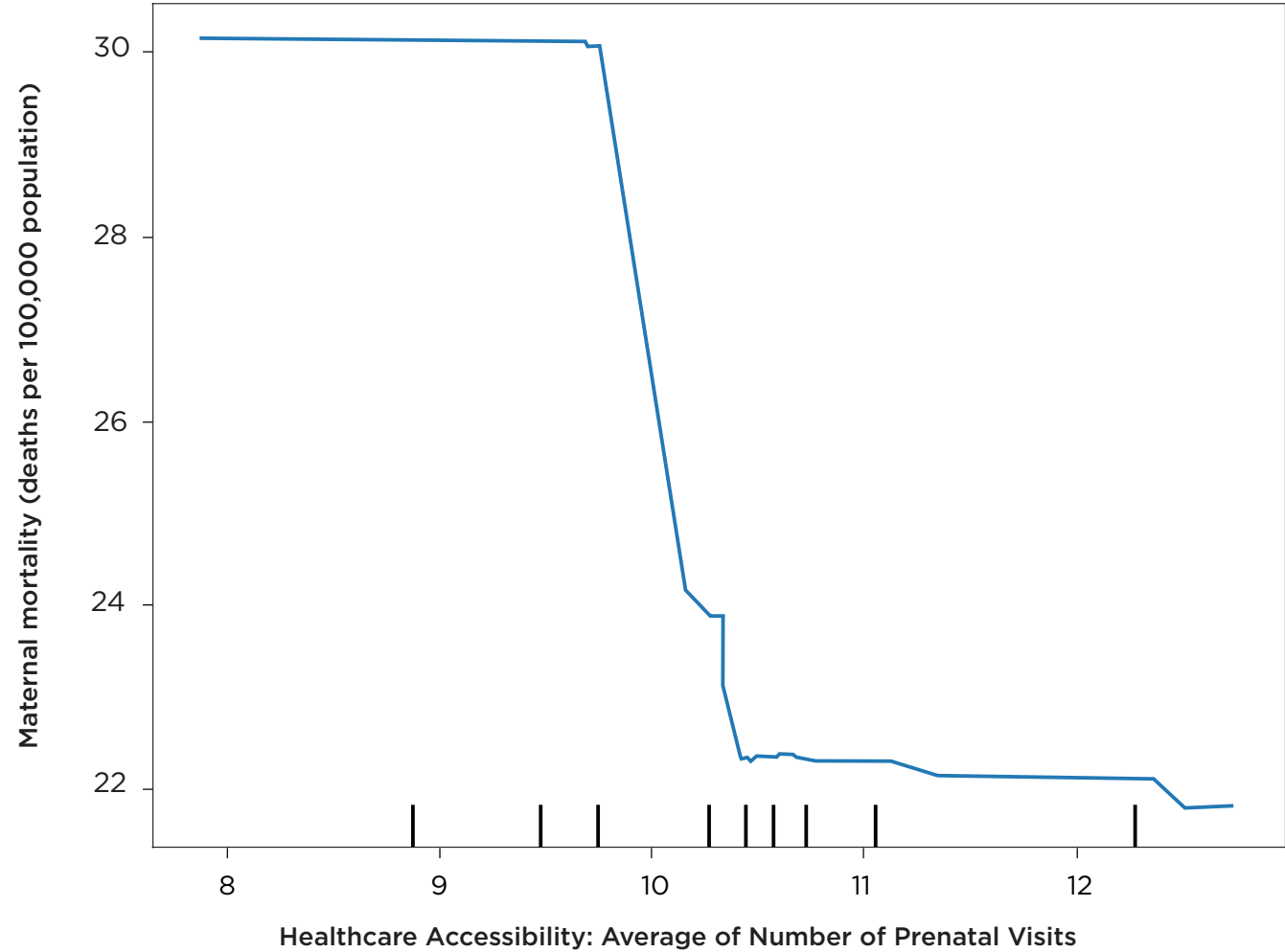


Source: Authors' calculations using CDC National Vitality Statistics Service Natality data.

Heartland states reveal a concerning pattern of high childbirth rates where the mother traveled to another county to receive care and deliver their baby. The out-of-county rate for Mississippi is 51%, meaning one of every two pregnant women deliver their baby in a county different from the one in which they live. Arkansas and Louisiana are slightly better off, with rates around 40%, while Ohio is better off with only 34% of women experiencing an out-of-county childbirth.

As illustrated in Figure 11, part of the concern around out-of-county childbirth is access to prenatal care leading up to delivery. The graph illustrates the relationship between prenatal visits and maternal mortality: pregnancy-related death risk drops from one in three to almost one in five women, if a woman is able to receive 10 or more prenatal care visits during pregnancy. While the relationship between prenatal visits and death risk is not causal, it does reinforce the idea that proximity to an appropriate healthcare provider is a key strategy in empowering women to pursue care, as it offers enhanced convenience and potential cost savings.

FIGURE 11: RELATIONSHIP BETWEEN AVERAGE NUMBER OF PRENATAL VISITS AND PREGNANCY-RELATED DEATH, U.S., 2014-2020



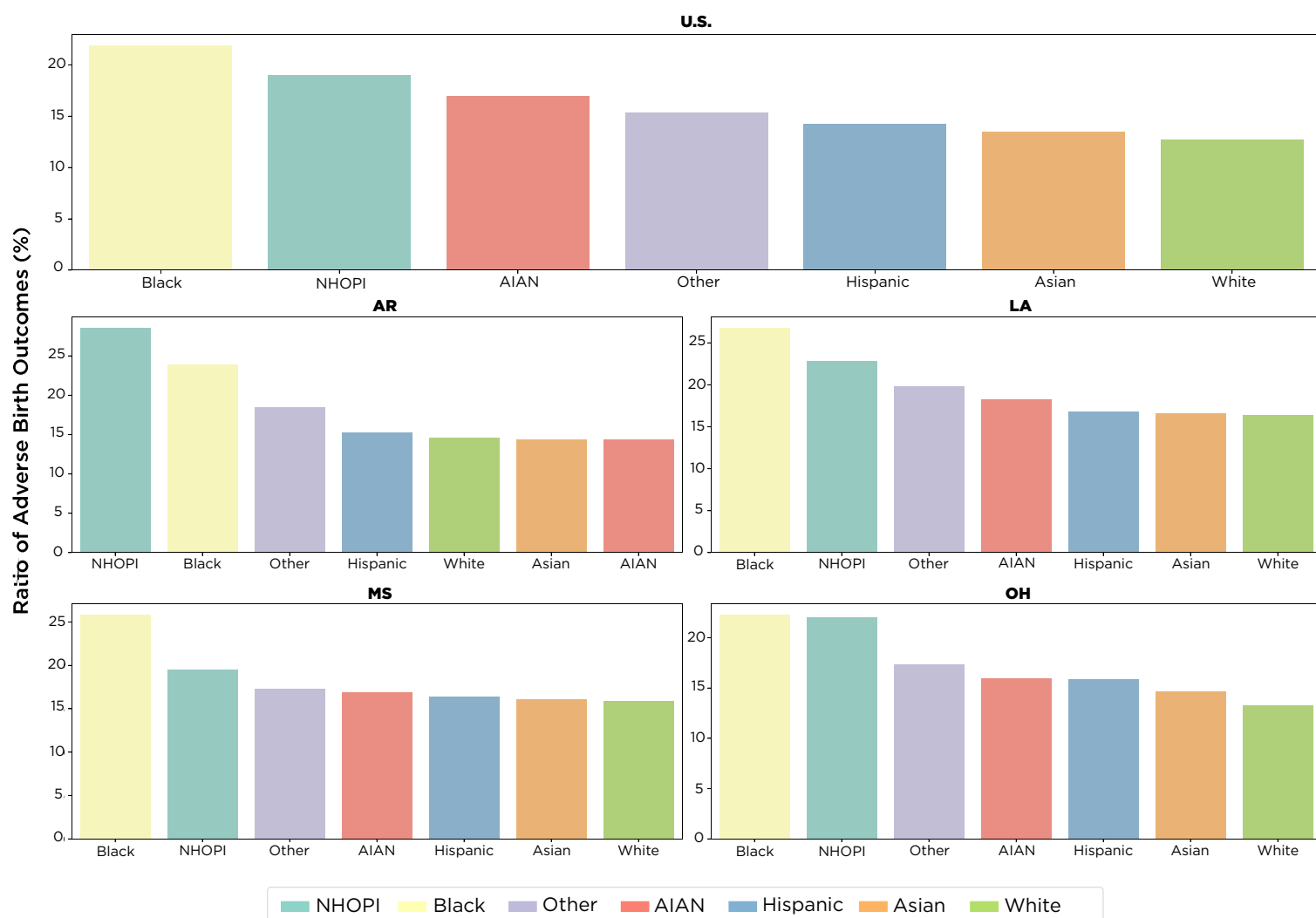
Source: Generated from analysis conducted by the authors using CDC National Vitality Statistics Service Natality data and <https://www.cdc.gov/nchs/maternal-mortality/mmr-2018-2021-state-data.pdf>

The Role of Race and Ethnicity

To fully appreciate how access varies by race and ethnicity, one must first understand the distribution of undesirable birth outcomes by race and ethnicity. The prevalence of undesirable birth outcomes, measured as the share of live births having an undesirable outcome, across different racial and ethnic groups in Ohio,

Arkansas, Louisiana and Mississippi is a reminder of the pervasive racial disparities in maternal and child health. Each state presents a unique pattern, yet a common thread is the higher prevalence among Black mothers compared to other racial groups. This trend is not just a matter of public health but also a reflection of deeper societal issues that disproportionately affect Black moms.

FIGURE 12: SHARE OF LIVE BIRTHS RESULTING IN UNDESIRABLE OUTCOMES BY RACE AND ETHNICITY, SELECTED STATES AND U.S., 2014-2020 AVERAGE



Source: Authors' calculations using CDC National Vitality Statistics Service Natality data.

In these states, Black mothers consistently experience the highest rates of undesirable birth outcomes. For instance, in Louisiana, this group faces a rate of approximately 26.73%, while in Mississippi, the rate is 25.85%. These figures are considerably higher than for White mothers, who experience prevalence rates of 16.42% in Louisiana and 15.92% in Mississippi. In Arkansas, the highest prevalence is observed among Native Hawaiian and Other Pacific Islander (NHOPI) mothers at 28.50%. This data suggests that minority groups, such as Black and Pacific Islanders, face more complex perinatal treatment, and therefore need greater access to maternal health care providers. It also points to the need for culturally sensitive and specific health interventions that address the unique needs of these communities.

“Support groups like Nurse-Family Partnership in Louisiana are important. This is a great program where moms and babies focus on their diets. The philosophy around care and really a system that reduces costs overall because when prenatal interventions are implemented effectively, they reduce the problems 20 years down the road and the high costs of health care.”

— Sarrah Evans, Certified Professional Nurse and Midwife, Nest Health (LA)

TABLE 6: SHARE OF BIRTHS IN RELATION TO MOTHER'S COUNTY OF RESIDENCE BY RACE AND ETHNICITY, U.S., 2014-2020 AVERAGE

RACE	IN COUNTY	OUT OF COUNTY	OUT OF COUNTY <30 MILES	OUT OF COUNTY 30 TO 60 MILES	OUT OF COUNTY >60 MILES
HISPANIC	80.60%	19.40%	27.21%	43.66%	29.13%
AIAN	60.73%	39.27%	10.44%	34.79%	54.77%
ASIAN	77.90%	22.10%	41.12%	39.44%	19.44%
BLACK	75.54%	24.46%	42.53%	44.35%	13.13%
NHOPI	84.74%	15.26%	19.83%	48.00%	32.18%
WHITE	63.41%	36.59%	33.40%	50.84%	15.76%
U.S. AVERAGE	70.44%	29.56%	33.61%	48.08%	18.31%

Source: Authors' calculations using CDC National Vitality Statistics Service Natality data and OSRM.

Geographic distribution of different racial and ethnic communities can impose inherent limitations on health care choices. The higher prevalence of out-of-county births among the American Indian and Alaska Natives (AIAN) community could be reflective of their residence in regions with scarce health care infrastructure, which in turn could be linked to the fact that Native Americans have their own health care system and members may be seeking care only in those facilities. Fragmentation and no or low levels of coordination across different health care systems could make travel for childbirth a necessity rather than a choice, further deepening the chasm of health care inequality. White mothers also show a consistent increase in out-of-county births over the years. In contrast, minority groups like Hispanic and Black mothers, despite an overall increase, have percentages that hover below the national average. These patterns are possibly indicative of the differential access to high-quality health care services, with Non-Hispanic, white mothers potentially having better access to specialized medical services and thus more willingness to travel for childbirth.

Institutional barriers appear to be limiting access of rural and underserved groups to top-tier health care facilities. One such barrier, according to respondents, is implicit bias and unrecognized racism in the health care system. This affects communication and trust between providers and women of color, primarily Black women, which in turn hinders access.¹⁴ Women are

reluctant to accept perinatal health care services even when they are available due to a lack of trust, resulting in low attendance at appointments or checkups.

Institutional barriers such as unrecognized racism could be reduced by providing more information on how best to access midwives, doulas and Community Health Workers (CHWs), along with increasing the health care workforce. To expand the workforce, you must also provide quality training and education opportunities and other solutions, such as scholarships and loan forgiveness, for those wanting to build a career pathway in health care but especially for underrepresented populations in the health care workforce. CHWs, in particular, have proven effective in closing the cultural gap in health care.

“Licensing and certification establishes a baseline level of skills to provide oversight and enable those individuals to become part of the paying health care system so they can have sustainable wages. The doulas, the Community Health Workers, the peer individuals, they bring real value by having reach into the community. The medical care system does not reach out into the community so these roles serve as a bridge.”

— Joe Thompson
President and CEO, Arkansas Center for Health Improvement (AR)

Health Literacy and other Behavioral Factors

Lower educational levels point to a lower level of health literacy, as well as lack of awareness about the benefits of specialized medical care available at a further distance. Interviewees supported this analysis, with OB-GYNs, doulas and midwives noting women from low-income populations often lack basic knowledge on topics such as their own physiology, healthy nutrition, sleep and reproductive processes, including menstruation, fertility, pregnancy, delivery and postpartum.

Low health literacy has a negative impact on women's awareness of the consequences of pre-existing medical conditions on maternal health and results in a lack of urgency in preventing or treating such conditions. The intersection of low health literacy and accessibility to care is at the center of the current low health indicators many moms face in our nation.

These factors, together with the absence of resources to guide these mothers to superior health care alternatives, can act as a barrier, preventing access to high-quality health care and emphasizing the need for targeted educational interventions.

The Need for Specialized Care

Certain medical conditions necessitate specialized neonatal and surgical care unavailable in all counties. The development of facilities like specialized pediatric surgery units or Neonatal Intensive Care Units (NICUs) within more communities would empower mothers to receive care closer to home, enhancing accessibility and convenience. For example, by establishing more such facilities, a significant number of mothers, like those representing the 66.74% of congenital diaphragmatic hernia cases resulting in out-of-county births, could benefit from local care, thereby fostering community health and reducing the need for long-distance travel.

Telehealth can assist in many instances. In emergency situations, specialists can guide non-specialist local doctors via telehealth to perform surgery. In less extreme cases, patients could consult specialists prior to surgery or undergo follow-ups with their local provider – a physician, midwife and/or RN – via telehealth.

TABLE 7: AVERAGE UNDESIRABLE CHILDBIRTH OUTCOMES RELATIVE TO MOTHER'S COUNTY OF RESIDENCE, U.S., 2014-2020

BIRTH CATEGORY	PRETERM BIRTHS	INFANT DEATHS	ABNORMAL INFANT HEALTH CASES	MATERNAL MORBIDITY CASES	HIGH RISK CASES	PRENATAL VISITS	AVERAGE OF BIRTH WEIGHT IN GRAMS
IN COUNTY	11.02%	0.23%	30.33%	1.32%	82.07%	11.21	3274.81
OUT OF COUNTY	13.03%	0.32%	32.62%	1.38%	85.28%	11.28	3256.69
<30 MILES	11.42%	0.25%	30.87%	1.28%	85.79%	11.55	3279.65
30 TO 60 MILES	12.64%	0.28%	32.18%	1.35%	85.55%	11.37	3271.07
>60 MILES	17.69%	0.60%	37.85%	1.64%	84.26%	10.66	3167.03
ALL	11.62%	0.26%	31.01%	1.34%	83.02%	11.23	3269.43

Source: Authors' calculations using CDC National Vitality Statistics Service Natality data and OSRM

Additional Barriers to Maternal Health Care

The challenge of accessing transportation was cited by most respondents in our interviews as one of the biggest barriers to women accessing quality perinatal health care.

Some of the relevant factors include:

- the lack of adequate transportation, whether private or public;
- the complications of scheduling Medicaid transportation to make it on time for appointments; and
- the lack of child seats in Medicaid transport, which means women must arrange costly child care.

While transportation options exist for rural and other underserved areas with low-income populations, there is room for improvement to make these services more effective, user-friendly and accessible, potentially enhancing productivity by minimizing the need for time off work.

Community Health Workers (CHW) and doulas can help moms access transportation resources. Supportive and effective transport models that have been proven to work can be expanded. For example, in urban areas partnerships with taxis and ride share companies like Uber and Lyft can be paid by Medicaid. In rural areas, the most effective model we have seen is [New Growth Transit](#) in Missouri, which is based on a proven program in New York.

The need for child care is another major barrier for low-income women impacting their ability to attend appointments and access out-of-county maternal health care. When combined with lack of transportation, every visit to the doctor can feel like an insurmountable task for a pregnant woman with other children. Not only is child care expensive, but it is difficult to access quality child care in low-income areas and to find care for occasional events like doctor appointments when not registered with a care provider for a consistent schedule.

Many mothers working in low-income jobs have no paid maternity leave, which puts additional pressure on them to have child care arranged almost as soon as their child is born. Working mothers who already have children sometimes have no choice but to miss health appointments due to a lack of child care, transportation and they simply cannot afford time away from work. Many moms who do find ways to overcome the hurdles, sometimes arrive late for appointments due to their transportation being less reliable or child care complications. When arriving late, they often face harsh judgments from staff, in some cases losing their appointments.

CHWs and doulas can help moms access child care resources and transportation to appointments. Family paid leave policies covering at least six weeks, if not more, are crucial to allowing families time to adjust and mothers time to recover before returning to the workforce.

RETHINKING THE APPROACH TO MATERNAL HEALTH CARE

Improving maternal health outcomes benefits workforce productivity, promotes equity and saves on health care spending. Finding a comprehensive approach to maternal and infant health care is therefore urgent and highlights the need to look at the issue through different lenses, perhaps learning from other locations to find the solutions moms and their babies deserve. For instance, Alaska has the least medicalized approach to maternal health care in the U.S. - relying primarily on midwives with a community approach that provides good perinatal care for remote areas - but has outcomes far superior to other states.

The combination of health care resource shortages - particularly OB-GYNs - and the high rate of preventable chronic conditions among high-risk moms, many of whom live in poverty, is at the root of our nation's maternal health crisis. On the positive side, "preventable" brings hope for practical solutions and the practitioners we interviewed for this report overwhelmingly expressed their willingness to be part of the change.

In broad terms, there are two components when engaging with this issue. First, we must address the immediate crisis. This will take effort and require resources to improve access to perinatal care for underserved women who are neglected by the medical system. Second, and as important, we must concurrently focus on preventive measures that will gradually reduce the crisis and more effectively empower these women. Women's empowerment requires parallel approaches that promote better health care and healthier lifestyles.

These two broad components, improving access to perinatal care and focusing on preventive measures, urgently need a new way of thinking about a mom's health. Leaders too often fail to explore models that have worked in developed and developing countries, including the U.S. Adapting borrowed ideas to local contexts and supporting on-the-ground initiatives that are already working would help truly move the needle in the right direction.

"What we have built out in the Healthy Mothers Healthy Babies Coalition of Hawaii is a clinical component and also a social services component. The provider covers the basics, then we consider what else that mother needs ... It takes a different form of caring. It's a cultural shift."

— Tanya Smith-Johnson, Certified Professional Midwife and President, National College of Midwifery

While hospitals are critical for delivering babies in the model we've become accustomed to, they are not the only means, and we must be open to other alternatives that would work best within the needs and constraints of local contexts.

Many respondents, including medical doctors, told us the U.S. has over-medicalized and made less personal what is essentially a natural process that often requires an individualized approach.¹⁵

The harms of rushed and impersonal care are heightened by a lack of trust, primarily among women of color, who may not feel comfortable raising concerns with or asking questions of their doctors. Low-income women are usually less knowledgeable about the health care system - and even the maternal journey itself - which makes them less empowered to ask questions and request the resources needed.

“Unfortunately, a significant portion of women in poverty have poor living conditions and unhealthy habits. Those are two of the main contributing factors to the high risks. There is no way that in 15-20 minutes, an OB-GYN can solve the whole-life issues many of these women are facing. The doctor can only do so much when that woman begins her pregnancy with those bad habits in place and a lot of them with obesity and other complications. A collaborative approach to care would work to address these, where you have social workers, doulas or others who can address those issues better than a doctor.”

— Paige Partridge, the late OB-GYN (AR)

Respondents stressed that services covering the perinatal health care spectrum are highly fragmented, disconnected and siloed. When you add services that impact a mom’s health but are outside the health care system, fragmentation is more pronounced. Fragmentation often leads to little or no care coordination as well as lack of continuity, especially for women who need to find providers that accept Medicaid or will take uninsured pregnancies. Low-income women often need to go to different places for various services while also facing transportation and child care challenges.

The Ohio Department of Health’s Comprehensive Maternal Care program, launched in 2023, aims to overcome these challenges by providing more personal and customized interventions for moms and families who have historically lacked ready access to high-quality responsive care before and after pregnancy. They provide obstetrical practices with support to help them develop community connections and culturally aligned supports for women with Medicaid to navigate pre- and post-natal care.

“How do you equip moms and families to recognize when they’re not doing well and then if they go to their providers, prepare providers to help them, to listen to them. That’s where a lot of systemic racism arises. It’s both things, providers may not recognize those symptoms and patients don’t know what to ask or discuss with providers. A lot of education needs to happen among patients and providers.”

— Nirvana Manning, OB-GYN and Chair of the Department of Obstetrics and Gynecology, University of Arkansas Medical School, Little Rock (AR)

On the other hand, doctors interviewed mentioned they want to better serve their patients who face multiple challenges, but often find themselves overwhelmed and powerless, not knowing where to start and not having the time or resources to address them properly. In many cases, they feel they need to prioritize the medical side of the pregnancy for which they were trained.

“When people feel they have a good relationship with their provider and they feel it was a shared process, then that’s when you see satisfaction and better outcomes.”

— Robin Weiss, doula and President, DONA International

Respondents were clear women want a shared process and a partnership when it comes to maternal health care – they want support, connection, a relationship with their provider as well as shared and informed decision-making. A more collaborative approach among those serving moms could not only help improve their health outcomes but could also help relieve burnout among medical providers, as well as save on the costs of care in the long-term by helping prevent complex cases.

While we need a less medicalized approach to maternal health, this is not to say that OB-GYNs are not needed. Instead, solutions should not be primarily centered on them. We propose looking at alternative models, not a one-size-fits-all approach, that are collaborative and multidisciplinary, including both medical and non-medical professionals, to provide perinatal health care in a more effective and financially sustainable way.

“Doctors who have a more holistic approach to medicine are needed. The more people that are involved, the better, a multidisciplinary approach works. For example, Community Health Workers are helpful, they can bridge that gap of navigating resources, they can go out to the community and help. Having more people who are educated about pregnancy would make a huge difference.”

— Constance Chapman, OB-GYN, Family Practice and Obstetrics - Mainline Community Health Center, Monticello (AR)

FIGURE 13: SOLUTIONS NEEDED TO ADDRESS MATERNAL HEALTH CARE



Figure 13 outlines some of the mutually reinforcing approaches that could work together to improve maternal health care in a comprehensive way.

For perinatal care, we recommend separating low-risk moms from high-risk moms, as illustrated in Figure 14. Throughout the perinatal care stage, traditional maternal health services could be complemented, not necessarily replaced, by telehealth, mobile units, home visits or a combination of these. In general, this model reflects a less medicalized approach that is also more inclusive of the social determinants of health.

For **low-risk pregnancy moms**, we propose offering perinatal health care by certified midwives or a physician with OB-GYN training (such as a primary care or family practitioner), whichever provider is more accessible or possible to expand in an area. These services could be provided by expanding services through FQHCs, RHCs or other providers that already have the capability to accept Medicaid.

“We are not going to ever get an OB-GYN trained person in these very rural areas in Arkansas. ...so we have to think out of the box and get other providers to provide obstetrical services. A huge asset are Certified Nurse Midwives.”

— Nirvana Manning, OB-GYN and Chair of the Department of Obstetrics and Gynecology, University of Arkansas Medical School, Little Rock (AR)

All providers should collaborate with the nearest hospital offering maternal health services for deliveries. For areas that are too far from a hospital with maternal health, birthing centers and at-home deliveries with a certified midwife are also options. A recent international study found that midwives help substantially reduce maternal and neonatal mortality as well as stillbirths, even in countries with a high Human Development Index. Family planning interventions delivered by midwives have the largest impact, but midwife-delivered interventions across the maternal health spectrum – from preconception to postpartum – also make a substantial contribution. However, to realize this potential, “midwives need to have sufficient skills and competencies, be part of a team of sufficient size and skill and work in an enabling environment.”¹⁶

“Doulas and other perinatal support workers save lives. They are truly integral to ensuring safe outcomes and better outcomes for moms and babies.”

— Jatu Boikai, Nurse Manager of Maternity Services, Mount Carmel Grove City Health System (OH)

“Providing access to doulas can help bridge the gap in maternal health care. ...Doulas can spend more time with moms, more than just that 5 - 10 minute doctor’s visit in a more personal setting.”

— Tasia Stewart, doula, Birthmark Doula Collective, New Orleans (LA)

Doulas should also be included to offer the emotional and informational support essential for moms. Many doulas are equipped to offer mental health screenings, educate women on how to navigate the health care environment and be better advocates for themselves. Other non-medical services that can help low-risk moms prevent health complications include CHWs, lactation services or any other support group targeting moms.

Paving the way for doulas’ inclusion in Ohio, maternal health advocates are pushing for Medicaid to cover doula services. The Ohio Board of Nursing’s Doula Advisory Board¹⁷ is developing a plan by October 2024 that will serve as the framework for Ohio’s doula certification, which will be part of the larger Maternal and Infant Support Program¹⁸ at Medicaid.

In **high-risk pregnancies**, there should be a generalist OB-GYN, as well as specialists, collaborating with these medical and non-medical providers as needed, either on-site or through telehealth and/or mobile units. Telehealth offers a unique opportunity to expand access for underserved communities to specialists when complications arise, not from home but through the clinic and in partnership with the patient’s local provider.

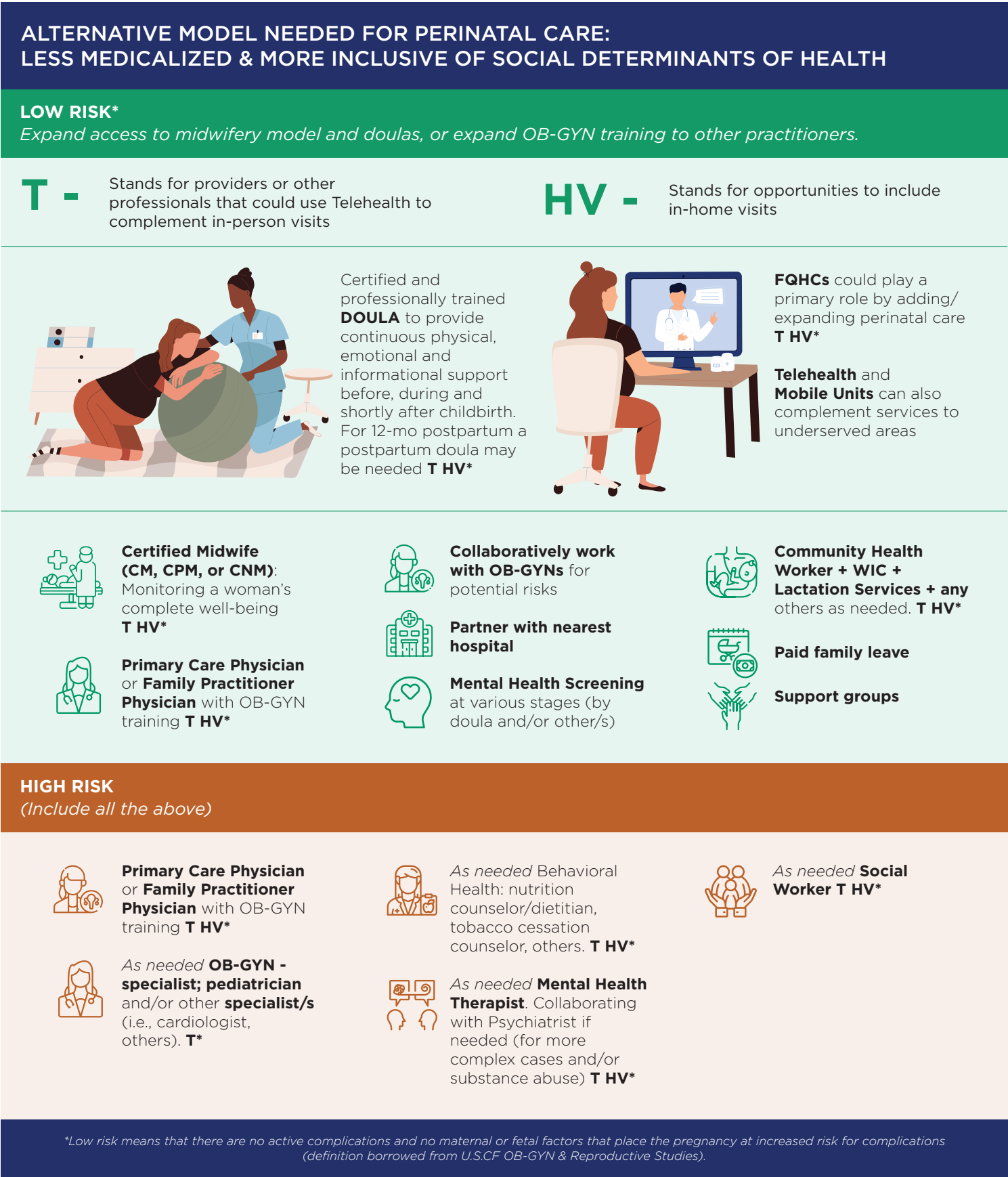
For mental health services, telehealth accessed from home is an excellent way to expand access to underserved mothers. Many moms may still need help to access telehealth in the initial stages, which a doula, social worker or CHW could provide.

Respondents raised several barriers to a more collaborative perinatal care model:

- resistance by medical doctors who were trained to favor the existing, more medicalized model,
- a fear of risk and complications in pregnancy and delivery,
- the sometimes antagonistic relationship between doctors and midwives and doulas that arises precisely from a lack of collaboration,
- a lack of understanding of the modern role of midwives,
- non-existent or low reimbursement rates for doulas and community health workers (which prevents them from earning a living wage),
- and current hospital policies that do not include midwives and doulas.

Awareness, education and facilitated conversations are needed to navigate these barriers and build trust between all the stakeholders.

FIGURE 14: PERINATAL CARE DIFFERENTIATED BY RISK CATEGORY



Heartland Forward Action Plan to Advance Maternal Health Outcomes

As shared throughout this report, the U.S. currently has the highest rate of pregnancy-related deaths of all high-resource countries and is the only high-resource country with a rising rate of these deaths over the last 20 years.

As a country and a heartland region, we must protect our children, families and mothers. Given the complexity and scale of the issues, Heartland Forward, a policy think and do tank is focused on tangible solutions that can be universally applied across the heartland. The four solution areas are as follows:

1. Supporting and advocating for Community Health Workers (CHWs)
2. Expanding access to telehealth
3. Addressing workforce shortages across the health care industry
4. Increasing transparency through data collection and evaluation

The goal is to approach these four areas with a thoughtful action plan to achieve measurable impact in the lives of moms, families and communities over a three-to-five-year period.

ACTION 1: Supporting and advocating for Community Health Workers (CHWs)

As our analysis demonstrates, access to health care results from both availability of adequate care and the ability of mothers to utilize the care. Community Health Workers (CHWs) are essential to addressing the gaps and shortcomings of maternal health. CHWs often fill gaps in care by being an advocate for patient care - orchestrating medical referrals, liaising between providers and patients and offering educational resources and tools to assist with improved outcomes. CHWs are trusted members of their communities, making house calls and visits to those in need—offering a more personalized approach to care. In many circumstances, CHWs can spend more direct time with patients than health care providers and can thus afford particular and detailed insight into the needs and wellbeing of those they serve.

Recognized as a designated workforce classification by the U.S. Department of Labor, CHWs fill a crucial role in keeping new mothers and soon-to-be mothers healthy and well. It is critical that the scope of practice and payment for CHWs is clearly defined, along with their training and certification. It is estimated that over the next few years, at least 8,000 more CHWs will enter the workforce, offering a meaningful opportunity to leverage these individuals to assist with maternal care.

The care of new and expecting mothers requires the unique and personalized services offered by CHWs. As CHWs often serve as an inextricable part of the maternal health wellness team, they are a crucial part of maternal health overall, and, by extension, women's health care.

Next Steps: Heartland Forward will continue its advocacy and public education campaign around the importance of CHWs while collaborating with the Heartland Health Caucus, policymakers, providers, insurers, industry leaders and other key stakeholders to expand CHW presence within the maternal health care space.

ACTION 2: Expanding access to telehealth

According to a report from the Centers for Medicare and Medicaid Services, most women in rural America live more than a 30-minute drive from a hospital or obstetric services facility. Additionally, more than 10% drive over 100 miles for prenatal and/or postpartum care.

Telehealth services can help close these geographic gaps so that new, expecting and future mothers can use existing methods of care. The advancement of telehealth increases access to care for millions of women, but unfortunately there remains historical legislative barriers restricting telehealth services, gaps in educational resources on how to utilize telemedicine and lack of affordable, high-speed internet access.

For telehealth to work we must close the digital divide and create access for affordable, high-speed internet. Devices and training must be provided to allow individuals to use web-based telehealth services

from home. As telehealth offerings expand, support for people who may have difficulty navigating new systems is essential.

Heartland Forward has been working to close the digital divide and increase high-speed internet access across the heartland. An estimated 42 million Americans lack reliable access to an internet connection and therefore are excluded from utilizing telemedicine as a vehicle to obtain maternal or other critical health care services.

Next Steps: Heartland Forward will continue its work through the Connecting the Heartland initiative to accelerate the adoption of affordable high-speed internet and digital skills, particularly in rural and underserved areas, while simultaneously leveraging the strength of the Heartland Health Caucus to inform policymakers about the importance of thoughtful and less-restrictive telehealth regulations. More on Heartland Forward's telehealth policy recommendations can be found [HERE](#).

ACTION 3: Addressing workforce shortages across the health care industry

The American health care system is experiencing a profound shortage of qualified caregivers, which has affected multiple areas of medicine including maternal care. The Bureau of Labor Statistics projects that the U.S. will experience a deficit of 195,000 nurses by 2031. The Association of American Medical Colleges estimates that the U.S. will need an additional 124,000 physicians over the next decade.

In 2024, Heartland Forward will launch a workforce pilot in Southeast Missouri to incentivize and train more nurses in the local community—a pilot which could be replicated across the heartland. By prioritizing technical training, fervent mentorship and comprehensive support services, this pilot becomes not only a sustainable pathway into the nursing profession, but a strong factor in nurse retention. Additionally, more should be done to recruit and train doulas and midwives—specifically in rural and underserved communities—as they are critical in serving the needs of new and expecting mothers. Doulas and midwives fill a remarkable void in communities with inequitable access to primary care physicians and OB/GYNs.

Next Steps: Heartland Forward will work with other states and local communities to help support health workforce shortages across the heartland - considering an expansion of the Missouri pilot to other states and communities with a focus on increasing access and reimbursements for doulas and midwives. Additional policy recommendations from Heartland Forward on health care workforce shortages can be found [HERE](#).

ACTION 4: Increasing transparency through data collection and evaluation

Maternal health is a complex process involving a system of agents made more difficult by complicated payment arrangements and social determinants of health. As our analysis highlighted, adequate data for understanding perinatal health care is often unavailable or inadequate for analysis at substate geographies.

These realities, coupled with low levels of health literacy and an acute shortage of health care resources that worsened since the COVID-19 pandemic, pose challenges on accessing a complex maternal health care system.

Without sufficient data guiding health care policy for mothers and children, policymakers are unlikely to accurately diagnose the underlying issues to inform policy solutions that increase the access to fair and effective care. Ohio's Colleges of Medicine Government Resource Center¹⁹ represents one model that provides data, analysis and expert access to enhance pregnancy-related health care. Heartland Forward is committed to creating greater transparency and flexibility in medical treatment while supporting states to ensure they can track and work off the most reliable data and research.

Next Steps: Heartland Forward strives to create a health index to shine light on opportunities for resources to enhance available care options. In doing so, Heartland Forward hopes to increase the accessibility of maternal care. Heartland Forward's health index will be distributed to community partners, providers, insurers, policymakers and other key stakeholders throughout the 20 heartland states.

METHODOLOGY

APPENDIX

This research utilizes a comprehensive mixed-methods approach, merging quantitative data analysis with qualitative insights to evaluate the availability and accessibility of maternal health resources in the chosen states.

Qualitative Methodology

The qualitative portion of this report was informed by open-ended interviews conducted between the authors and 34 various maternal health experts at the local, state and national levels. The backgrounds of interviewees were recorded across multiple different domains, including the area covered by their work (local, state, or national), the state they work in and their area(s) of expertise regarding a few major categories. These professional categories included: doula practice and training, midwifery, nursing, obstetrics/gynecology/OB-GYNs, pediatrics or family medicine, mental/behavioral health specialists and social workers and experts in public health, health programs or health policy. Generally, respondents - excluding national - were categorized by only one state, but many were recorded as being experts in either multiple geographic scopes or multiple areas of expertise. Tables with the specific designation counts can be found below.

Total interviewees: 34

BY STATE (INCLUDING SOME WHO WERE ALSO LOCAL EXPERTS):

STATE	INTERVIEWEES
Arkansas	14
Mississippi	9 (2 based in TN)
Louisiana	4
Ohio	6
Kentucky	1

BY AREA COVERED (SEVERAL INDIVIDUALS QUALIFIED FOR MORE THAN ONE):

AREA	INTERVIEWEES
Local	23
State	15
National	3

BY OCCUPATION (SOME INDIVIDUALS QUALIFIED FOR MORE THAN ONE):

AREA OF EXPERTISE	INTERVIEWEES
Doula practice/training	4
Midwifery	3 (1 non-nursing)
Nursing (non-midwifery)	5
Obstetrics/Gynecology/OBGYNs	10
Pediatrics or Family Medicine	4
Mental/Behavioral Health Specialist/Social Workers	4
Public health or health policy	12

Quantitative Methodology

Our methodology is designed to evaluate the accessibility of maternal health resources and the economic implications of various birth outcomes. This multifaceted approach combines data collection, geographical analysis and economic assessments to provide an in-depth understanding of the maternal health care landscape. Our methodology lays the foundation for a robust analysis of health care accessibility, out-of-county childbirths and the economic impact of undesirable birth outcomes.

The initial step in our analysis involved data collection. For evaluating OB-GYN accessibility, we obtained lists of all actively licensed OB-GYN specialists from State Medical Boards in Arkansas, Ohio and Mississippi. However, we faced a data limitation in Louisiana where these records were unavailable. Despite this, we managed to collect accessibility data for all four states in other analysis areas. Hospital location data was sourced from CovidCareMap Health Care System Capacity data, aggregating information from the Health Care Cost Report Information System (HCRIS) and Definitive Health Care. For identifying OB-GYN specialists who accept Medicaid or Medicare, we utilized datasets from the Centers for Medicare & Medicaid Services (CMS). Mental health service data, including those specifically tailored for pregnant women, were gathered from hhs.gov.

The National Vital Statistics Services dataset from the Centers for Disease Control (CDC) provided crucial information on all U.S. births from 2014 to 2020, offering a comprehensive view of birth-related trends and outcomes. Economic data, essential for assessing the financial impacts of out-of-county childbirths and undesirable birth outcomes, was compiled from various sources, including the IRS for travel reimbursement rates, the Bureau of Labor Statistics for average hourly wages and Beam et al. (2020)'s study on health care spending.

To make sense of this data, we utilized various statistical techniques. Data reduction techniques such as the random forest algorithm, along with Variable Inflation Factor (VIF) and Pearson correlation analysis allowed us to hone our focus to 46 crucial variables

influencing pregnancy-related health outcomes. These selected variables captured the distilled essence of our comprehensive dataset. Then, we compared these variables to maternal mortality rates, revealing enlightening patterns and connections.

A central part of our analysis was the exploration of variable significance, shedding light on the crucial role of factors related to access. Notably, the average number of prenatal visits stood out as the most significant correlate of maternal mortality, accounting for approximately 50% of maternal mortality at the state level. Moreover, the frequency of preterm birth and low birth weight emerged as the second and third most influential determinants, explaining almost 20% and 15% of maternal mortality, respectively. These insights underscore the direct and significant influence of health care access and undesirable birth outcomes on maternal mortality rates.

To enhance the clarity and visual presentation of our findings, we employed partial dependence plots, illustrating how variations in these key determinants (the average number of prenatal visits, the frequency of preterm births and low birth weight) impact maternal mortality. For example, these plots reveal a higher number frequency of prenatal visits and how it correlates with reduced maternal mortality, emphasizing the importance of accessible and quality prenatal care. However, the effect of increased prenatal visits on lowering maternal mortality levels reaches a plateau after about 10 visits, suggesting that beyond this threshold, other factors gain prominence. It is worth noting a plateau in the number of prenatal visits does not imply additional visits are unnecessary, but rather the quality and substance of the visits are what truly count.

Using ArcGIS, we geocoded health care provider locations to establish geographic correlations with county centroids, representing patient origins. The supply table creation involved matching provider coordinates with Census Bureau data to identify corresponding GEOID or County FIPS codes, thus cataloging the number of providers in each county. The demand matrix, based on county population counts, outlined the potential health care service demand in each area.

Travel distances between patient-source and provider-destination pairs were calculated using the OSRM API, forming a cost matrix that highlighted the spatial and temporal barriers to health care access. These data points were processed through the Rational Agent Access Model (RAAM) algorithm, developed by Saxon and Snow (2019), which balanced supply against demand and incorporated travel costs to calculate a uniform accessibility score for each county. This score, a measure of health care accessibility, reflected the availability of providers against patient needs and geographical constraints.

In analyzing the Economic Impact of Undesirable Birth Outcomes, we categorized each birth based on gestation duration and weight metrics using CDC standards. Applying average medical costs from Beam et al. (2020)'s study, we assigned estimated economic values to each birth outcome.

To conduct the accessibility analyses, the Rational Agent Model was used.²⁰ This model provides a framework for analyzing the spatial accessibility of health care services. This model considers patients as individuals who choose health care by minimizing their overall costs, including accessibility (ease of reaching services) and availability (the presence and adequacy of these services). This perspective is particularly relevant for expectant and new mothers, who must balance travel time with potential wait times at health care facilities.

This model introduces a dynamic feedback mechanism between patient decisions and service availability, accounting for the trade-offs between travel times and congestion at care points. Such an approach offers a more realistic understanding of health care access scenarios and is instrumental in identifying areas lacking sufficient maternal health resources.

The Rational Agent Model's application to maternal health care can lead to transformative insights into the accessibility challenges faced by pregnant and postpartum women. It empowers health care planners and policymakers to pinpoint areas with inadequate accessibility and develop targeted strategies to

enhance resource distribution. Ensuring equitable access to essential maternal health resources is a crucial step towards improving maternal and infant health outcomes.

This comprehensive methodology enables a multi-dimensional analysis of maternal health care accessibility and the economic ramifications of various birth outcomes. By integrating geographical, demographic and economic data, we provide a holistic view of the maternal health landscape, identifying key areas for improvement and intervention.

To arrive at these costs, the study utilized indirect cost estimations based on the assumption of an eight-hour workday, applying the current average hourly wage rate reported by the Bureau of Labor Statistics. The costs were then adjusted to December 2021 U.S. dollars using the medical care component of the Consumer Price Index. This method allowed for the translation of lost workdays into monetary values, reflecting the economic impact of preterm birth on workplace productivity and associated costs due to absenteeism and disability claims.

To assess the economic impact of preterm births on workplace productivity across different states, preterm birth cases from 2014 to 2020 were gathered and analyzed to calculate the yearly state-wide averages of workplace productivity loss, medical-related disability and medical-related absenteeism.

GLOSSARY

Cesarean delivery: A surgical procedure to deliver a baby through incisions made in the mother's abdomen and uterus. It's generally performed when vaginal delivery poses risks to the mother or the baby.

Contraception: Methods or devices used to prevent pregnancy. It includes birth control pills, intrauterine devices (IUDs), condoms and other measures to control fertility. Effective contraception also heavily relies on education and proper use.

Doula: A trained professional who provides continuous physical, emotional and informational support to a mother before, during and shortly after childbirth. They also assist the childbirth process by offering guidance and advocacy, aiming to ensure a positive birthing experience.

Federally Qualified Health Center (FQHC): A community-based health care facility that provides comprehensive primary care services to underserved populations regardless of their ability to pay. FQHCs receive federal funding and follow specific guidelines to serve medically underserved areas or populations.

Hypertension: Commonly known as high blood pressure, hypertension is a medical condition characterized by elevated blood pressure in the arteries, which can lead to various health complications if left untreated.

Medicaid vs. Medicare: Medicaid is a joint federal and state program that provides health care coverage to individuals and families with limited income and resources. Medicare is a federal health insurance program primarily for people aged 65 and older, as well as certain younger individuals with disabilities. Individuals can qualify for both. Reimbursement refers to the process in which the Medicaid program pays providers for delivering health care to Medicaid enrollees.

Midwife: A health care professional, often a certified nurse-midwife (CNM) or certified midwife (CM), who provides care to women during pregnancy, childbirth and postpartum. Midwives focus on supporting natural childbirth and can offer a range of services, including prenatal care, delivery and gynecological care.

Morbidity: The state of being diseased or unhealthy within a population. Maternal morbidity refers to the incidence of illness or injury within pregnant and birthing persons, both during the pregnancy and the weeks following labor and delivery.

Mortality: The rate of death within a specific population or due to a specific cause. Maternal mortality rates refer to the number of deaths amongst pregnant and birthing persons due to complications either caused or exacerbated by pregnancy, either during pregnancy or in the weeks following delivery.

OB vs. GYN: An OB (Obstetrician) is a health care professional specializing in pregnancy, childbirth and postpartum care. A GYN (Gynecologist) focuses on women's overall reproductive health, providing care for the female reproductive system, excluding pregnancy and childbirth. Many providers specialize in both, abbreviated as OBGYNs, but not always.

Perinatal: Relating to the period shortly before and after childbirth, especially describing the weeks before and after delivery. It refers to the time when both the mother and the baby require special medical care and attention.

Postpartum: The period after childbirth, generally up to a year, where recovery from labor and delivery occurs, along with adjusting to parenthood and caring for new life. Postpartum care involves medical check-ups, support and guidance for both the mother and the newborn.

Pregnancy descriptors:

- **Mistimed pregnancy:** pregnancies that occur for mothers who wish to become pregnant, but not at the time that particular pregnancy occurred.
- **Unsure pregnancy:** in this report refers to pregnancies where the pregnant person is unsure of whether or not they wanted to conceive. Beyond the scope of this report, the term is also used to describe pregnancies where the pregnant person is not sure whether or not they are pregnant.
- **Unwanted pregnancy:** pregnancies where the mother did not wish to become pregnant at the time of conception and sometimes in the future as well. This distinction can be important due to the psychological implications of distress for mothers in this situation.
- **Unplanned and unintended pregnancy:** used synonymously for pregnancies where the mother became pregnant unintentionally. The term “unwanted” is sometimes used synonymously with these terms, but unplanned and unintended specifically refer to whether the conception was planned and not whether the pregnant person wishes to have a child at that time or in the future.

Pregnancy risk:

- **High-risk:** A pregnancy with potential complications that could threaten the health of the mother, fetus or both. Factors contributing to a high-risk pregnancy may include advanced maternal age, pre-existing health conditions or pregnancy-related complications. Differentiating between low and high-risk pregnancies has implications for both the scope and kind of care needed to maximize the well-being of mothers and fetuses.
- **Low-risk pregnancy:** A pregnancy where the pregnant person and developing fetus are not facing significant health complications or risks. These pregnancies typically proceed without major medical interventions.

Prenatal: Refers to the period before birth, covering the entire duration of pregnancy. This is often used to describe the care and medical attention provided to a woman during her pregnancy, typically aimed at ensuring the health of both the mother and the developing fetus.

Preventive or Preventative [health] care: Medical services and interventions aimed at preventing illnesses, diseases, or other health problems. This can include vaccinations, screenings, check-ups, counseling and education to maintain overall health and well-being.

Social Determinants of Health (SDOH): The conditions in which people are born, live and work that impact their overall health and well-being. SDOH include factors like socioeconomic status, education, neighborhood, physical environment, employment, social support networks and access to health care.

Telehealth: The use of digital communication technologies (such as video calls, phone calls or secure messaging) to provide health care services remotely. Telehealth allows patients to consult with health care professionals, receive medical advice and access care without in-person visits.

ENDNOTES

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- ² Ayten Bilgin, Marina Mendonca, Dieter Wolke; Preterm Birth/Low Birth Weight and Markers Reflective of Wealth in Adulthood: A Meta-analysis. *Pediatrics* July 2018; 142 (1): e20173625. 10.1542/peds.2017-3625 <https://publications.aap.org/pediatrics/article-abstract/142/1/e20173625/37468/Preterm-Birth-Low-Birth-Weight-and-Markers?redirected-From=fulltext>
- ³ Patel VP, Davis M, Li J, Hwang S, Johnson S, Kondejowski J, Croft D, Rood K, Simhan HN. Workplace Productivity Loss and Indirect Costs Associated With Preterm Birth in the United States. *Obstet Gynecol.* 2024 Jan 1;143(1):23-34. doi: 10.1097/AOG.0000000000005404. Epub 2023 Oct 17. PMID: 37851518; PMCID: PMC10715688.
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- ⁵ Blakstad MM, Perumal N, Bliznashka L, Lambiris MJ, Fink G, Danaei G, et al. (2022) Large gains in schooling and income are possible from minimizing adverse birth outcomes in 121 low- and middle-income countries: A modelling study. *PLOS Glob Public Health* 2(6): e0000218. <https://doi.org/10.1371/journal.pgph.0000218>
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- ⁷ Callan, G, “Willmar doctor shares how first-of-its-kind program is addressing dearth of OB-GYN care in rural America”, Oct. 27, 2021, <https://kstp.com/kstp-news/top-news/willmar-doctor-shares-how-first-of-its-kind-program-is-addressing-dearth-of-ob-gyn-care-in-rural-america/>
- ⁸ This is supported by recent research, including: United States Government Accountability Office (2022), *Maternal Health: Availability of Hospital-Based Obstetric Care in Rural Areas*, pgs. 14 - 16. Available at <https://www.gao.gov/assets/gao-23-105515.pdf>.
- ⁹ FQHCs meet the following criteria: qualify for funding under Section 330 of the Public Health Service Act (PHS); qualify for enhanced reimbursement from Medicare and Medicaid;* serve an underserved area or population; offer a sliding fee scale; provide comprehensive services (either on-site or by arrangement with another provider), including: preventive health services, dental services, mental health and substance abuse services, transportation services necessary for adequate patient care, hospital and specialty care; have an ongoing quality assurance program and have a governing board of directors.
- ¹⁰ [https://www.ruralhealthinfo.org/topics/federally-qualified-health-centers#:~:text=Over%209.6%20million%20rural%20residents,Primary%20Health%20Care%20\(BPHC\)](https://www.ruralhealthinfo.org/topics/federally-qualified-health-centers#:~:text=Over%209.6%20million%20rural%20residents,Primary%20Health%20Care%20(BPHC))
- ¹¹ CDC. (2022, September 19). Four in 5 pregnancy-related deaths in the U.S. are preventable. CDC; Centers for Disease Control and Prevention. <https://www.cdc.gov/media/releases/2022/p0919-pregnancy-related-deaths.html>
- ¹² Substance Abuse and Mental Health Services Administration. (2020). Key substance use and mental health indicators in the United States: Results from the 2019 National Survey on Drug Use and Health (HHS Publication No. PEP20-07-01-001, NSDUH Series H-55).
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- ¹⁶ Andrea Nove, Ingrid K Friberg, Luc de Bernis, Fran McConville, Allisyn C Moran, Maria Najjemba, Petra ten Hoope-Bender, Sally Tracy, Caroline S E Homer (2020), Potential impact of midwives in preventing and reducing maternal and neonatal mortality and stillbirths: a Lives Saved Tool modeling study, *The Lancet Global Health*. Available at: [https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(20\)30397-1/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30397-1/fulltext)
- ¹⁷ <https://nursing.ohio.gov/about-us/advisory-groups-and-committees/06-doula-advisory-board>
- ¹⁸ <https://medicaid.ohio.gov/families-and-individuals/citizen-programs-and-initiatives/maternal-and-infant-support/maternal-and-infant-support>
- ¹⁹ <https://grc.osu.edu/About>
- ²⁰ Saxon, J., & Snow, D. (2020). A rational agent model for the spatial accessibility of primary health care. *Annals of the American association of geographers*, 110(1), 205-222.

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DATA RESOURCES:

- National Center for Health Statistics - National Vital Statistics System
- Centers for Medicare & Medicaid Services Data
- Internal Revenue Service - Standard mileage rates
- US Bureau of Labor Statistics
- Mississippi State Board of Medical Licensure
- Arkansas State Medical Board
- CovidCareMap <https://www.covidcaremap.org/>
- U.S. Department of Health & Human Services <https://findtreatment.gov>



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