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Infant Mortality in Alabama: Examining Ongoing Rural Labor and Delivery Unit Closures and Their Effects on Urban Hospitals

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Abstract

Alabama consistently reports some of the nation's highest infant mortality rates; the state is among the worst in the country, with rates well above the national average. This is often seen in areas identified as maternity care deserts, where no hospital or birth center offers obstetric care, and no obstetric providers are available within the limits of that county. The purpose of this study is to demonstrate that increasing rural hospital closures negatively impacts infant mortality rates not only in rural areas but also in otherwise well-equipped, higher income urban and suburban regions that serve rural patients. Using established databases, county-level infant mortality outcomes were correlated with key demographic factors, such as per capita income, maternal vulnerability, and hospital location. Over a five-year period, key population risk factors, such as distance to a hospital, social vulnerability, and patient insurance status, were compared to visualize their impact on infant mortality. This study found that lower income areas exhibited higher maternal vulnerability scores and limited access to adequate healthcare and prenatal resources. Nearly one in three women in Alabama began prenatal care after the first trimester or received inconsistent care throughout their pregnancy. However, infant mortality rates increased the most in higher income counties. This rise is attributed to patients living in close proximity to closing rural hospitals traveling to larger urban facilities for delivery, a pattern consistent with evidence that women in Alabama's maternity care deserts travel more than twice as far for care as those in areas with full access. The financial strain leading to rural hospital closures forces this travel, negatively affecting infant outcomes for mothers who received inadequate prenatal care and compounding preexisting disparities, including higher infant mortality among babies born to African American mothers. Infant mortality rates in otherwise seemingly well-equipped counties are increasing due to rural hospital shutdowns and the scarcity of resources available to populations residing in underserved areas. A limitation of this study is the difficulty in tracking patient travel, specifically, distinguishing between travel solely for birth vs. travel for varying degrees of prenatal care. Limited access to resources in rural areas makes it difficult for patients to receive necessary care during pregnancy, negatively impacting the health of their infants and contributing to Alabama's infant mortality rates, which remain unacceptably high despite modest statewide improvements over the last decade.

Categories: Obstetrics/Gynecology, Public Health, Preventive Medicine
Keywords: infant mortality rates, limited prenatal care, maternal care desert, medicaid-insured mothers, social determinants of health (sdoh), travel distance

Introduction And Background

The United States reports one of the highest infant mortality rates among developed nations [1]. The incidence of maternal mortality in America has continued to rise since the early 2000s. Maternal health and infant survival declined sharply during the COVID-19 pandemic as healthcare access became even more limited [2]. In the years since, maternal health outcomes have not improved; they have continued to worsen, and this decline has coincided with a growing number of hospital closures [3]. The state of Alabama consistently ranks among the top three states for the highest infant mortality rates. In 2024, Alabama had the third highest infant mortality rate in the country at 7.64 per 1,000 live births, with the national average being 5.61 [4]. Of the 20,162 infant deaths that occurred in the United States in 2023, 442 of these occurred in Alabama. There are many factors that go into maintaining a healthy pregnancy and birthing a healthy infant, many of which revolve around obtaining proper access to necessary health resources, a common barrier in rural Alabama [5,6]. These factors are commonly defined as social determinants of health (SDOH), which are used by many organizations to determine the health of a population as a whole and provide tailored educational resources where possible [7].

Approximately one-third of the counties in Alabama are considered maternal care deserts. This is defined as any county lacking a birthing center and without obstetric providers available to care for the population's residents, a classification that two-thirds of rural Alabama counties fall under [8]. Over one-fourth of women are not within a 30-minute drive to a birthing center, increasing the time needed to receive emergent care when delivery is imminent, and making the recommended minimum 13 prenatal care visits more challenging for rural mothers to attend [5,8]. This also complicates postpartum care. When patients have

trouble traveling to their providers, continuity of care often suffers. Complications during this critical period may then be caught late or missed entirely. The number of counties in Alabama considered maternal care deserts is projected to increase within 2026 as more birthing centers are filing for closure due to lack of necessary funding [3,9]. Much of this stems from rural birthing centers' heavy reliance on Medicaid, which can reduce or withdraw funding based on poor performance scores, including tracking the number of prenatal visits and delivery complications [9,10]. This has an influence on Medicaid payments under its quality- and value-based program. When appropriate levels of care are not reached, not only Medicaid reimbursement but also patient outcomes are affected [10]. Other factors driving these closures include low Medicaid reimbursement rates, high workforce costs, and the greater financial vulnerability of rural hospitals in general. This vulnerability has several causes: lower patient volume, increased amount of improperly reimbursed care, and staffing and facility costs that are hard to sustain [3,9,11]. The result is a self-reinforcing cycle. Together, these pressures are closing both birthing centers and entire hospitals. Each closure weakens rural health care further, and ongoing Medicaid cuts put these populations at even greater risk [3,11].

Medicaid covers many births that occur throughout the nation for those that qualify within the published income brackets; in Alabama, the Alabama Coordinated Health Network released guidelines through the presumptive eligibility for pregnancy notion that ensures Alabama mothers get appropriate coverage during their pregnancy [12]. The guidelines state that the coverage begins immediately once a medical provider trained in Alabama Medicaid Agency regulations confirms the pregnancy [12]. However, coverage does not equal access. It is important to note that though a patient may be approved and carry a Medicaid status, if they are unable to travel to a facility to receive care, they cannot utilize the coverage. Federal legislation could also help address these barriers through increased transportation services and even Telehealth options within the prenatal period. The proposed Rural Obstetrics Readiness Act would fund grants to expand Telehealth support and obstetric emergency training in rural hospitals that no longer have labor and delivery units. The bill has not yet become law. It reflects a persistent problem: even though Medicaid coverage has expanded, many mothers still struggle to reach facilities that can care for them properly [13].

SDOHs in each area are examined to assess this risk and to identify where the lack of appropriate health resources is greatest. The World Health Organization defines SDOHs as "the conditions in which people are born, grow, live, work and age, and people's access to power, money and resources" [7]. The driving factors of these SDOHs that influence infant mortality the most are chronic conditions, fertility rates, health insurance coverage, availability of obstetric clinicians, travel time to care, and availability of hospital and birthing centers [7,8]. These are further assessed using data from the March of Dimes (MOD), a U.S. nonprofit dedicated to improving maternal and infant health through research, education, and advocacy, with goals of ending preventable maternal and infant deaths and closing health equity gaps [8]. MOD then identified several key determinants, state and federal policies that had some major impacts on infant mortality nationwide. This review examines the remaining birthing centers in rural areas and the travel times to urban birthing centers with available obstetric clinicians. It also evaluates health insurance coverage at the time of care, comparing the proportions of patients with private insurance, with Medicaid, and without insurance. The goal is to determine if the type of insurance coverage correlates with the amount of prenatal care received and how travel to the few remaining birthing centers affects infant mortality among low-income families.

Access to timely obstetric care during pregnancy and the postpartum period, along with adequate insurance coverage, are critical factors in promoting a healthy pregnancy that does not develop into one classified as high risk [5]. A high-risk pregnancy is defined as a state of pregnancy that carries an increased chance of adverse outcomes to the mother, fetus, or both, also considering the lifestyle choices and demographics of the mother alongside pertinent SDOHs [8]. The American College of Obstetricians and Gynecologists emphasizes the importance of individualized care that is tailored to addressing the SDOHs that most greatly impact each patient's case. Identifying the overlap between social risks and clinical risks is crucial for creating a care plan that most appropriately addresses the risk factors that are most significantly affecting each pregnancy [5]. The high infant mortality rate in Alabama cannot be attributed to any single factor but rather to the compilation of the aforementioned factors that create an increasing difficulty for mothers in rural areas to access the level of prenatal care necessary to decrease risks for their pregnancy and birth.

Using data collected by the Alabama Department of Public Health, infant mortality rates at the county level were examined against known SDOHs that create risk for pregnancy. The main factors were per capita income by county, maternal vulnerability scores, social vulnerability scores, and driving distance to the nearest hospital with a birthing center. Rural vs. urban classifications were made based on accepted Centers for Disease Control and Prevention guidelines of population sizes, and maternal care deserts were identified by MOD classifications within these areas [8,14]. This was done retrospectively during the five-year period from 2019 to 2023. These data were then compared with the percentage of each county's residents covered by Medicaid to assess the relationship between Medicaid coverage and infant mortality (infant deaths per 1,000 live births). Each factor was then mapped by county and displayed side by side with county infant mortality rates to visualize how each factor corresponds to infant mortality.

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Review

As of 2023, the Alabama Department of Public Health reported 7.4 infant deaths per 1,000 live births; some counties remained unreported to the department, accounting for the slight discrepancy from the Centers for Disease Control and Prevention calculation of 7.64, as shown in Figure *1* [15]. SDOHs such as structural inequality, low socioeconomic status, and lack of access to care are large contributors to increased rates of preterm labor, infant mortality, and poor maternal health [7]. These factors influence timely initiation of prenatal care, consistent visit attendance, and access to high-risk services when necessary. This study compares data based on three pertinent social factors, including travel time to care displayed in Figure *2* [8], Medicaid coverage displayed in Figure *3* [16], and the availability of prenatal care within the state of Alabama displayed in Figure *4* [8]. Medicaid coverage was chosen, as it covers approximately 50% of all yearly births within Alabama and is the most common health care coverage system for rural Alabamians; 48.1% of Alabama's rural population is eligible/utilizing Medicaid, and 16.4% has no health insurance coverage [17]. Meaning nearly half of Alabama's rural population, which all reside in maternal care deserts, utilizes Medicaid; however, Medicaid reimbursement in Alabama is among the lowest in the nation, with average per-enrollee spending at 66.7% of the national average [9]. An interesting set of trends can be noted within the figure shading. The areas displayed as having the highest infant mortality rates, as shown in Figure *1*, are the same areas that are shown to display the lowest travel time to care and the lowest Medicaid coverage throughout the state, areas that are not defined as maternal care deserts. However, the inverse is also displayed, where the identified maternal care deserts that display the largest travel time to care and the most extensive coverage under Medicaid are recording lower infant mortality rates at the birthing centers within those counties. This is due, largely in part to birthing centers' reliance on Medicaid funding to keep birthing centers functional [9,17].

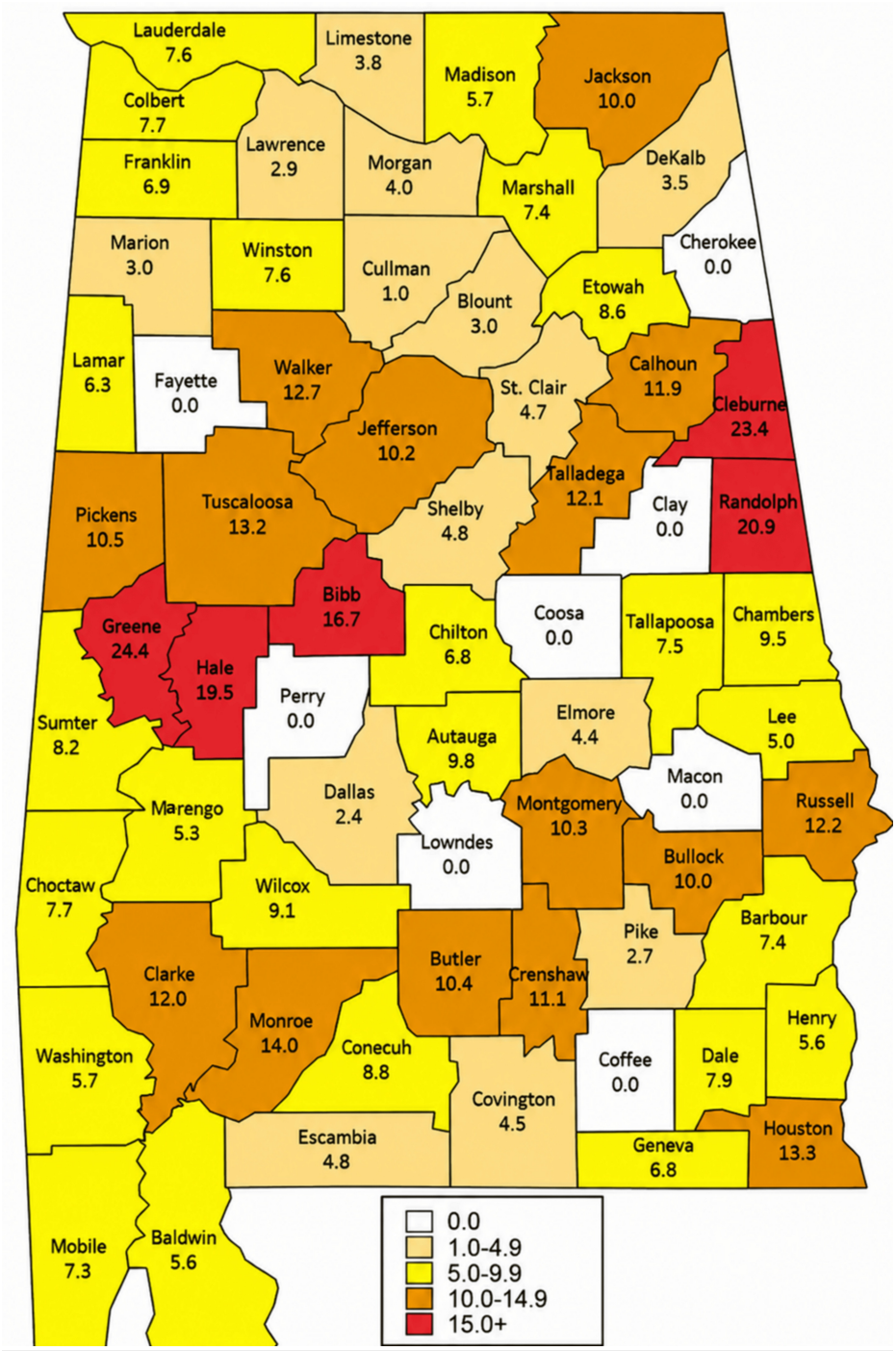


FIGURE 1: 2023 infant mortality rates by county in Alabama

Source: Adapted with permission from the Alabama Department of Public Health [15]

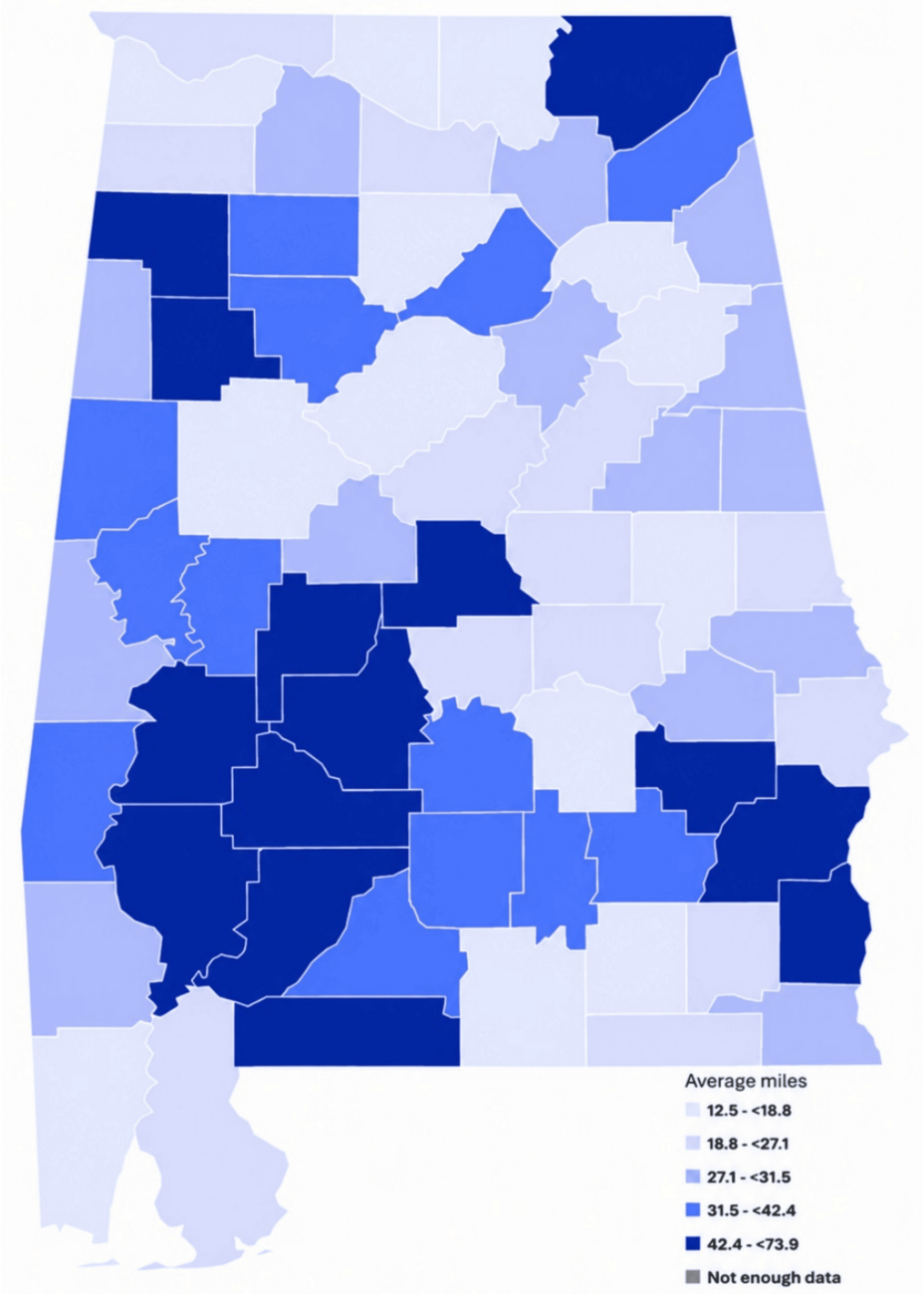


FIGURE 2: Distance to birthing hospital by county in Alabama

Source: Adapted with permission from the March of Dimes [8]

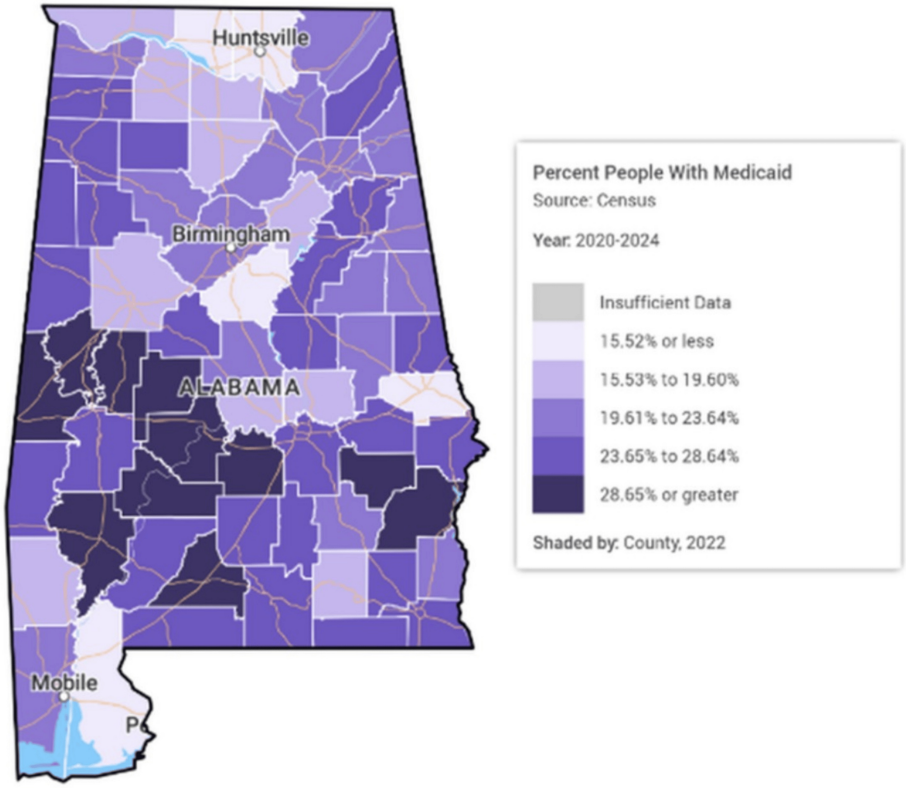


FIGURE 3: Percent of people that the Centers for Medicare and Medicaid Services reported as utilizing Medicaid by County in Alabama from 2020 to 2024

Source: This is an original image created by the authors based on the data from [16]

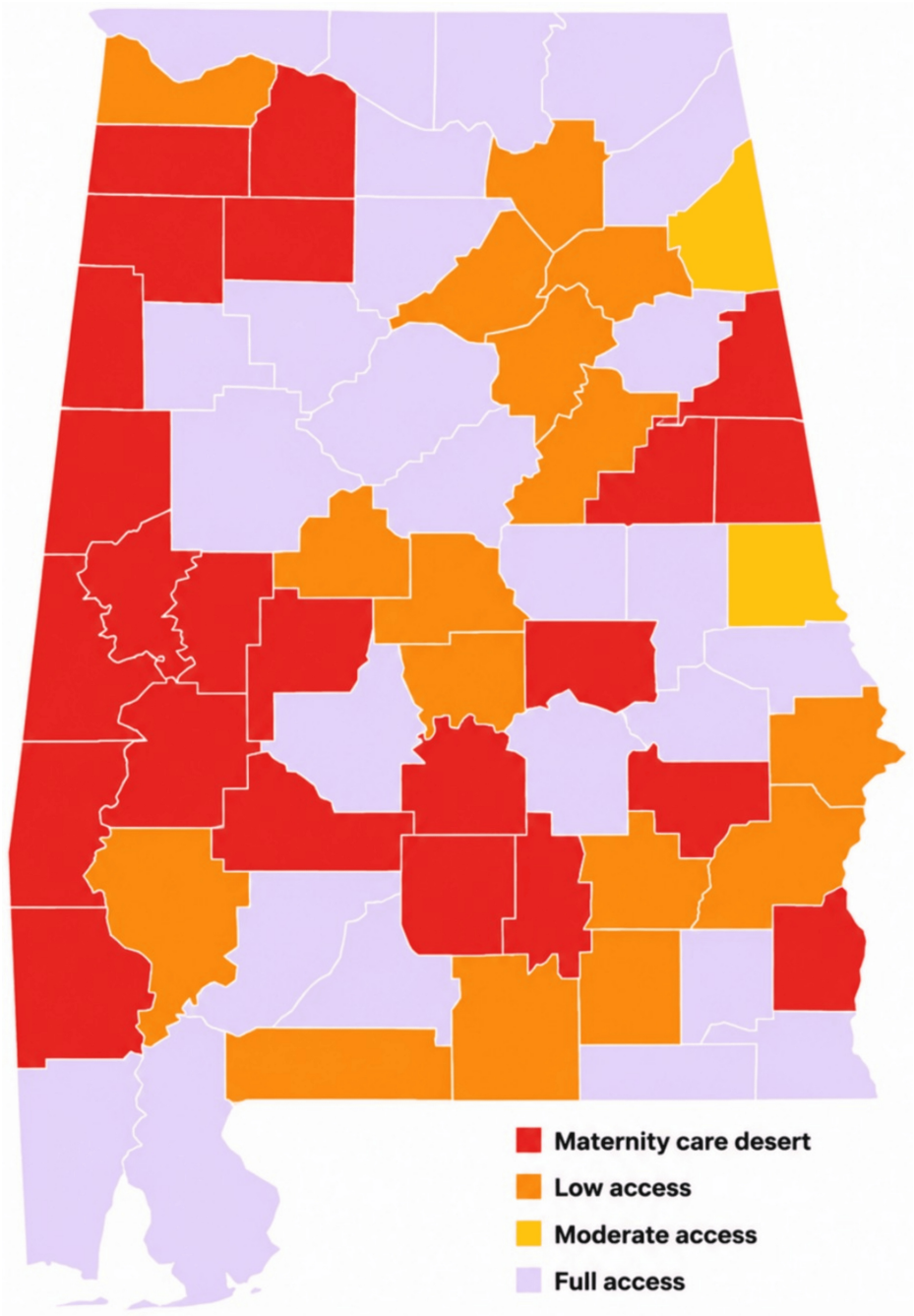


FIGURE 4: Defined maternity care deserts and low healthcare access areas by County in Alabama as of 2023

Source: Adapted with permission from the March of Dimes [8]

The amount of funds provided by Medicaid to rural birthing centers is already among the lowest in the nation, which, in combination with the amount of care provided to any uninsured patients that goes without reimbursement, creates a large financial burden, making it difficult to maintain the level of care needed to serve the population [18]. The funding provided is determined on a performance-based sliding scale, meaning that with better patient outcomes and compliance with screenings and follow-up care, a facility receives more funding [9]. Factors that go into helping combat causes of increased mortality rates and keep a pregnancy healthy. When the reported infant mortality rate of a facility increases, its score is negatively affected, and the amount of federal funding it receives decreases. Rural populations are at an increased risk of negative birthing outcomes as they are often unable to access an adequate level of care and screening to be considered a low-risk pregnancy. The initiation and consistency of prenatal care directly correlates with the risk of neonatal defects, preterm birth, and complications during pregnancy [19]. All of these are used to create a maternal vulnerability score that is used to label a pregnancy as high risk or not. This index

considers general, reproductive, mental and physical health, as well as the physical environment and socioeconomic status of each area [20]. All components that coincide with the SDOHs are considered to most influence infant mortality rates as well [21].

In 2022, nearly one in three women in Alabama began prenatal care after the first trimester or received inconsistent care throughout their pregnancy. While in that same year, 89.9% of mothers in rural areas of Alabama and 26% of mothers in urban areas of Alabama traveled more than 30 minutes to reach a birthing facility [8]. Of the 52 rural hospitals in Alabama, only 15 have labor and delivery units, and three more are at risk of closing in 2026 [3]. This is attributed to several key factors that create a compounding cycle that results in federal funding being pulled from rural hospitals, thus forcing a shutdown of their labor and delivery units. This study found that maternity care deserts, where access to adequate obstetric care and other prenatal resources is limited throughout pregnancy, had the highest maternal vulnerability scores [21]. However, these counties did not have the highest infant mortality rates. Instead, infant mortality was highest in higher income counties. This may be because rural areas lack birthing centers, which forces mothers to travel to hospitals in other counties to give birth [3]. Routine admission meetings with mothers lacking prenatal care often revealed pregnancy complications that were too advanced for any treatment other than delivery and crisis management [22].

The increased travel and the number of births occurring at larger urban facilities are resulting in a large increase in the mortality and complication rates used for scoring to receive federal funding. Due to an increased number of medically complex pregnancies, whether due to lack of appropriate screening or prenatal care, delivering at these facilities and affecting their mortality rates [18]. This demonstrates that though these facilities have all necessary prenatal resources and providers, and are providing the standard of care necessary to screen and maintain a healthy pregnancy, their infant mortality rates are continuing to increase [22]. This puts these large urban facilities at risk of losing federal funding because of poor performance scores, even as rural birthing center closures increase their patient populations and their need for funding. A limitation of this study is found in the ability to track the purpose of patient travel, specifically whether some patients can travel for any level of prenatal care vs. if they can travel only to give birth. However, the trends suggest that these patients are not traveling to the recommended average of 13 visits during a pregnancy, even if they do complete at least one prenatal visit [7]. Financial strain has led to rural birthing center closures, forcing patients to travel to major cities for labor and delivery. As a result, urban hospitals see an increased number of medically complex patients that they did not have the opportunity to manage previously.

Looking forward, subsequent comparison of similar SDOH factors and their effect on maternal vulnerability and mortality could be examined both on a state and a nationwide level. Running a comparison between the amount of prenatal care received and the outcomes of birth, mortality/complications, and factoring in insurance status to determine which factors contribute more than others to the infant mortality rate is of interest as well. Examination of the effects of Alabama's Rural Health Transformation Program (approved December 2025), in conjunction with the Transforming Maternal Health Program, is of high interest once in effect. The projected funding allocated from the Centers for Medicare and Medicaid Services has the goal of increasing access to care by dispersing digital tools to rural facilities to establish connections with maternal-fetal medicine specialists via Telehealth communication [23]. Future research will identify the county-level factors that contribute most to maternal mortality and adverse infant health outcomes. These findings will inform the development of a free, publicly accessible online database of Alabama Department of Public Health-approved prenatal resources. The database will also provide guidance on obtaining prenatal vitamins and other nutritional support at minimal cost and identifying services to reduce travel burden to obstetric providers and birthing centers. In collaboration with local public health officials, this initiative aims to improve resource distribution and address the specific needs of each community. By improving access to prenatal resources and combating barriers to transportation, these measures may help reduce infant mortality and support the establishment of adequately resourced maternity care facilities.

Conclusions

There is no single factor responsible for Alabama’s substantially elevated infant mortality rate; rather, it is the result of a multifactorial process in which the SDOH create care barriers and collectively increase the risk of adverse maternal and neonatal outcomes during pregnancy and the postpartum period. Approximately one-third of Alabama counties are classified as maternal care deserts, leaving a significant proportion of pregnant individuals with limited access to essential prenatal and obstetric services. The loss of Medicaid funding and subsequent closure of birthing centers in rural communities further intensify these disparities by increasing the distance patients must travel to receive prenatal care and delivery. These barriers can interfere with patients receiving care at the recommended intervals for prenatal care, limiting opportunities for early identification and management of complications. When patients are transferred to larger regional hospitals for delivery or management of complications, any resulting infant death is recorded in that hospital's county. Yet these hospitals might have provided adequate care had the patient been under their care throughout pregnancy. This cycle illustrates how gaps in rural healthcare infrastructure can worsen disparities impacting maternal and infant outcomes. Addressing Alabama’s infant mortality crisis therefore requires interventions that target the underlying determinants of health that limit access, with an emphasis on expanding equitable and accessible prenatal and obstetric care early in pregnancy.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Skylar E. Nollenberger, Erin K. Ussery

Acquisition, analysis, or interpretation of data: Skylar E. Nollenberger, Erin K. Ussery, Jonathan Payne

Drafting of the manuscript: Skylar E. Nollenberger, Erin K. Ussery

Critical review of the manuscript for important intellectual content: Skylar E. Nollenberger, Erin K. Ussery, Jonathan Payne

Supervision: Jonathan Payne

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