Improving Access to Maternal Health Care in Rural Communities

ISSUE BRIEF

CMS
CENTERS FOR MEDICARE & MEDICAID SERVICES

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1. EXECUTIVE SUMMARY

Across the country and at every level of government there has been a growing focus on rural health. At the same time, rising maternal mortality rates and the disproportionate affect they have on Black, American Indian, and Alaska Native women is of great concern. Rural maternal health care is therefore an administration priority and the Centers for Medicare & Medicaid Services (CMS) has been focused on improving rural maternal health outcomes. Specifically, CMS has aligned health policies to its Rural Health Strategy and its new Rethinking Rural Health Initiative, released its first Medicaid and Children's Health Insurance Program (CHIP) Scorecard to evaluate state progress on maternal health outcomes, and is preparing to implement the recently enacted Improving Access to Maternity Care Act and Preventing Maternal Deaths Act. This issue brief was developed by CMS to provide background information on the scope of this problem and to focus attention on the need for national, state, and community-based organizations to collaborate on developing an action plan to improve access to maternal health care and improve outcomes for rural women and their babies.

A lack of access to high quality maternal health services in rural communities is the result of many factors including hospital and obstetric department closures, workforce shortages, and access to care challenges arising from the social determinants of health which have contributed to disparities in maternal health care for rural women and their babies. These access challenges can result in a number of negative maternal health outcomes including premature birth, low-birth weight, maternal mortality, severe maternal morbidity, and increased risk of postpartum depression. These health disparities affect American Indian and Alaska Native and women of color disproportionately. Since one in five Americans live in a rural community, including approximately 18 million women of reproductive age, it is critical that federal, regional, state, local agencies and communities work together to improve access to high quality maternal health services in rural communities.

Hospital closures: Since January 2010, more than 100 rural hospitals have closed, with a disproportionate share occurring in the South. Multiple factors contributed to these closures. Among them were higher rates of uninsured patients, large amounts of uncompensated care, financial distress, hospital size, and community poverty rates. Between 2004 and 2014, 179 rural counties lost or closed their hospital obstetric services. Consequentially, fewer than 50% of rural women have access to perinatal services within a 30-mile drive from their home and more than 10% of rural women drive 100 miles or more for these services. These conditions affect access to care before, during, and after pregnancy and are more pronounced in the Black and Hispanic communities, and disproportionately affects low-income women.

Access to care: Before pregnancy the health and wellness of a woman is critical to achieving safe outcomes for her and her baby. Access to care is vital during this period because it allows providers to identify, treat, and stabilize chronic conditions; address behavioral health needs; and, plan for a healthy and intentional pregnancy. During pregnancy a woman's need for access to maternal health services increases. Prenatal care can reduce the risk of pregnancy complications for both the mother and child. After pregnancy women must establish or reestablish their well-woman care. At each point along this continuum women in rural communities experience challenges and barriers.

Insurance coverage: Medicaid is the nation's single largest payor of perinatal care and is especially important in rural areas. In 2017, Medicaid paid for 43% of all births in the United States (1.7 of the 3.9 million births) and an estimated 50-60% of births in rural areas.[1,2] However, many women covered by Medicaid lose their coverage 60 days postpartum. This loss of health coverage increases the likelihood that these women will receive inadequate or no health services, increases their risk of morbidity and

mortality, and increases their likelihood of receiving no support for conditions that emerge after the 60-day period. However, the loss of Medicaid eligibility is a qualifying event to enroll in Exchange coverage, and the president's 2020 budget proposes giving states the authority to allow mothers with substance abuse disorder to stay eligible for Medicaid for one year after giving birth.

Workforce supply and distribution: Maternal health care is delivered by a vast array of providers—specialty providers; primary care providers, including advanced practice nurses; nurses; community health workers; and doulas. Each of these health care professionals plays a critical role in providing maternal health care before, during, and after pregnancy. However, there is a shortage of maternal health care providers in rural and urban areas. By 2020, it is estimated that the US will have a shortage of 6,000-8,800 obstetricians and gynecologists (OB-GYNs) with a projected increase in that shortage to 22,000 by 2050. The shortage is more severe in rural areas, where many counties do not have a practicing OB-GYN. Although family physicians are the largest group of rural obstetrical providers, midwives are another important source of maternal health services in rural areas.[3] While midwives currently attend less than 10% of all births in the US, they attend over 30% of deliveries in rural hospitals. There are still barriers to the practice of midwifery across the country even though midwifery has proven to be a safe and cost-effective mode of maternal health care.[4, 5, 6] Although some states have limits on the services covered, all states provide coverage of certified nurse midwife services through Medicaid. In contrast, many private insurance plans do not cover services provided by midwives or offer only limited coverage. Other providers that deliver critical services to women before, during, and after pregnancy, including behavioral health providers and dentists, are also difficult to access in rural communities.

The lack of adequate, high quality maternal health care in rural communities has led many rural communities to find creative and innovative solutions to address some of the maternal health care delivery challenges in their communities. These innovative solutions include opportunities to improve access to a skilled maternal health workforce by expanding training of maternal health providers in rural areas, incentivizing maternal health providers to practice in rural areas, leveraging the existing health care workforce, and standardizing scope of practice laws for maternal health providers. Some programs are working to make maternal health care more affordable by paying for the cadre of maternal health providers, expanding and extending insurance coverage, unbundling postpartum services, and establishing accountable care organizations covering maternal health services. Others have implemented programs to increase access to risk-appropriate, quality care; to establish frameworks for high-quality care; and, to address patient -centered care and care coordination. By working together to ensure widespread dissemination and adoption of these programs, we will move closer to ending the gap in maternal health disparities and ensure that all rural women and their babies have better maternal health outcomes.

2. INTRODUCTION

In an ideal maternal health system, all women would have access to comprehensive, seamless medical care with links to behavioral, economic, and social supports. Additionally, they would be engaged with this system before, during, and after pregnancy. Across the United States, many women are not receiving care in this ideal system, and women in rural communities face unique challenges that make it harder for them to reach this ideal or any care at all in some cases. Because maternal health care is a growing concern in rural America, rural maternal health care is an administration priority and the Centers for Medicare & Medicaid Services (CMS) has been focused on improving rural maternal health outcomes.

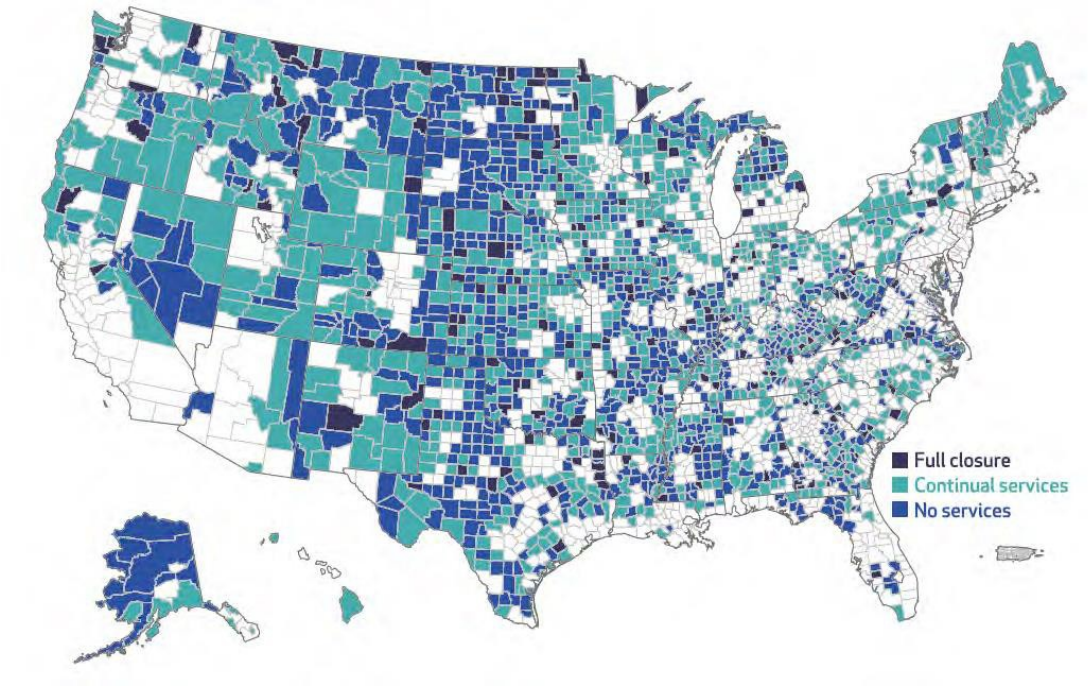
As part of its Rethinking Rural Health Initiative, CMS released its first Rural Health Strategy in 2018. By applying a rural lens, CMS works to have new health policies and initiatives positively impact rural communities. As an example, the agency finalized improvements to the accuracy of Medicare payments to low wage hospitals so they can increase what they pay their workers, and help ensure patients including those living in rural areas, continue to have access to high-quality, affordable healthcare.[7] Other CMS rural and maternal related activities have included, the recent release of the first Medicaid and CHIP Scorecard to evaluate state progress on health outcomes and determine return on investment. The Scorecard includes a measure related to postpartum care and may eventually include other maternal and infant health outcomes. Furthermore, CMS looks forward to implementing the newly enacted Improving Access to Maternity Care Act, which ensures that the National Health Service Corps sends OB-GYNs to areas of greatest need, as well as the Preventing Maternal Deaths Act, which authorizes the Centers for Disease Control and Prevention (CDC) to support state and tribal maternal mortality review committees (MMRCs).

Although CMS has made great strides to improve rural maternal and child health outcomes, there is still much to be accomplished. CMS developed this issue brief to increase understanding and awareness of the difficulties women in rural communities face and to highlight the need for a coordinated and collaborative development of a strategic plan to improve access to maternal health care and health outcomes. This issue brief focuses on access to care for women in rural communities before, during, and after pregnancy. It provides an overview of the challenges they encounter accessing maternal health care, describes opportunities to address these challenges within the maternal health system, and provides examples of programs that are overcoming barriers to improve access and quality in rural maternal health care.

Since January 2010, more than 100 rural hospitals have closed, with a disproportionate share occurring in the South.[8, 9] These closures were the result of multiple factors including higher rates of uninsured residents, higher amounts of uncompensated care, financial distress, hospital size, and community poverty rates.[10, 11] Although many rural hospitals remain open, some have discontinued certain specialty service lines, including obstetric and gynecologic services. Between 2004 and 2014, 179 rural counties experienced closures/loss of hospital obstetric services (Figure 1).[12] Also during this time, more than half of the rural counties in the US either had no hospital obstetric services or lost them (Appendix A).[13] Low birth volumes, low revenue levels due to payor mix (e.g., high rates of Medicaid coverage), difficulty recruiting and maintaining skilled maternal health care providers (e.g.,

obstetricians, labor and delivery nurses, obstetric anesthetists), and concerns regarding the high cost of malpractice insurance have all contributed to obstetric unit closure in rural hospitals.[i]

Figure 1. Hospital Obstetric Services in Rural Counties, 2004–2014



Source: P Hung, C Henning-Smith, M Casey, and K Kozhimannil. Access to Obstetric Services in Rural Counties Still Declining, With 9 Percent Losing Services, 2004–14. Health Aff (Millwood). 2017 Sep 1; 36(9): 1663-1671.

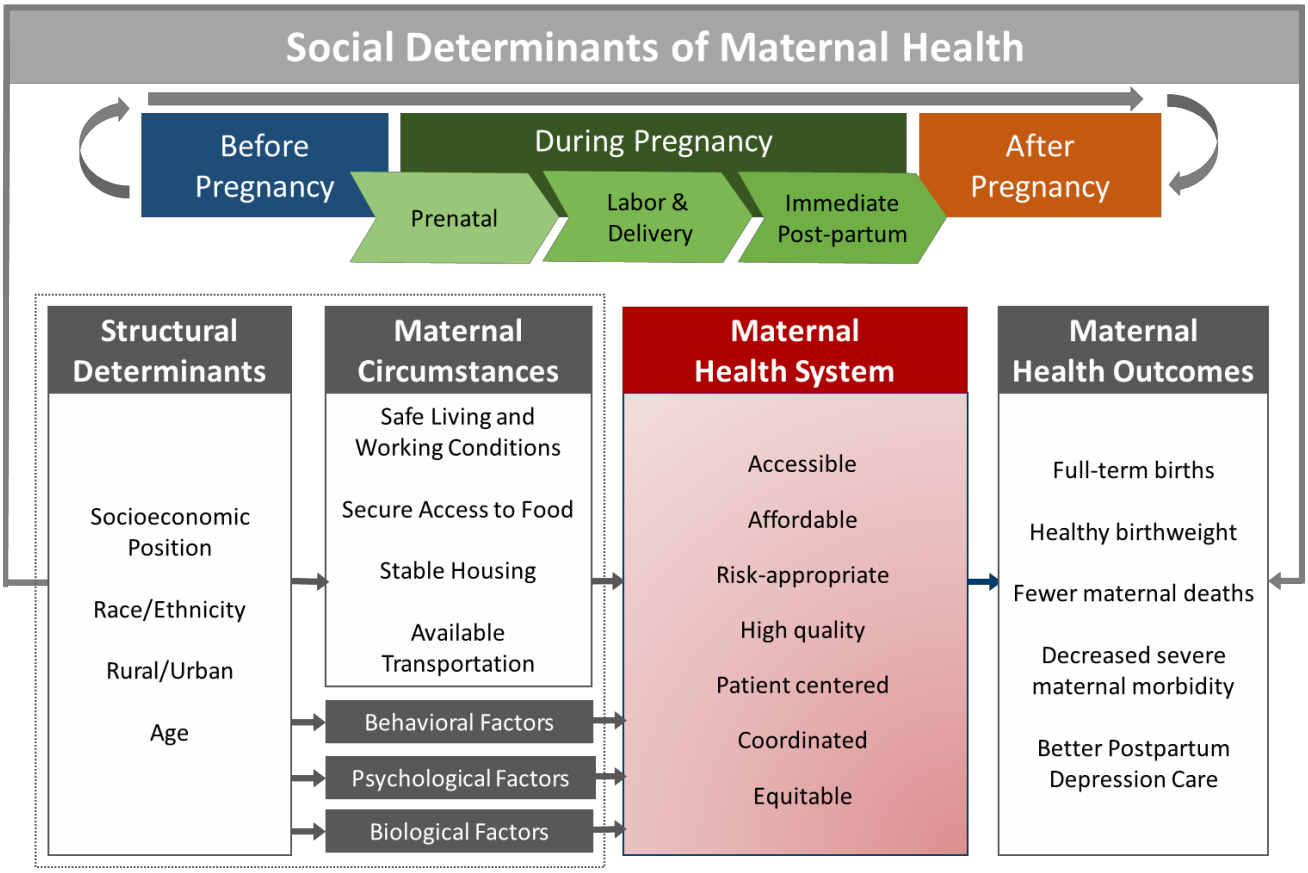
These closures and resulting lack of services have affected rural women's access to and timeliness in receiving maternal health care. Nearly half of all rural counties in the US do not have a hospital with obstetric services.[14] Subsequently, fewer than 50% of rural women have access to perinatal services within a 30-minute drive of their homes, and more than 10% of rural women drive 100 miles or more for such services.[15] Additionally, linkages to behavioral health care and social services that help promote healthy pregnancies and healthy outcomes for rural women are inadequate.[16, 17] These challenges are greater for racial and ethnic minority women living in rural communities, as closures were more likely to occur in communities with a higher percentage of Black, Hispanic, and unemployed residents.[18]

These gaps in maternal health care clearly affect access to labor and delivery services, but they also affect access to care before, during, and after pregnancy, and comprise one set of factors associated with a range of infant and maternal health outcomes in rural America, such as maternal mortality. The CDC defines pregnancy-related deaths as the death of a woman while pregnant or within 1 year of the end of a pregnancy –regardless of the outcome, duration or site of the pregnancy–from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.[19] Using maternal mortality as one proxy for overall maternal health, there are 29.4 maternal deaths per 100,000 in the most rural areas versus 18.2 in urban areas.[20] Social factors such as income,

[i] There are multiple definitions of rural in use across the federal government. In this issue brief, we define rural as counties classified by the Office of Management and Budget (OMB) as micropolitan (statistical areas have a population of 10,000 or more but less than 50,000) and nonmetropolitan (areas outside of Core Based Statistical Areas).

education, housing, food, transportation and social support, commonly referred to as the social determinants of health, also affect a wide range of health, functioning, and quality-of-life outcomes and risks. Addressing social determinants of health may be especially difficult in rural areas, which tend to have fewer educational and job opportunities, older housing, and limited access to healthy foods. These factors and a lack of access to health services contributes to disparities in health.[21,22,23] Figure 2 provides a social determinants of health framework that illustrates how maternal health is a result of the structural, behavioral, biological, psychological, systemic, and socioeconomic circumstances that operate across a woman's life and across generations. It also illustrates the critical role the maternal health care system plays in mitigating risk and affecting outcomes. Ideally, maternal health care is: risk-appropriate; delivered by a skilled workforce; coordinated or integrated with behavioral, economic, and social supports; affordable for mothers, and families; and equitable.

Figure 2. Social Determinants of Maternal Health



Sources: Manyazewal, T. Using the World Health Organization health system building blocks through survey of healthcare professionals to determine the performance of public healthcare facilities. Archives of Public Health. 2017 Dec;75(1):50. | Solar, O, Irwin, A. A Conceptual Framework for Action on the Social Determinants of Health. Social Determinants of Health Discussion Paper 2 (Policy and Practice). Retrieved from: https://www.who.int/sdhconference/resources/ConceptualframeworkforactiononSDH_eng.pdf.

3. ACCESS TO MATERNAL HEALTH CARE IN RURAL COMMUNITIES

One in five Americans live in a rural community, including approximately 18 million women of reproductive age, and nearly half a million babies are born in rural hospitals each year.[24,25,26] Medicaid plays a large role in covering costs of deliveries in both rural and urban areas and is the single largest payor of perinatal care. In 2016, Medicaid paid for 43% of all births in the US.[27] Rural communities tend to have higher rates of Medicaid coverage than urban communities, and rate differences vary significantly across states.[28]

A lack of access to maternal health care can result in a number of negative maternal health outcomes including premature birth, low-birth weight, maternal mortality, severe maternal morbidity, and increased risk of postpartum depression. Poor or absent prenatal care can contribute to these outcomes. Women in rural communities are more likely to begin prenatal care late. Less formal education, lower health literacy, unplanned pregnancies, and poor transportation have all been associated with late prenatal care.[29] In both rural and urban areas, there are persistent disparities in maternal health including prenatal care and maternal morbidity and mortality by race and ethnicity, and socioeconomic status. [30, 31,32,33,34,35] Research examining racial and ethnic health disparities within rural areas is limited. That said, the evidence that is available shows that rural racial and ethnic minority populations face substantial health, access to care, and lifestyle challenges.

Addressing health disparities between women in rural and urban areas and by race and ethnicity requires addressing a woman's health needs before, during, and after pregnancy.[36] This includes making sure women have adequate health coverage, access to family planning and routine check-ups, as well as mental and oral health care and social supports. Table 1 highlights the vital maternal health system elements before, during, and after pregnancy. Women in rural areas have less access to these services due to several barriers discussed in Section 4.

Table 1. Vital Maternal Health System Elements Before, During, and After Pregnancy

Maternal Health System Elements	Before Pregnancy	During Pregnancy			After Pregnancy
		Prenatal	Labor & Delivery	Postpartum	
Health Insurance Coverage	X	X	X	X	X
Family Planning	X			X	X
Routine or Regular Checkups	X	X			X
Identification and Support for High-Risk Conditions	X	X		X	X
Mental Health and Substance Use Screening, Treatment, Recovery Support, and Wrap-around Care	X	X	X	X	X
Oral Health Services	X	X		X	X
Genetic Screening and Counseling	X	X			

Maternal Health System Elements	Before Pregnancy	During Pregnancy			After Pregnancy
		Prenatal	Labor & Delivery	Postpartum	
Risk-appropriate Labor and Delivery Services			X		
Breastfeeding Support		X	X	X	
Social Services	X	X		X	X
Initiatives to Decrease Disparities in Health Care	X	X	X	X	X

The data in Table 1 summarizes the information presented in Section 3; therefore, the contributing sources are listed in the narrative below.

3.1 Before Pregnancy

Before pregnancy, the health and wellness of a woman is critical to achieving safe outcomes for her and her baby. Access to care is critical during this period because it allows providers to identify, treat, and stabilize chronic conditions; address behavioral health needs; and plan for a healthy and intentional pregnancy.[37]

Key health risks during this period are generally ongoing or chronic health conditions and behaviors that impact the woman during and after pregnancy, increase the risk of maternal morbidity and mortality, and impact the child both in utero and after birth. These health risks include chronic diseases such as hypertension, cardiac disease, obesity, and asthma; behavioral health such as tobacco use, substance use disorders, and mental health concerns; exposure to violence; and unintended pregnancy.[38] Lack of insurance during this time period is particularly deleterious since affordability of care is a barrier to access.[39]

Before pregnancy vital health system services to address problems associated with getting pregnant or health conditions associated with carrying a baby to full-term include:[40]

- Health coverage to support access to care.
- Family planning for appropriate birth spacing and prevention of unintended pregnancies.
- Routine or regular checkups.
- Mental health and substance use screening, treatment, recovery, and wrap-around care to reduce tobacco use, alcohol misuse, and substance use, and to provide mental health support.
- Oral health services to improve oral health and reduce the risk for premature and low-birthweight babies.
- Identification and support for high-risk conditions to provide appropriate services to manage conditions that impact pregnancy outcomes.
- Social services (e.g., family support, economic services, violence prevention, nutrition support) to reduce or prevent risk factors such as exposure to violence or poor nutrition and to support stability in employment and housing.
- Initiatives to decrease disparities in health care.

For women in rural areas, both a lack of health insurance and less access to consistent primary, specialty, and supportive services reduce the chances that they will receive these vital health services. Many women do not have health coverage or access to health care due to cost and other barriers until becoming pregnant, which is a qualifying event for Medicaid enrollment.[41] A lack of health insurance, combined with lower adherence to treatments and regimens, can affect women's health and pregnancy outcomes.[42,43,44,45,46]

Women of color in rural communities have less access to pre-pregnancy services, and data show they are more likely to become pregnant without receiving adequate previous health care.[47,48,49] In addition, women of color in rural areas reported experiencing discrimination and/or feelings of stigmatization when accessing maternal health care services, resulting in health care avoidance. This further exacerbates the risks to overall maternal health experienced by women of color living in rural areas.[50] Although the focus of this issue brief is on women living in rural communities, it is worth noting that many of these barriers are also experienced by women of color living in urban areas.

3.2 During Pregnancy

3.2.1 During the Prenatal Period

During the prenatal period**,** a woman's need for access to maternal health services increases. This period includes the prenatal period, labor and delivery, and the immediate postpartum period. Prenatal care can reduce the risks of pregnancy complications for both the mother and child. Access to care is vital during this period to ensure early and frequent monitoring of the pregnancy's progress as well as for conditions such as depression, substance use disorder, gestational diabetes, hypertension and other chronic disorders, and oral disease.[51]

Key health risks during this period are similar to those in the before-pregnancy period and include ongoing or chronic health conditions and behaviors that increase the risk of maternal morbidity and mortality and poor birth outcomes for the child. Delay in accessing vital health services, and fewer total prenatal visits, contribute to higher rates of perinatal complications.[52,53,54]

During the prenatal period, vital services needed include:[55]

- Health coverage to support access to care.
- Routine monitoring of the progress of the pregnancy and the health of the mother, including routine prenatal tests, blood pressure and weight checks, and measures of the baby's growth.[56]
- Mental health and substance use screening, treatment, recovery, and wrap-around care to improve mental health and reduce tobacco use, alcohol misuse, and substance use.
- Oral health services to improve oral health and reduce the risk for premature and low-birthweight babies.
- Identification of high-risk conditions and provision of appropriate services to minimize their impact on pregnancy outcomes, particularly for women with high-risk pregnancies.
- Breastfeeding support and classes to increase breastfeeding rates. Data show that breastfeeding provides health benefits for both mothers and babies.[57]
- Social services (e.g., family support, economic services, violence prevention, nutrition support) to reduce or prevent risk factors such as exposure to violence or poor nutrition and to support stability in employment and housing.

- Genetic screening for genetic disorders in the fetus.[58]
- Prenatal/Birthing classes to prepare for the stages of pregnancy and labor and delivery.
- Initiatives to decrease disparities in health care.

Women in rural areas are less likely to access prenatal services during their first trimester than urban and suburban women. This behavior is attributed to less education about the importance of perinatal health, barriers to traveling to care, and a higher rate of unintentional pregnancy.[59,60]

Evidence suggests that racial and ethnic minorities in rural communities are less likely to have a personal doctor and are more likely to forgo medical care due to cost compared to non-Hispanic White rural adults.[61] As noted above, experiences of discrimination and stigmatization in accessing maternal health care services result in further health care avoidance for women of color, including American Indian and Alaska Native women.[62, 63]

For American Indian and Alaska Native populations, access disparities can be greater. Approximately 40% live on reservations or in highly rural or frontier communities that are long distances from care. Many American Indian and Alaska Native women who live on reservations receive care from the Indian Health Service or tribal health centers, which typically do not offer the full range of maternal health services.[64,65] Compared to White women, American Indian and Alaska Native women living in rural communities are twice as likely to report receiving late or no prenatal care (13% vs. 6%).[66]

3.2.2 During Labor and Delivery

During labor and delivery women need access to appropriate providers and to hospitals equipped for labor emergencies. Providers performing cesarean and vaginal deliveries must have the knowledge and skills to manage high-risk patients as well as immediate access to the resources needed to respond to an emergency (e.g., sufficient supply of blood).[67,68]

Key health risks during this period are labor that does not progress in a timely manner, umbilical cord complications, cardiac or respiratory distress in the baby, perinatal tears, and excessive bleeding, among others.[69] Serious complications may require surgical intervention in the form of a cesarean section (C-section).[70]

During labor and delivery, vital services include:

- Health coverage to support access to care.
- Mental health and substance use screening and treatment, particularly for women who need to manage symptoms of withdrawal during labor and delivery and prompt management of infants born after chronic exposure to substances.[71]
- Risk-appropriate labor and delivery services, particularly for women with high-risk conditions such as high blood pressure, a breech baby, heart disease, HIV infection, and multiple babies.[72]
- Breastfeeding support post-delivery, particularly for women who have received pain management medications that can impact breastfeeding.[73]
- Initiatives to decrease disparities in health care.

The lack of access to appropriate labor and delivery facilities and services for women living in rural areas has led to documented increases in out-of-hospital births, including home births; births in hospitals without obstetrics services; and poorer birth outcomes such as preterm births.[74] Additionally, for many rural women and their obstetricians, fear of not reaching the hospital in time during labor

because of long travel distances has resulted in an increase in early elective delivery through the induction and augmentation of labor and low-risk cesarean delivery.[75] Complications associated with these procedures have led to increased rates of maternal mortality, as women are eight to 10 times more likely to die due to complications of a cesarean section compared to vaginal birth.[76,77,78,79] Elective inductions that occur before 39 weeks are risky for newborns and can lead to more prolonged labors and increased risk of hemorrhage.[80]

Women of color in rural areas are more likely to live in counties with proportionately fewer obstetricians and family physicians and with higher odds of lacking hospital obstetric services.[81] Evidence also suggests that rural hospital closures and closures of rural obstetric units are affecting communities of color and low-income communities at greater rates than other communities.[82] [83]

3.2.3 Immediately Postpartum

Immediately postpartum a woman is adapting to significant hormonal and physical changes, learning to care for the new baby, and possibly recovering from major surgery. This "fourth trimester" includes three phases: 1) the first six to 12 hours post-birth where the mother is recovering from the acute physical effects of the birth, 2) the two- to six-week period where immediate physical, hormonal, and emotional changes and recovery occur, and 3) up to six months post-birth where the pace of physical, hormonal, and emotional change continues.[84,85] Key health risks during this period include acute conditions such as pelvic floor trauma, infection, and hemorrhaging, as well as the effects of chronic health conditions such as diabetes and hypertension. Postpartum depression and substance use disorders can also be contributing factors to poor health outcomes.[86,87]

During the postpartum period, vital services needed include:[88]

- Health coverage to support access to care.
- Family planning to encourage healthy birth spacing to improve birth outcomes for mother and baby.
- Mental health and substance use screening, treatment, recovery, and wrap-around care to reduce substance misuse and mental health support, particularly for post-partum depression.
- Oral health services to screen for oral health issues that can occur or worsen during pregnancy.
- Identification of and support for high-risk conditions such as diabetes or hypertension that emerged during or were exacerbated by pregnancy and identification of conditions that could lead to maternal mortality.
- Breastfeeding support such as linkages to community support resources, support groups, and equipment such as breast-pumps.
- Social services (e.g., family support, economic services, violence prevention, nutrition support) to help the mother and family adjust to caring for the new baby, to ensure adequate access to food and formula, to support stability in housing, and to support a return to the workforce.
- Initiatives to address disparities in health care.

Between 10% and 40% of women do not complete a postpartum visit.[89] Similar to barriers in accessing prenatal care, many women who live in rural areas may not receive the recommended postpartum care or follow-up visits due to geographic isolation, limited transportation, and a lack of child care, among other reasons.[90]

As with prenatal care, women of color in rural communities face barriers to access including lack of a primary care provider, avoidance of medical care due to cost, and experiences of discrimination and

stigmatization in accessing maternal health care services.[91,92] It is also during this period when most maternal deaths occur.

3.3 After Pregnancy

After pregnancy women must reestablish their well-woman care, or in some instances establish care if they did not receive any before pregnancy. This period looks much like before pregnancy and is focused on supporting and improving a woman's health, enabling her to care for her current child/children, return to work/school, and prepare for future children, if desired. Access to care allows women to recover physically, mentally, and socially from the pregnancy.[93]

Key health risks during this period are similar to those in the before pregnancy period. Additionally, for women who developed health conditions in the perinatal period (e.g., gestational diabetes, hypertension), their health status and needs are different than before pregnancy and require ongoing attention from health care providers.

After pregnancy, vital services needed include:

- Health coverage to support access to care.
- Family planning for appropriate birth spacing and prevention of unintended pregnancies.
- Routine or regular check-ups
- Mental health and substance use screening, treatment, recovery, and wrap-around care to reduce substance misuse and to provide mental health support, particularly for postpartum depression.
- Oral health services to improve oral health and reduce the risk for premature and low-birthweight babies
- Identification and support for conditions that emerged during or were exacerbated by pregnancy such as diabetes or hypertension.
- Social services (e.g., family support, economic services, violence prevention, nutrition support) to support the family with stability in housing and to a return to the workforce if appropriate.
- Initiatives to address discrimination in health care.

As they do before pregnancy, women living in rural areas experience lower access to and utilization of care after pregnancy.[94] Depending on their state coverage policies, women insured by Medicaid may lose their coverage 60 days postpartum.[95] Although the loss of Medicaid eligibility is a qualifying event to enroll in Exchange coverage, these women are at further risk of receiving either inadequate or no health care services heightening their risk of morbidity or mortality or not receiving support for conditions that emerge after the 60-day window.[96] Women of color in rural communities face these barriers to access and others including lack of a personal provider, avoidance of medical care due to cost, and experiences of discrimination and stigmatization in accessing maternal health care services.[97,98]

4. OPPORTUNITIES TO IMPROVE ACCESS TO MATERNAL HEALTH CARE IN RURAL COMMUNITIES

In an ideal maternal health system, all women would have access to comprehensive, seamless medical care with links to behavioral, economic, and social supports as needed, and they would be engaged in this system before, during, and after pregnancy. Lack of access to maternal health care in rural communities is a result of many factors and creating the ideal maternal health system requires multiple steps. This section describes the challenges and opportunities related to creating an ideal maternal health system. The pillars of the ideal system are:

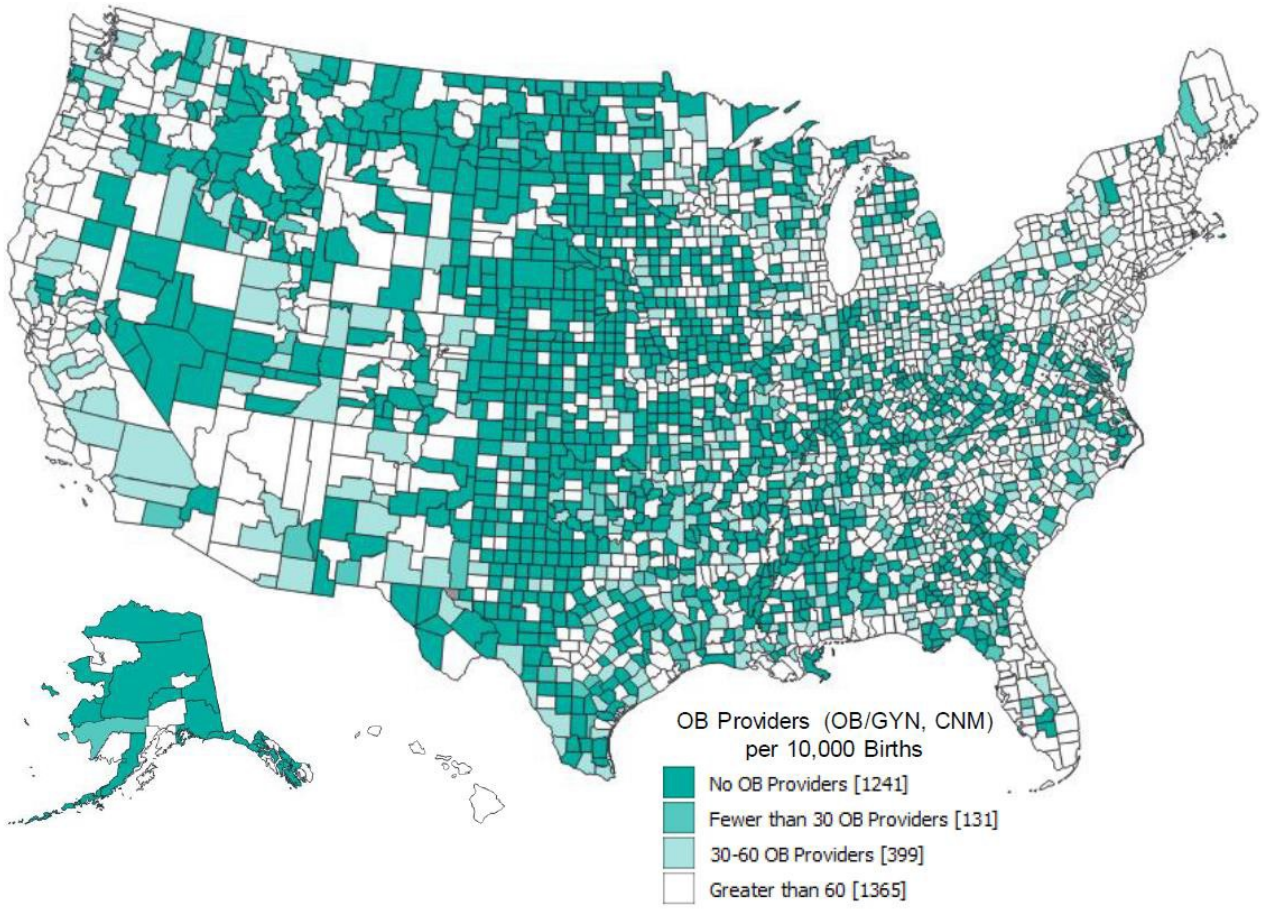
- Accessible
- Affordable
- Risk-appropriate
- High quality
- Patient centered
- Innovative
- Coordinated
- Equitable

4.1 Accessible: Delivers Care via a Multidisciplinary Workforce

Maternal health care is delivered by a range of providers, including specialty providers (e.g., obstetricians and gynecologists), family physicians and other primary care physicians, and advanced practice nurses (e.g., midwives, community health workers, and doulas). Each of these health care professionals plays a critical role in delivering maternal health care before, during, and after pregnancy. Appendix B presents an overview of the scope of practice and accreditation requirements of the maternal health care workforce in the US.

Hospital closures and variability in quality and preparedness are compounded by an overall shortage of the maternal health workforce in both rural and urban areas. By 2020, it is estimated that the US will have a shortage of 6,000-8,800 physicians specializing in obstetrics and gynecology (OB-GYNs) relative to anticipated demand, with a projected increase in that shortage to 22,000 by 2050.[99] The shortage is more severe in rural areas, where almost half the counties do not have hospital obstetric services, nor do they have a single OB-GYN or certified nurse midwife (Figure 3).[100, 101]

Figure 3. Distribution of Obstetric Providers by U.S. County



Source: March of Dimes. 2018. Nowhere to Go: Maternity care deserts across the U.S. Retrieved from: https://www.marchofdimes.org/materials/Nowhere_to_Go_Final.pdf.

Additionally, counties with greater proportions of Blacks, Hispanics and lower median incomes were more likely not to have hospital obstetric services. Urban counties average nearly 35 obstetricians per 1,000 residents, while rural counties average less than two per 1,000 residents. This lack of OB-GYNs puts pressure on other providers, such as those in primary care and family medicine, to fill gaps.[102] Consequently, rural hospitals with lower volumes are more likely to have family physicians, general surgeons, and shared nursing staff attend to births, rather than obstetricians.[103] At the same time, the number of family physicians providing OB services is decreasing, with only 19.2% performing routine deliveries.[104]

In part because of physician shortages, midwifery is a significant source of maternal health services in rural areas. While midwives currently attend less than 10% of all births in the US, they attend over 30% of deliveries in rural hospitals.[105,106] Several studies have shown that incorporating midwives into health care results in improved infant and maternal outcomes, including decreased neonatal and maternal mortality, fewer preterm births, and better mental health.[107, 108] Yet, there are barriers to the practice of midwifery across the country, with varying regulations related to training, scope of practice across states, and limited education and training pathways. One example is the complex nature of midwifery certification in the US. While all 50 states allow Certified Nurse Midwives (CNMs) to practice legally, many states require supervision or a collaborative agreement from a partnering physician rather

than allowing them to practice independently, and only six states recognize certified midwives (CM).[109, 110] Although seven states limit the services covered, all states provide coverage of certified nurse midwife services through Medicaid.[111]

Other providers that deliver critical services for women before, during, and after pregnancy, specifically behavioral health providers and dentists, are also difficult to access in rural communities. Approximately 35% of people living in the US reside in a Mental Health Care Health Professional Shortage Area and approximately 17% of the population lives in a Dental Care Health Professional Shortage Area, indicating a lack of access to behavioral and oral health services that are critical across a woman's reproductive years.

The shortage of maternal health professionals has led to opportunities to improve access to a multidisciplinary maternal health workforce in rural areas. Several programs are described below that address this issue:

- **Expand Training of Maternal Health Providers in Rural Areas**. To attract providers to practice in rural areas, there is a need to increase support for those who are willing to train rural providers. Georgia established a Preceptor Tax Incentive Program in 2014 that provides uncompensated community-based faculty physicians with state tax deductions for training medical professionals, including training in maternal health care. Another method to attract and retain maternal health professionals in rural areas is to expand provider training programs in rural communities. Several studies have found that graduates of rural-specific family medicine programs are more than two times as likely to practice in rural areas compared to those who graduated from non-rural-specific family medicine programs.[112 ,113 ,114] The Federal Office of Rural Health Policy in the Health Resources Services Administration (HRSA) and multiple states and organizations have established rural training programs and grants to increase the number of physicians and other health care providers practicing in rural areas, yet the number of programs focusing on maternal health specifically is limited.[115] Some examples of these programs include the University of Wisconsin Department of Obstetrics and Gynecology Rural Track Program and Frontier Nursing University. The rural residency training track at the University of Wisconsin is the first training program in the nation to provide training on the health needs of rural women, and the Frontier Nursing University provides nurse-midwifery and nurse practitioner education to train primary care leaders who specialize in serving women and families in diverse, rural, and underserved communities. However, these programs alone are not meeting the demand for maternal health providers in rural communities.[116,117] The recently passed Improving Access to Maternity Care Act requires HRSA to identify areas that have a shortage of maternity care health providers in order to better align provider placement programs to those areas.[118]
- **Incentivize Maternal Health Providers to Practice in Rural Areas**. Incentive programs provide scholarships, grants, student loan repayment, student loan forgiveness, and other financial incentives to providers who commit to practicing in underserved areas. The National Health Services Corps provides tuition, fees, and stipend support to students who commit to providing care in underserved areas after graduation and loan repayment services to physicians, advance practice nurses, certified nurse midwives, and other clinicians who spend at least two years serving in a high-need health professional shortage area.[119] HRSA's Nurse Corps Loan Repayment Program supports registered nurses, advanced practice registered nurses, and nurse faculty who work in areas with a critical shortage of nurses.[120] There are other programs designed specifically to increase the number of maternal health providers in rural areas. On a federal level, the Improving Access to Maternity Care Act of 2018 established student loan forgiveness to OB-GYN providers entering practice in rural areas. This bill requires HRSA to identify health professional shortage areas with a shortage of maternity care health professionals to assign maternal health care

professionals to those areas, and to help them remain in rural communities. Oregon passed legislation to provide state income tax credits and medical liability insurance assistance to rural OB providers. Although the overall number of practicing OB providers in Oregon continued to decline, feedback from providers receiving this benefit and remained in a rural community, indicated that the incentives helped them to continue practicing in that community.[121] These programs could be expanded beyond physicians to include midwives, labor and delivery nurses, and other maternal health care workers. To attract providers to practice in rural areas, there is also a need to increase support for those who are willing to train rural providers. Georgia established a Preceptor Tax Incentive Program in 2014 that provides uncompensated community-based faculty physicians with state tax deductions for training medical professionals, including training in maternal health care.

- **Leverage the Existing Health care Workforce**. Recruiting and retaining providers in rural communities are long-term goals, but there are also opportunities to leverage the existing health care workforce to improve access to maternal health services. An example is training nurses in rural areas to provide counseling to women upon discharge about health risks and warning signs during the postpartum period.[122] Given higher accident and injury rates in rural communities, there is also an opportunity to leverage emergency medical services workers in prehospital management of obstetric care for pregnant trauma patients.[123] There is also a need to ensure behavioral health providers, such as social workers, are available to address substance abuse, mental health, and other conditions.
- **Standardize Scope of Practice Laws for Maternal Health Providers**. Practice laws between and within maternal health care professions are inconsistent across states. There are opportunities to standardize these laws both federally and among the states to ensure that women in rural communities have access to high-quality maternal health care. For example, the Interstate Medical Licensure Compact, an agreement between 26 states, one territory, and the 37 Medical and Osteopathic Boards in those areas, allows licensed physicians to practice across state lines if they meet eligibility requirements.[124] This standardization can occur between physicians and midwives, as well as with additional providers such as doulas and community health workers.
- **Assess Networked Models to Enhance Access to Rural Communities**. Rural areas often face challenges in supporting essential maternal and obstetric services due to low patient volume and geographic isolation. Having disparate rural providers and communities work together in formal and informal network arrangements can help create economies of scale and enhanced coordination that can improve access and outcomes. The Health Resources and Services Administration (HRSA) created a pilot program in 2019 to assess this approach. The Rural Maternity and Obstetrics Management Strategies program will support three pilot projects to test out new ways to improve access to and continuity of maternal and obstetric services in rural communities. The program will link rural hospitals, Federally Qualified Health Centers, Healthy Start grantees, Home Visiting Programs, Rural Health Clinics, and upstream tertiary hospitals in a network to enhance coordination of services through the use of coordinated care approaches and telehealth.

4.2 Affordable: Reduces Financial Barriers for Mothers and Families

Affordability is a primary barrier to accessing health care for those who are uninsured and those who have insurance plans with high premiums or high deductibles.[125] Although laws and regulations have expanded access to health insurance and coverage of maternal health and family planning-related services, in 2017, 11% of women in the US were still uninsured.[126] In addition, uninsured rates for people living in rural counties were higher than the rates for people living in urban counties, and, women of color and women living below 200% of the Federal Poverty Level had higher uninsured rates compared to other groups.[127, 128] While uninsured women are less likely to seek needed health care overall, according to a recent study, 38% of all women in the US do not seek health-related services

(e.g., receive recommended preventive care or follow up care, fill a prescription) due to cost.[129] This barrier is further exacerbated in rural areas and in states that did not expand Medicaid.[130, 131] Additionally, over one fourth of all women in the US reported spending $2,000 or more out of pocket per year on health care-related costs for themselves and their families.[132]

Below are examples of opportunities to improve affordability of maternal health care for mothers and families living in rural areas:

- **Paying for the Range of Maternal Health Providers**. In 2012, The US Department of Health and Human Services launched the Strong Start for Mothers and Newborns Initiative, which sought to reduce preterm births and improve outcomes for newborns and pregnant women. The initiative consisted of a public-private partnership and awareness campaign to reduce the rate of early elective deliveries prior to 39 weeks, and a funding opportunity to test the effectiveness of specific enhanced prenatal care approaches to reduce the frequency of premature births among pregnant Medicaid or CHIP beneficiaries at high risk for preterm births. Women who received prenatal care in Strong Start Birth Centers had better birth outcomes and lower costs relative to similar Medicaid beneficiaries not enrolled in Strong Start. In particular, rates of preterm birth, low birthweight, and cesarean section were lower among Birth Center participants, and costs were more than $2,000 lower per mother-infant pair during birth and the following year.[133] Given the findings from the Strong Start evaluation and other studies demonstrating the reduced costs of perinatal service models that include midwifery, birth centers, and other providers (e.g., peer counselors), Medicaid agencies and private insurers could adopt this model or initiate similar payment models.
- **Expanding and Extending Insurance Coverage**. Early initiation and continuous engagement in perinatal services are essential to achieving positive maternal health outcomes, yet 23.1% of women between the ages of 18 and 64 living in rural areas either delayed care or went without any medical care due to lack of insurance coverage.[134] Nearly half of all births in the United States are covered by Medicaid, and women covered by Medicaid need access to the full spectrum of maternal health services.[135] Medicaid coverage often ends for women at 60 days postpartum. There is a need for coverage beyond that immediate postpartum period, given the ongoing pregnancy-related risks and chronic conditions that women experience up to a year after giving birth.[136] Women who lose their coverage 60 days postpartum are vulnerable to postpartum and interconception health risks.[137,138] There are opportunities to overcome these barriers in accessing care for women by extending Medicaid coverage, extending coverage to one year postpartum, and helping those who may lose Medicaid eligibility transition to either another eligibility category or another coverage source. Thirty-one states and the District of Columbia have extended Medicaid coverage for new mothers beyond the postpartum period, but 19 have yet to do so.[139]
- **Unbundling Postpartum Services**. Global payment models may result in a lack of emphasis on or incentive to provide postpartum services. Unbundling certain postpartum services from perinatal episode-based payments could encourage engagement in this care. There is a growing movement to unbundle immediate postpartum long-acting reversible contraception from the bundled payments to improve immediate access to contraceptive services.[140]
- **Establishing Accountable Care Organizations Covering Maternal Health Services**. Accountable Care Organizations have been established to improve population health at lower costs among Medicare populations, and agencies are exploring opportunities to implement Accountable Care Organizations among Medicaid-covered and privately-insured populations to achieve similar results. Some organizations, such as the Camden Coalition of Healthcare Providers, have piloted these models with pregnant women, highlighting the opportunity to improve access to health care among this population while achieving lower costs.[141,142]

4.3 Risk-Appropriate: Exemplifies a High-Functioning Maternal Health System

Access to risk-appropriate, quality care is an indicator of a high-functioning maternal health system. Studies comparing quality of care and maternal health outcomes among rural versus urban hospitals have shown differing results. One study found that critical access hospitals (CAH) performed comparably on several outcome measures including cesarean delivery among low-risk women and episiotomy, and worse on others such as 3rd- or 4th-degree lacerations.[143] More consistent have been the findings demonstrating that hospitals with lower numbers of deliveries have worse outcomes than higher volume hospitals.[144, 145,146,147] Many of the poorer outcomes are attributed to lack of designated obstetric physicians and nurses attending these births as well as potentially lower access to resources such as blood banks to manage complications.[148,149] While access to risk-appropriate care during labor and delivery is critical, access to risk-appropriate care during and after pregnancy is also essential in monitoring and managing high-risk conditions such as diabetes or hypertension. The variability in quality and preparedness among rural maternal health services highlights the need for policies and programs to ensure that rural women have access to risk-appropriate care. Lack of access to risk-appropriate health care is also attributable, in part, to availability of hospital and obstetric units in rural areas, particularly given that nearly half of all rural counties have no hospital-based services.[150]

Opportunities to improve access to risk-appropriate maternal health care in rural communities include the following:

- **Defining and adopting a risk-appropriate care model.** Perinatal Regionalization of Care is a strategy to ensure that all pregnant women are receiving timely access to risk-appropriate care, especially in situations when transfer to another hospital is needed. In 1976, the March of Dimes published *Toward Improving the Outcome of Pregnancy*, introducing a model system for regionalized perinatal care. This document and follow-ups published in 1993 and 2010 helped move the US health care system toward perinatal regionalization, leading to a steady decline in infant mortality.[151] To support a similar regionalization of maternal care among perinatal providers**,** the American College of Obstetricians and Gynecologists (ACOG) and the Society of Maternal-Fetal Medicine established Levels of Maternal Care to help providers identify the most appropriate locations for each birth within their region based on perinatal risk factors.[152] Levels of Maternal Care are particularly important to rural communities in identifying and referring high-risk women to providers with the appropriate skills for their needs. The Levels of Maternal Care range from Birth Centers and Level I Centers providing basic care, to Level IV Regional Perinatal Healthcare Centers that provide care for the most complex perinatal conditions.[153] The CDC has also developed a tool called the Levels of Care Assessment Tool (LOCATe) to support decision making about risk-appropriate care at a regional level. Fifteen states currently participate in the CDC LOCATe program; expanding this system across all rural communities in the US will help improve access to risk-appropriate care for women in rural areas. LOCATe is based on the most recent guidelines and policy statements issued by the American Academy of Pediatrics, ACOG, and the Society for Maternal-Fetal Medicine.[154]
- **Establishing Hub-and-Spoke Models**. Hub-and-spoke models are one way to operationalize the regionalization of risk-appropriate care as defined in the Levels of Maternal Care. Hub-and-spoke is defined as “a model which arranges service delivery assets into a network consisting of an anchor establishment (hub) which offers a full array of services, complemented by secondary establishments (spokes) which offer more limited service arrays, routing patients needing more intensive services to the hub for treatment.”[155] Given the number of rural OB unit closures, hub-and-spoke models provide opportunities for rural providers to establish formal relationships with hospitals that are better equipped to handle high-risk births. As an example, Avera Health has established a hub-and-spoke relationship, termed a “Maternal Health Compact,” among a tertiary

care center and two rural hospitals in South Dakota. These hospitals remain connected using labor analysis software that supports providers in identifying risks and potential need for transfer during labor and delivery.[156]

- **Increasing Use of Birth Centers**. Birth centers have also proven to be an effective, safe, and lower-cost model to perinatal care than hospital deliveries for low-risk pregnancies. Between 2004 and 2013, the number of births occurring in freestanding birth centers in the US grew by 75% (from 9,620 to 16,913 births). An integrated literature review published in 2016 found that deliveries occurring at a birth center had lower rates of assisted vaginal births and cesarean section births than hospitals.[157]

4.4 High Quality: Provides Safe, Timely, Efficient, and Effective Care and Services

There are numerous frameworks that outline what constitutes high-quality care.[158] The Institute of Medicine (now the Health and Medicine Division of the National Academies of Sciences, Engineering, and Medicine) identified safety, timeliness, efficiency, and effectiveness as a few key elements. Safety entails avoiding harm to patients from the care that is intended to help. Timeliness pertains to reducing waits and the occasional harmful delays in receiving or delivering care. Efficiency calls for organizations and practices to minimize waste of resources such as equipment, supplies, ideas, and energy. Effectiveness means that the services being provided are evidence-based, while avoiding underuse, misuse, or the provision of services for those not likely to benefit. In 2016, the World Health Organization released, Standards for Improving Quality of Maternal and Newborn Care in Health Facilities[159], that includes guidelines to help, "end preventable maternal and newborn morbidity and mortality," and to ensure that, "every pregnant woman and newborn should have skilled care at birth with evidence-based practices".[160]

The following are examples of efforts to improve the quality of maternal health care:

- **Alliance for Innovation on Maternal Health Program**. HRSA, in partnership with ACOG, is designing and implementing protocols to improve the consistency and safety of maternity care in the US. The Alliance for Innovation on Maternal Health (AIM) Program collaborated with experts in maternity care to develop clinical care protocols, termed "Safety Bundles," for common conditions or procedures that may occur across the perinatal period. As of April 2019, 26 states have enrolled in the AIM Program and conducted a state needs assessment to determine which bundles were most appropriate for their state.[161] Although AIM is adopted at a state level, there are opportunities for dissemination and implementation of Safety Bundles across rural communities. As an example, the University of Utah has partnered with Project Extension for Community Healthcare Outcomes (ECHO) to implement AIM bundles for health systems across the state using telemedicine.
- **Perinatal Quality Collaboratives**. The CDC provides support to states to establish Perinatal Quality Collaboratives (PQCs). States are also supporting PQCs through their Title V Maternal and Child Health Block Grants. PQCs comprise interdisciplinary teams within a state or across states to engage in quality improvement initiatives in their region. The aim of PQCs is to improve quality of care across the perinatal period but they are particularly focused on reducing racial and geographic disparities, reducing preterm births and cesarean section births among low-risk women, and improving providers' ability to address pregnancy complications such as eclampsia and hemorrhage.[162]
- **Maternal Mortality Review Committees.** Over half the states have a comprehensive maternal mortality review process. MMRCs provide information on the causes of maternal mortality beyond the basic surveillance data collected by the National Center for Health Statistics and the Pregnancy

Mortality Surveillance System, both administered by CDC. MMRCs gather and review extensive information about individual cases of maternal death, determine whether the death was related to or aggravated by pregnancy, and develop recommendations of action that could help prevent similar deaths.[163] At the federal level, the recently passed Preventing Maternal Deaths Act expanded CDC's Safe Motherhood initiative with funding to implement MMRCs.[164] The CDC Foundation, with funding from Merck for Mothers, established a standardized data system to support MMRCs in collecting and reporting mortality data collected within their states.[165]

- **Quality Reporting.** There are also opportunities to collaborate across federal and state agencies to expand quality reporting capacity, consistency, and capability. The Centers for Medicare & Medicaid Services (CMS) Maternal and Infant Health Initiative is working with CDC, HRSA, and states to implement a Data Linkage Training series to improve states' abilities to report on Medicaid quality measures and report to the CDC's Pregnancy Risk Assessment Monitoring System.[166] CMS has developed a core set of perinatal quality measures, including measures related to elective and cesarean sections, pre- and post-natal care, and contraceptive care. The 2019 Core Set includes 12 measures, 8 from CMS's Child Core Set and 4 from the Adult Core Set, to help evaluate maternal and perinatal health in Medicaid and CHIP. Currently, reporting on these metrics is voluntary.[167] However, reporting of the Child Core Set and Adult Behavioral Health Measures will be mandatory under the Children's Health Insurance Program Reauthorization Act (CHIPRA) of 2009 and the SUPPORT for Patients and Communities Act, respectively.

4.5 Patient-Centered: Values the Whole Person and Family

Patient-centered care and services are those that are delivered in a manner that is respectful and responsive to individual patient preferences, needs, and values. In 2011, leading organizations in maternal health drafted a call to action, which stated that, "patient-centered and safe care of the mother and child enhance quality and is our primary priority".[168] Patient-centered care calls for providers and organizations to be kind, effective communicators, trustworthy, and respectful of different views of motherhood, childbearing, and the birthing process.

Examples of patient-centered care include:

- **Maternity Medical Homes**. Similar to Patient Centered Medical Homes, which are ways to organize and deliver the core functions of primary care, maternity medical homes incorporate many of the same strategies to address the clinical aspects of maternal health care as well as the behavioral, economic, and social needs of women before, during and after pregnancy. Maternity medical homes achieve this by conducting periodic risk assessments to tailor services to each woman's unique needs, provide care coordination and facilitate linkages to needed services, and improve engagement in and outcomes of maternal health care through shared decision making with women.[169]
- **Culturally Tailored Initiatives**. Given the vast diversity in geography, economy, and racial and ethnic make-up of rural communities across the US, it is critical to ensure that all services are culturally relevant to the respective community. This is especially evident among American Indian and Alaska Native communities, which differ not only geographically (e.g., reservations, tribal communities) but culturally. Programs such as the Family Spirit program or American Indian Infant Health Initiatives are dedicated to implementing culturally competent and behavioral-focused home visiting programs. Programs like these are essential to reducing disparities among young American Indian and Alaska Native families by educating them about infant and child care and healthy eating practices, while also ensuring the family is enrolled in health insurance and food assistance programs.[170, 171]

- **Responsive Leadership and Workforce.** Delivering patient-centered care to ever-diversifying communities will require organizations to have leadership teams and a trained workforce that is responsive to patients and families from a broad range of cultural and linguistic backgrounds. Training in and providing culturally and linguistically appropriate services is one means of advancing health equity, improving quality, and helping to eliminate health care disparities.[172] HRSA has resources that include checklists and guides regarding the implementation of cultural and linguistic competence into maternal and child health training programs.[173]

4.6 Innovative: Leverages Telehealth and Related Technology

Telehealth is the use of electronic information and telecommunication technologies to support long-distance clinical health care, as well as, patient and professional health-related education, public health, and health administration.[174] Telemedicine is the application of telehealth solely as it relates to clinical services. Opportunities exist to utilize telehealth and telemedicine, to expand access to maternal health care among women living in rural areas; yet its adoption remains limited.[175] In some cases, barriers to accessing maternal health services using telehealth are related to common challenges with telehealth (e.g., limited access to broadband in rural areas, cost of equipment or technologies, scheduling time with providers, reimbursement for teleconsultation). In other cases, legislative barriers contribute to the limited availability of these services.[2] In a review conducted in 2016, only three of 36 jurisdictions (which included states, territories, and the District of Columbia) had policies that addressed use of telemedicine for perinatal services.[176]

There are many forms of telehealth, including live video (synchronous telehealth), store-and-forward (asynchronous telehealth), remote patient monitoring, mobile health (mHealth), and electronic consults (e-consults), that can meet many different needs for women and providers in rural areas before, during, and after pregnancy.[177] Structural and legislative opportunities to expand use of telemedicine include improving access to broadband, ensuring the cost of technologies and devices are reasonable, and establishing policies that promote use of telemedicine among providers to expand access to maternal health services.

Below are examples of how and where telehealth can be leveraged to deliver maternal health services in rural areas:

- **Expanding Remote Monitoring**. Given the distance to care that many rural women experience, telemedicine can reduce the burden of frequent travel for perinatal care. In North Carolina, Cone Health has launched a remote monitoring program called Babyscripts Diabetes Program that provides daily blood sugar monitoring for pregnant women at risk for gestational diabetes. This program has helped providers monitor their most at-risk patients without requiring women to make extra visits to the physician's office during their prenatal period.[178] The Maternal and Child Health Bureau at HRSA launched a challenge to support the development of innovative technology-based solutions that help providers remotely monitor the health of pregnant women, and empower women to make informed decisions about their own care.
- **Engaging Providers and Patients Using Virtual Platforms**. Telemedicine also brings opportunities to improve ongoing engagement between providers and pregnant women throughout

[2] Medicare fee-for-service (FFS) coverage for telehealth is currently defined under Section 1834 of the Social Security Act, and is limited to telehealth services that are furnished via a telecommunications system by a physician or certain other types of practitioners to an eligible individual who is not at the same location. For more information on Medicare Telehealth Coverage and Payment Policies, please see: https://www.cms.gov/About-CMS/Agency-Information/OMH/Downloads/Information-on-Medicare-Telehealth-Report.pdf

their prenatal period. Programs such as the Lifeline4Moms and Georgia's Live Health Online provide pregnant women with unlimited access to essential providers, including mental health care specialists and lactation consultants.[179, 180] The CenteringPregnancy program has utilized telemedicine to engage distant maternal health care specialists in prenatal group care in rural South Carolina.[181]

- **Implementing Programs Using Phone Applications**. States and health systems alike have employed phone applications to increase engagement in perinatal services. Text4baby, developed with input from the US Department of Health and Human Services and private and public stakeholders, is the most widely available app and provides regular text messages on nutrition, safe sleep, doctor visits, pregnancy and baby milestones, and other important health topics.[182] Another example is the Wyhealth Due Date Plus application that Wyoming's Medicaid program uses to engage women in prenatal care by monitoring weekly progress and weight gain, connecting women to community resources, and providing 24/7 access to providers. A 2017 study of this phone application found a significant association between phone application use and engagement in prenatal care.[183]
- **Increasing Access to Virtual Consultation.** Practitioners can benefit from access to specialist colleagues across geographic distances. The Medical University of South Carolina provides a maternal-fetal telehealth program that offers specialty care to women who have high-risk pregnancies. This program pairs maternal-fetal medicine specialists with local providers to manage the care of women with high-risk pregnancies via video consultation, allowing real-time conversations between the specialist and the local provider.[184]
- **Expanding Training and Quality Improvement**. Virtual training and capacity building with existing providers can improve access to quality maternal health services in rural areas.[185] Programs such as Project ECHO and PedsPLACE offer platforms for rural providers who may be isolated from peer-learning opportunities to engage in ongoing training and education with providers in other locations using telemedicine. The University of Utah partnered with Project ECHO to implement quality improvement activities with hospitals across the state. Within the first year of the program, Project ECHO saved provider participants 10,000 miles and 180 hours of travel time to engage in these trainings.[186]

4.7 Coordinated: Connects Women to Behavioral and Social Supports

Access to behavioral and social services (e.g., family support, financial services, violence prevention, and nutrition support) are critical to the overall health and wellness of women before, during, and after pregnancy. Access to these services, particularly among women in rural communities, is inadequate. For example, prevalence of depression is higher among women in rural communities than in urban areas, yet limited access to behavioral health services reduces the likelihood that women in rural areas are screened and treated for this and other behavioral health conditions.[187, 188] With the exception of American Indians and Alaska Natives, racial and ethnic minorities tend to have lower rates of depression and any mental illness compared to non-Hispanic Whites. [189, 190] However, racial and ethnic minorities are less likely to receive treatment for any mental illness, including depression.[191, 192, 193] Further, although nutrition is paramount for women in achieving positive health outcomes before, during, and after pregnancy, access to healthy and affordable foods is often limited in rural communities.[194] Rural communities also often have limited access to social services such as housing support, employment services, childcare, and home visiting programs, all of which impact health outcomes for rural populations.[195] For some women who otherwise do not have access to health care, or who do not actively seek health care regularly, pregnancy offers an opportunity to connect with a medical home that is coordinated and integrated with behavioral, economic, and social supports. However, for women covered by Medicaid that opportunity may be time-limited.

Examples of opportunities to improve access to behavioral and social services include:

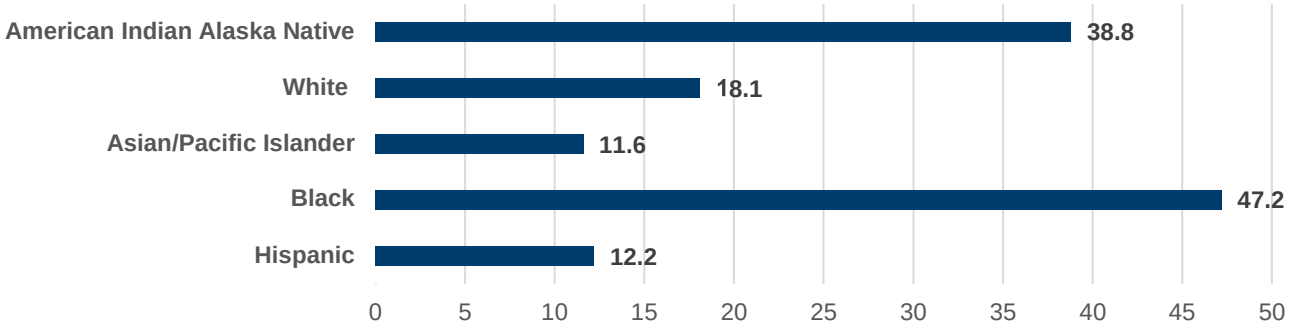
- **Behavioral Health Screening**. Given the prevalence of depression among women in rural areas, and that perinatal mood and anxiety disorders are among the most prevalent conditions affecting women during and after pregnancy, integration of behavioral health services into maternal health care is essential. In addition, rural communities face the same or higher rates of substance abuse as their urban and suburban counterparts. Adoption of screen-to-treat processes in perinatal services has been shown to increase identification of behavioral health conditions and linkage to behavioral health care, particularly when implemented during prenatal intake visits and during postpartum visits.[196] Though availability of onsite behavioral health services may be limited in rural areas, establishing a warm handoff or following up on referrals also improves the linkage to these services among women. One program that focuses in this area is the Maternal Opioid Misuse (MOM) model, launched by CMS in 2019. By working with states to promote coordinated and integrated care delivery, the MOM model seeks to improve quality of care and reduce costs for pregnant and postpartum women with opioid use disorder as well as their infants; expand access, service-delivery capacity, and infrastructure based on state-specific needs; and create sustainable coverage and payment strategies that support ongoing coordination and integration of care.
- **Partnerships with Community Services**. Community services often provide an additional entry point to behavioral, economic, and social supports that women need before, during, and after pregnancy. For example, the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) program link individuals to needed support services such as smoking cessation, substance abuse counseling, and immunizations. Connection to WIC services has also helped women connect to prenatal care earlier, improve their nutrition during and after pregnancy, and increase rates of breastfeeding.[197]
- **Health and Social Service Workforce**. Leveraging additional health and social service providers, such as community health workers (CHW), home visitors, case managers, and social workers, has also been successful in screening and linking patients to essential services.[198] CHWs, in particular, have improved health outcomes among patients by helping them adhere to their care plans and reducing visits to emergency departments. Within maternal health care, CHWs help to educate women about breastfeeding and child care, provide initial screenings for conditions such as postpartum depression, and link women to health care and other social supports.[199]

4.8 Equitable: Provides High-Quality, Patient-Centered Care to All Women

Access to quality maternal health care is just one factor among many that influence maternal health outcomes. Research has shown that, while there have been improvements in quality of care broadly, these efforts have not reduced health disparities for women of color.[200] A number of person- and system-level factors contribute to the perpetuation of health disparities, including institutional bias. Given that causes are multifactorial, solutions are far more complex than just improving quality of care.

Though national data on rural maternal mortality by race and ethnicity are limited, available data show that maternal mortality is higher among women of color and lowest among non-Hispanic White women.[201,202] Overall, women of color accounted for 40.7% of all US live births, but experienced 61.8% of the 7,487 pregnancy-related deaths from 1993 to 2006.[203] Black women are three to four times more likely to die or suffer serious illness from pregnancy-related causes than White women, regardless of their socioeconomic status.[204] Between 2011 and 2015, there were 47.2 deaths per 100,000 live births among Black mothers, compared to 18.1 for non-Hispanic White mothers (Figure 4).[205]

Figure 4. Maternal Mortality per 100,000 Live Births from 2011 – 2015



Source: America's Health Rankings. Health of Women and Children. Retrieved from: https://www.americashealthrankings.org/explore/health-of-women-and-children/measure/maternal_mortality/state/ALL.

Disparities also exist in maternal morbidity and birth outcomes. In 2016, Black women had preterm birth rates that were 50% higher than white women.[206] Although there are minimal disparities in prevalence of postpartum depression or other behavioral health disorders among racial and ethnic groups, treatment rates for these disorders are significantly lower among Black and Hispanic women.[207]

Although maternal mortality disparities are greatest for non-Hispanic Black women, the rate for American Indian and Alaska Native women is also concerning. Reports of maternal mortality rates among American Indian and Alaska Native women vary but can be as high as twice the mortality rate among White women.[208] Barriers to perinatal care among this population are also unique in that approximately 40% live on reservations or in highly rural or frontier communities, exacerbating barriers related to distance to care. Many American Indian and Alaska Native women seek care from the Indian Health Service or tribal health centers, which often do not offer the full range of maternal health services, in some cases, due to challenges related to recruiting and retaining maternal health care providers.[209] In a study conducted in 2012 of American Indian and Alaska Native women accessing maternal health care at an IHS facility, patients reported their primary concerns were related to communication barriers, a lack of cultural competency or awareness among their providers; a lack of continuity in their providers, with many reporting that they had seen a different provider during each prenatal visit; and financial and transportation barriers that inhibit them from accessing care. [210] Fewer American Indian and Alaska Native women living in rural communities access prenatal care within the first trimester, compared to non-Hispanic White women.[211] Each of these barriers, along with differences in rates of poverty, obesity, and alcohol, tobacco, and substance use, can contribute to higher rates of maternal mortality among American Indian and Alaska Native women.[212]

The interplay of structural determinants (e.g., socioeconomic position, race/ethnicity), maternal circumstances (e.g., living and working conditions, transportation), and behavioral, psychological, and biological factors help to explain disparities in health outcomes in rural areas.[213,214,215] Access to transportation, stable housing, child care, healthy foods, and health insurance are central to ensuring that women, particularly women living in rural areas, are able to access the maternal health care they need before, during, and after pregnancy. Addressing these needs may not be sufficient to eliminate racial and ethnic disparities experienced by women of color living in rural communities. As demonstrated by the National Healthcare Quality and Disparities Report, issued annually by the Agency for Healthcare Research and Quality, improvements in health care quality do not always result in reductions of racial and ethnic disparities.[216] Achieving health equity requires a specific focus on closing the gap.

It is essential that federal, states, regional, and local organizations engage a cross-section of stakeholders from the community to inform the development and implementation of programs and policies aimed at maternal health care for women living in rural areas. It is also essential for systems to evaluate their programs in an effort to build the evidence base, and for evidence-based or evidence-informed strategies to be tested in rural contexts. Unfortunately, communities of color and tribal communities are frequently left out of the conversations related to rural America.

Examples of resources and programs intended to assist health systems achieve equity for all women include:

- **AIM Maternal Safety Bundle on Reduction of Peripartum Racial/Ethnic Disparities**. This resource helps health systems improve their data collection, staff training, and patient, family, and community engagement to address racial and ethnic disparities among their populations.[217]
- **Core Quality Measure Collaborative OB-GYN Measures.** The Core Quality Measure Collaborative (CQMC) is a collaboration with CMS, the America's Health Insurance Plans, and the National Quality Forum. The CQMC has identified 8 core quality measure sets that can be used with commercial and government payers, including one for OB-GYN. The OB-GYN core set focuses on care provided in ambulatory and hospital/acute settings and includes 11 measures ranging from frequency of ongoing prenatal care and breast and cervical cancer screening to elective delivery, Cesarean section, and exclusive breast milk feeding. These measures are *provider-level* in contrast to the current *state-level* Medicaid Core set.[218]
- **Maternal Mortality Review Data System Socio-Spatial Indicators**. The Maternal Mortality Review Data System has included a set of contextual measures (termed socio-spatial indicators) related to the health service environment, reproductive and behavioral health, and social and economic factors that are intended to demonstrate the link between maternal mortality and health equity within individual communities. Subsequently, MMRCs can use these data to incorporate equity into their review discussions.[219]
- **Community-Driven Initiatives**. There are promising community-driven initiatives that could be employed and tested in rural areas. For example, the HRSA Maternal and Child Health Bureau's Healthy Start program aims to improve women's health before, during, and after pregnancy by supporting communities in implementing evidence-based practices to connect women and families to health care and other support services.[220] The Best Babies Zone Initiative builds cross-sector partnerships in communities to address maternal health disparities by engaging women in helping to design activities, and better linkage to economic, education, early care, health care, and community services.[221] Evaluations of these programs have demonstrated reduced disparities in short-term outcomes (e.g., increased access to maternal health care), medium-term outcomes (e.g., increase in rates of breastfeeding and postpartum visits), and long-term outcomes (e.g., reduction in premature births and low birth weight births).[222, 223]

5. HIGHLIGHTED EXAMPLES: IMPROVING ACCESS TO MATERNAL HEALTH CARE IN RURAL COMMUNITIES

CMS conducted interviews with six organizations to highlight a variety of promising approaches, facilitators, barriers, and opportunities for further impact. The case studies address several of the factors contributing to problems accessing maternal health care in rural communities, including workforce shortages and access to care challenges associated with social determinants of health. They illustrate efforts to stabilize rural hospital obstetrical services, regionalization and coordination of care, quality improvement initiatives, training and guideline development, provider recruitment and retention strategies, and expansion of care models. These organizations were selected because of their geographical variation (e.g., Alaska, Arkansas, California, Kansas, South Carolina, and Wisconsin), diversity in focus area (e.g., group prenatal care, birth centers, rural OB-GYN residency program, telemedicine, quality improvement), as well as their documentation and/or publication of the impacts and outcomes associated with their program. The experience of these organizations highlights policy and structural changes that could be adopted to improve access to maternal health services in rural communities. Most of these organizations reported difficulty recruiting and retaining maternal health providers, low patient volume for maternal services, and disincentives or barriers related to reimbursement of maternal health services. Yet they overcame these barriers with unique strategies, such as partnering with community or state associations, collaborating with urban or academic providers, or using telehealth and other innovations. High-level summaries of the case studies follow in the narrative below with full profiles provided in Appendix C. A summary of which barriers each organization aimed to address is included in Table 2.

Table 2. Summary of Barriers Addressed in Each Case Study

Case Study Summary	Hospital Closures	Access to Care	Insurance Coverage	Workforce Supply and Distribution	Quality	Health Disparities	Social Determinants of Health
Matsu Midwifery. Birth center, family health center, and functional medical clinic with flexible schedules and multiple services to accommodate patients and families.		X		X		X	X
Antenatal & Neonatal Guidelines and Education Learning System. State-based program aimed at improving access to and the quality of maternal health services within Arkansas.	X	X	X		X	X	X
California Maternal Quality Care Collaborative. Multi-stakeholder collaboratives specifically designed to improve the quality of maternal health services through quality improvement activities and a maternal health e-learning platform for provider professional development.		X			X	X	

Case Study Summary	Hospital Closures	Access to Care	Insurance Coverage	Workforce Supply and Distribution	Quality	Health Disparities	Social Determinants of Health
Kearny County Hospital. Education to family medicine providers in the provision of perinatal care, including labor and delivery services; partnerships with foundations and universities in training and quality improvement activities; in-person and virtual prenatal care.	X	X		X	X	X	X
CenteringPregnancy of South Carolina. Group prenatal care model for pregnant women.		X				X	X
University of Wisconsin's Rural Residency Program in Obstetrics and Gynecology. Rural residency program aimed at expanding the maternal health workforce in rural Wisconsin.	X	X		X	X		

Matsu Midwifery. Matsu Midwifery is a birth center, family health center, and functional medical clinic located in Wasilla, Alaska, that provides services to women across a large area. With a 150-mile catchment area, the center has implemented several strategies to improve access to and engagement in perinatal care. These strategies include establishing a flexible schedule and providing multiple services to accommodate patients and families; identifying an OB champion within the hospital system who regularly provides consultation services and facilitates transfers as necessary; and hosting group prenatal classes to build a community among women in the prenatal period. While most of the surrounding Alaska Native population seeks care at a nearby hospital dedicated to this population, Matsu Midwifery aims to address disparities among the patients who choose to seek care from the birth center by actively supporting patients at risk for perinatal depression. As a result of these efforts, Matsu Midwifery reduced perinatal anxiety, postpartum depression, and feelings of isolation among its patients; and facilitated quick and successful transfers from the birth center to the local hospital during emergencies.

Antenatal & Neonatal Guidelines and Education Learning System. The Antenatal & Neonatal Guidelines and Education Learning System (ANGELS) program was established by the University of Arkansas to improve access to and the quality of maternal health services within the state. The ANGELS program employed several strategies to improve access to maternal health services, including establishing a 24/7 call center for providers and patients experiencing perinatal complications or emergencies, expanding teleconferencing services with providers across the state, and improving capacity and readiness of rural providers to handle obstetric emergencies. Understanding that provider bias, either unconscious or conscious, is one reason why minority communities do not have equitable access to high-quality health care services, the ANGELS program will roll out training using the AIM Disparities Safety Bundle to address issues such as providing equitable pain management and identifying signs of hemorrhaging among Black populations. As a result of these efforts to improve maternal health services in Arkansas, the ANGELS program has experienced the following results: a decrease in the distance that many women in Arkansas must travel to be seen by an obstetric expert, an increase in Medicaid beneficiaries delivering premature or low-birthweight babies at the University of Arkansas Medical Sciences (versus at a hospital less equipped for the special needs of the mother and

baby), a decrease in complications for high-risk women and their babies, and increased cost savings for Arkansas' Medicaid program due to fewer complications.

California Maternal Quality Care Collaborative. Through efforts from Stanford University School of Medicine in tandem with the State of California, the California Maternal Quality Care Collaborative (CMQCC) was formed in 2006 as a multi-stakeholder organization to improve maternal health outcomes in California by targeting preventable morbidity, mortality, and racial disparities. CMQCC supports collaboratives specifically designed to improve the quality of maternal health services. It has established incentives programs for organizations that participate in quality improvement activities and provided a maternal health e-learning platform for provider professional development. Understanding that rural communities in California, especially rural communities of color, experience poor maternal health outcomes, CMQCC aims to improve its relationships with hospitals in these areas to increase awareness of available quality improvement resources, including technical assistance. It also aims to improve its data collection to better understand experiences of bias in health care settings and perception of health care among communities of color, namely Black women. Since its inception, CMQCC has documented the following changes in maternal health outcomes in California: a decline in rates of maternal mortality by more than 55%, a decline in maternal morbidity by 20.8% among hospitals participating in the quality collaboratives for hemorrhage and preeclampsia, an increase in full-term births by 8%, and a potential increase in public interest in maternal health outcomes and health care performance due to increased public reporting of quality data.

Kearny County Hospital. As multiple hospitals surrounding Lakin, Kansas, closed their obstetric units, women in the nearby counties had less access to prenatal care and labor and delivery services. At the same time, this population also had high rates of gestational diabetes (approximately twice the national average), and type 2 diabetes after birth. To address these issues, Kearny County Hospital has provided continued education to family medicine providers in the provision of perinatal care, including labor and delivery services; partnered with foundations and universities in training and quality improvement activities; and increased access to in-person and virtual prenatal care. To address existing health disparities among women of reproductive age within the county, Kearny County Hospital built bridges to the county's most vulnerable maternal populations by partnering with the largest employer in the county to link employees directly to care. It also established relationships via targeted programming with local refugee communities to build trust among these populations. All these efforts resulted in an increased volume of births, reduction in births of babies that were large for gestational age, and an increase in breastfeeding initiation.

CenteringPregnancy of South Carolina. CenteringPregnancy of South Carolina is a subset of the larger Centering Health care Institute that provides a group prenatal care model for pregnant women. Implementation of CenteringPregnancy of South Carolina began in 2012 at the Greenville Health System and has expanded to 24 sites (22 sites are currently operating) across the state. Rural sites, in particular, tend to experience more challenges in program implementation, especially in engaging and retaining rural women due to barriers such as transportation, education about the importance of prenatal care, and limited provider capacity in smaller clinics or hospitals. CenteringPregnancy leveraged several strategies to improve access to maternal health care across each of these sites, including providing technical assistance and creating a collaboration network in South Carolina, establishing enhanced payments for CenteringPregnancy services, designing alternative versions of CenteringPregnancy to increase sustainability among rural programs, and fostering maternal health research in South Carolina. As a result of these efforts to improve maternal health services in South Carolina, CenteringPregnancy has experienced improved maternal health outcomes including lower rates of preterm birth, low-weight babies, cesarean sections, and gestational diabetes; higher rates of breastfeeding initiation among participants; and implementation, sustainment, and collaboration among 22 CenteringPregnancy sites across the state, including urban and rural communities.

University of Wisconsin's Rural Residency Program in Obstetrics and Gynecology. In 2017, the University of Wisconsin Department of Obstetrics and Gynecology established a rural residency program aimed at expanding the maternal health workforce in rural Wisconsin. In building this residency program, the department partnered with state-level agencies and other workforce training programs to communicate to funders and policy makers the need to improve the rural OB-GYN workforce. It also increased training for medical residents on rural disparities. While the program has not yet been able to address the maternal health disparities among tribal communities in rural Wisconsin due to the lack of OB-GYN preceptors, it aims to build capacity and improve quality of care within other rural communities. In its two years of existence, the program has seen an increased interest among medical students to participate in a rural training track as either a rotation or residency position, increased interest from rural hospitals and providers to serve as preceptors for rural residents, and increased collaboration among rural providers and academic medical institutions for consultations and continued education.

6. CONCLUSION

A lack of access to high-quality maternal health services in rural communities is the result of many factors including workforce shortages, hospital and obstetric department closures, and access to care challenges arising from social determinants of health. These access disparities result in worse health outcomes for rural women and their babies, with American Indian and Alaska Native women and women of color suffering disproportionately. To directly address these challenges, stakeholders across the health system and in rural communities have developed creative solutions to address some of the gaps in maternal health care. Improving maternal health and health care in rural communities will require cross-sector efforts at the federal, regional, state, and local levels. Through continued engagement with stakeholders to highlight and understand these challenges, CMS can work towards creating a system that is accessible, affordable, risk-appropriate, high-quality, patient-centered, coordinated, innovative, and equitable. Such a system will ensure that all women and their babies have access to the maternal health services they need and have better outcomes.

APPENDIX A. DISTRIBUTION OF HOSPITAL OBSTETRIC UNIT CLOSURES IN MICROPOLITAN AND NONCORE[iii] COUNTIES, 2004–2014

Counties	All Rural Counties	Rural Counties with 10,000 49,999 Residents	Rural Counties with Less than 10,000 Residents
Number of Counties	1,984	646	1,338
Counties that never had hospital(s) with OB services	898 (45.3%)	114 (17.6%)	784 (58.6%)
Counties with continual OB services	907 (45.7%)	503 (77.9%)	404 (30.2%)
Counties with loss of all OB services	179 (9.0%)	29 (4.5%)	150 (11.2%)
Closures of hospitals with OB units	14	3	11
Closures of OB units	165	26	139

Source: Hung, P, Kozhimannil, K, Henning-Smith, C, and Casey, M. Closure of Hospital Obstetric Services Disproportionately Affects Less-Populated Rural Counties. University of Minnesota Rural Health Research Center. April 2017.
Available: http://rhrc.umn.edu/wp-content/files_mf/1491501904UMRHRCOBclosuresPolicyBrief.pdf

[iii] Noncore counties are areas with less than 10,000 residents.

APPENDIX B. SCOPE OF PRACTICE AMONG MATERNAL HEALTH PROVIDERS

Table 3. Provider Type, Scope, Accreditor, and Location

Provider Type	Scope	Accreditor	Location
Obstetricians	Pregnancy, childbirth including complex deliveries, postpartum period, and women's health services	American Board of Obstetrics and Gynecology (ABOG)	All 50 states
Gynecologists	Overall reproductive health, including pregnancy, childbirth, and postpartum period and women's health services	ABOG	All 50 states
Family Physicians	Comprehensive medical care, health maintenance, and preventative services; pregnancy, childbirth, and postpartum care	American Board of Family Medicine	All 50 states
Certified Midwives	Non-nurses who have a background in a health-related field other than nursing and graduate from a midwifery education program accredited by the Accreditation Commission for Midwifery Education (ACME); comprehensive women's health services and sexual health services depending on practice location	American Midwifery Certification Board (AMCB)	All 50 states
Certified Nurse Midwives	Registered nurses who pass a nurse-midwifery education program or graduate-level education in programs accredited by ACME; comprehensive women's health services and sexual health services depending on practice location	AMCB	28 states
Doulas	Non-clinical maternal support and education in homes, birth centers, and some other medical facilities before, during, and after birth	Childbirth and Postpartum Professional Association; DONA International; others	All 50 states

Provider Type	Scope	Accreditor	Location
Community Health Workers (CHWs)	Community-based health education, basic health services, and referral recommendations for health services	Varies by state[224]	47 states

Sources: An Overview of OB-GYN Certification. American Board of Obstetrics + Gynecology. Retrieved from: https://www.abog.org/specialty-certification/overview-of-specialty-certification. Become Certified. American Board of Family Medicine. Retrieved from: https://www.theabfm.org/become-certified. | About Midwives. Midwives Alliance North America. Retrieved from: https://mana.org/about-midwives/types-of-midwife. | Standards and Ethics. DONA International. Retrieved from: https://www.dona.org/what-is-a-doula/scope-and-ethics/. | Summary of State Community Health Worker Laws. Centers for Disease Control and Prevention. Retrieved from: https://www.cdc.gov/dhdsp/pubs/docs/chw_state_laws.pdf.

APPENDIX C. SUMMARY OF SIX CASE STUDIES

CMS conducted interviews with six organizations to highlight a variety of promising approaches, facilitators, barriers, and opportunities for further impact. The case studies illustrate efforts to stabilize rural hospital obstetrical services, regionalization and coordination of care, quality improvement initiatives, training and guideline development, provider recruitment and retention strategies, and expansion of care models. These organizations were selected because of their geographical variation (e.g., Alaska, Arkansas, California, Kansas, South Carolina, and Wisconsin), diversity in focus area (e.g., group prenatal care, birth centers, rural OB-GYN residency program, telemedicine, quality improvement), as well as their documentation and/or publication of the impacts and outcomes associated with their program.

1. Matsu Midwifery and Family Health

- **Location:** Wasilla, Alaska
- **Organization Type:** Family Health and Birth Center (3 birthing rooms)
- **Community Characteristics:** Population of Wasilla 7,831 in 2010; Largest Industry: Professional Service (many commute to Anchorage)

Description of the Program or Practice

Matsu Midwifery's facility is located within an hour of Anchorage, Alaska. It includes a midwifery clinic, family health center, and functional medicine clinic. The center's total catchment area has a 150-mile radius. The birth center leveraged several strategies to improve access to its care, including:

- **Establishing a flexible schedule and providing multiple services to accommodate patients and families.** To address patient transportation barriers, Matsu Midwifery's providers ensure that their schedule is flexible enough to accommodate walk-ins if patients are in the area and need to be seen, and they make themselves available on the weekends and after hours if needed. The providers also do their best to coordinate with families so that all members (e.g., mothers and children) can be seen during the same visit. The midwives will sometimes try to make home visits for prenatal care if they are going to be in the area of a patient without transportation.
- **Actively supporting patients with behavioral or emotional risks.** Although Matsu Midwifery, does not accept patients engaging in risk behaviors (e.g., use of tobacco or nicotine, alcohol, marijuana, or controlled substances), the family practice works with patients who have stopped engaging in such behavior(s) either individually or in an ongoing group setting (e.g., Centering Anxiety Group, smoking cessation programs) to maintain healthy lifestyle changes. During a weekly meeting, the team of providers tracks stressors or other risks that their patients may be experiencing, such as living far away from family, lack of social support, and feelings of isolation. This ensures that any providers who are on call or seeing patients that week are aware of patients' potential risks (e.g., emotional, family-oriented) in addition to the essential care or services they need.
- **Partnering with obstetric/gynecologic (OB-GYN) physicians in the local hospital to provide consultation services and receive transports as needed**. Matsu Midwifery has a very strong working relationship with an OB-GYN provider in the area but has struggled with more systematic partnerships with the hospital generally. The partner provider is willing to provide consultation at any hour to the midwives via phone or text; she also facilitates quick and seamless transfers to the

hospital as needed, which has resulted in improved outcomes for patients.

- **Hosting group prenatal classes to build community among women in the prenatal period**. Matsu Midwifery hosts a group prenatal care program called CenteringPregnancy for which half the practitioners are trained facilitators. The program consists of group classes with six to eight pregnant women of similar gestational age. The meetings are two hours long and occur every month for the first 32 weeks of pregnancy and then every other week thereafter, which has helped to build a community among the population. However, given the relatively small patient population, gestational age groups are looped into the same cohort to make the discussions more robust.

Results

As a result of these efforts to improve its maternal health services, Matsu Midwifery reports the following results:

- Reduced perinatal anxiety, postpartum depression, and feelings of isolation.
- Quick and successful transfers to the local hospital as a result of a partnership with an OB-GYN provider.

Barriers

- Public advertising has not been an effective recruitment strategy, and sometimes a midwife who is hired or trained is not retained due to the culture of the birth center. Matsu Midwifery does not follow a typical hierarchical model that other birth centers or labor and delivery clinics follow during births. All attending providers, regardless of credentials, are encouraged to raise questions or take the lead in certain situations, which has not aligned with some providers who have trained in a different environment.
- Transportation to clinical services is an issue for both rural and local clients. Although the state Medicaid program does provide some support for patient travel from rural areas, authorizations are often difficult to obtain when Matsu Midwifery is not considered the closest provider to the patient.
- Some federal insurance plans (e.g., Tricare, plans purchased from the Marketplace) do not cover services provided by Direct Entry Midwives (DEM), which requires the birth center to alter its attending teams for patients covered under these plans.
- Matsu Midwifery has also experienced challenges in working with the local Emergency Medical Service agency during emergency transfers to the hospital. Matsu Midwifery has initiated collaborative conversations to facilitate emergency transfers more seamlessly.

Facilitators

- To facilitate direct recruitment of midwifery students, Matsu Midwifery works closely with colleges and universities that have midwifery programs such as Georgetown University. Matsu Midwifery also serves as a training site for the DEM model, which is an apprentice training model.
- The birth center allows women who live far away or have challenges with transportation to stay in an unused birthing room for up to 24 hours after they would have been discharged for monitoring, but these stays are not reimbursable.
- In addition to its relationships with the OB-GYN physician in the hospital, Matsu Midwifery has invited a member of the Matsu Health Foundation to serve on its board. This relationship has helped to improve education and awareness among the hospital's leadership of the birth center's

services.

Areas of Opportunity Identified by Participants

Matsu Midwifery's experiences raise the following implications and/or recommendations to improve access to maternal health services in rural areas:

Access to Hospitals and Obstetric Units

- Reimburse travel, hotel, or an extra night's stay within the birth center for non-local women who elect to receive care from and/or deliver at the birth center.

Access to a Maternal Health Workforce

- Allow for reimbursement of a broader range of maternal health providers (e.g., DEM) among health plans, particularly those with more restrictive regulations such as Tricare or plans on the Health Insurance Marketplaces.

2. Antenatal & Neonatal Guidelines and Education Learning System

- **Location:** Arkansas
- **Organization Type:** Telemedicine Education Learning System
- **Community Characteristics:** Population: 2,915,918 in 2010 (1,278,329 in rural communities); Largest Industry: Agriculture

Description of the Program or Practice

The Antenatal & Neonatal Guidelines and Education Learning System (ANGELS) program was established by the University of Arkansas to improve access to and quality of maternal health services within the state. The program grew steadily from the mid-1990s to 2003, when the state Medicaid program asked ANGELS to submit a proposal to expand the program across the state. Leveraging this support, ANGELS employed several strategies to improve access to maternal health services, including:

- **Establishing a 24/7 call center for providers and patients experiencing perinatal complications or emergencies.** The ANGELS call center is staffed by OB nurses who are able to support rural providers in triaging patients, connecting them to maternal-fetal medicine specialists, and arranging transport to a labor and delivery unit at the University of Arkansas Medical Center when needed. They are also working to expand their ability to conduct consultations with patients in rural areas, particularly for those who have complications after discharge or are part of the Abnormal Mom Abnormal Baby program, which supports families with high-risk infants.
- **Expanding teleconferencing services with providers across the state.** Using funding from Medicaid, the university, and other sources, the ANGELS program has incrementally expanded its teleconferencing services to additional rural clinics and hospitals across the state. Teleconferencing allows ANGELS providers to conduct virtual training and real-time consultations for patient care, which reduces the frequency of patient travel to the university medical center.
- **Improving capacity and readiness of rural providers to handle obstetric emergencies.** Each year, the ANGELS program releases more than 160 guidelines to physicians in Arkansas to enhance standardization of obstetric and neonatal care. The program particularly seeks to roll out these guidelines to hospitals and providers that do not provide OB services. The program also deploys equipment to rural providers to ensure they have materials necessary to manage labor and deliveries according to the Alliance for Innovation on Maternal Health's (AIM's) Safety Bundles, especially those for hypertension and hemorrhage.
- **Addressing health disparities and bias among rural providers.** Understanding that provider bias, either unconscious or conscious, is the biggest reason why minority communities do not have equitable access to high-quality health care, the ANGELS program will roll out training using the AIM Disparities Safety Bundle. This training will specifically address issues such as providing equitable pain management and identifying signs of hemorrhaging among Black populations.

Results

As a result of these efforts to improve maternal health services in Arkansas, the ANGELS program has experienced the following results:

- A decrease in the distance many women in Arkansas must travel to be seen by an obstetric expert.
- An increase in Medicaid beneficiaries delivering premature or low-birthweight babies at the University of Arkansas Medical Sciences (versus at a hospital less equipped for the special needs of the mother and baby).
- Decrease in complications for high-risk women and their babies.
- Increased cost savings for Arkansas' Medicaid program due to fewer complications.

Barriers

Two of the biggest challenges that the ANGELS program encounters are: 1) growing pains (e.g., expanding telemedicine services to over 40 sites) and 2) gaining buy-in from new systems and providers. Health systems often feel threatened by telemedicine relationships because providers feel like they are taking patients away from their facilities. The ANGELS program ensures that patients always remain in care with their originating provider, but it recommends that alternative payment models be established to better facilitate the financial relationship between the consulting and original physicians.

Transportation barriers are the primary reason that the ANGELS program experiences no-shows for its specialists at the university medical center. The state Medicaid transportation service requires patients to reserve transportation 24–48 hours ahead of time and does not allow patients to bring children with them. Most women are not able to anticipate the need for transportation that far in advance and are not able to spare an entire day for the shared ride. These missed appointments create additional risks for women who are continuing to advance in their gestational age without seeing a provider to manage potential health concerns.

Facilitators

The ANGELS program has received funding from several sources, which has enabled it to expand its telemedicine relationships with over 40 sites within the state. Each year Arkansas' Medicaid program works with ANGELS to identify new funding needs, which the University of Arkansas matches. The state has also received federal funding to expand broadband services to rural areas, particularly rural providers (e.g., hospitals, clinics, Federally Qualified Health Centers).

ANGELS also has a strong working relationship with the state department of health, which helps to align limited resources to ensure optimum access to care for rural communities.

Last, when rural women must travel to the university medical center for perinatal care or neonatal care, the university provides hotel space for free to avoid lodging costs and other travel concerns for rural families.

Areas of Opportunity Identified by Participants

The ANGELS program's experiences within Arkansas raise the following implications and/or recommendations to improve access to maternal health services in rural areas:

Access to Hospitals and Obstetric Units

- Expand Regionalization of Care, or Levels of Care determinations, among maternal health providers across rural and urban communities.
- Reimburse travel, hotel, or an extra night's stay for rural women who are traveling to urban areas for high-risk deliveries or ongoing, high-risk infant care.
- Improve transportation services provided by or funded through Medicaid programs (e.g., relax "call-ahead" requirements, shorten trips between rural and urban centers).

Use of Telemedicine

- Implement alternative and/or value-based payment models that facilitate teleconsultation relationships between rural and urban providers.
- Establish funding mechanisms that support 24/7 maternal call centers and teleconferencing with rural clinics.
- Continue to fund broadband expansion efforts and telehealth equipment purchases in rural communities.

3. California Maternal Quality Care Collaborative (CMQCC)

- **Location:** California
- **Organization Type:** Care Collaborative (over 200 member hospitals)
- **Community Characteristics:** Population: 35,235,956 in 2010 (1,880,350 in rural communities); Largest Industry: Agriculture and Science and Technology

Description of the Program or Practice

California experiences similar barriers as other states in sustaining access to maternal health services in rural areas due to recent closures of rural hospitals and OB units. The California Maternal Quality Care Collaborative (CMQCC) was formed in 2006 by Stanford University School of Medicine in tandem with the State of California as a multi-stakeholder organization to address overall improvement of maternal health outcomes in California by targeting preventable morbidity, mortality, and racial disparities. CMQCC works with hospitals and provider organizations to offer maternal health services across California, including in urban, suburban, and rural areas. CMQCC utilizes the following strategies to improve access to and the quality of maternal health services in California:

- **Supporting collaboratives specifically designed to improve the quality of maternal health services.** CMQCC establishes quality improvement collaboratives intended to support hospitals, including small, rural, and/or low-performing hospitals, to both improve and sustain practices to improve maternal health outcomes. CMQCC's coaching team provides hands-on, in-person training to onboard and support providers in participating hospitals. In 2018, Blue Shield of California funded a Quality Improvement Training Academy that trains hospital leadership teams on core quality improvement skills. Participation in these collaboratives has been extended to birth centers, in addition to the traditional hospitals previously participating.
- **Establishing incentive programs for organizations participating in quality improvement activities.** CMQCC has worked to identify, develop, and sustain quality improvement incentive programs for maternal health programs in California through strategic partnerships with payors such as California's managed Medicaid programs and Partnership Health Plan. These incentives encourage hospitals to achieve and maintain certain quality benchmarks through sustained quality improvement efforts. The California Secretary of Health and Human Services also published a public honor roll of hospitals that have achieved the Healthy People 2020 rate for cesarean sections. CMQCC encourages participation by small and rural providers by offering discounted rates and scholarship funds to offset participation costs.
- **Providing a maternal health e-learning platform for provider professional development.** CMQCC rolled out an e-learning program for rural and low-birth-volume hospitals to engage and educate nurses on skills for supporting labor. These sessions have specifically contributed to improving access to and the quality of labor and delivery care in small and rural hospitals.

Results

Since its inception, CMQCC has documented the following changes in maternal health outcomes in California:

- Decline in rates of maternal mortality by more than 55%.

- Decline in maternal morbidity by 20.8% among hospitals participating in the quality collaboratives for hemorrhage and preeclampsia.
- Increase in full-term births by 8%.
- Potential increase in public interest in maternal health outcomes and health care performance due to increased public reporting of quality data.

Barriers

Factors related to provider turnover, limited provider capacity, and low birth volumes all serve as barriers to the participation of small and rural hospitals in CMQCC's programs. Low labor and delivery volumes are a barrier to analyzing and interpreting quality and performance measures among small and rural hospitals. When assessing the quality of care for small hospitals, CMQCC is sensitive to interpretation of data and its relation to quality improvement.

Facilitators

CMQCC maintains strong connections with Stanford University and the State of California for program promotion, support, and maintenance. Funding relationships and participation incentives provided by the California Healthcare Foundation, Blue Shield of California, California Medicaid, Healthcare Management Associates, the Yellow Chair Foundation, and the Robert Wood Johnson Foundation have also been essential to the sustainability of the program.

To ease participation barriers among small and rural hospitals, CMQCC provides discounted participation fees. As part of the Data Center's effort, CMQCC also attempts to collect data with minimal burden on hospitals. To this end, CMQCC repurposed discharge data required by the state by requiring that the same data be sent to the collaborative. CMQCC receives birth certificate data from the state as well, which requires minimal extra effort for those reporting the data.

Areas of Opportunity Identified by Participants

Through its work, CMQCC has identified recent trends and priority areas in health system strengthening, data collection and analysis, and social support programming to improve maternal health outcomes in California, including:

Quality Improvement

- Incorporate Regionalization of Care models as a key component of quality improvement collaboratives.
- Provide discounts or financial support to rural providers who participate in Quality Care Collaboratives.

4. Kearny County Hospital's Pioneer Baby Program

- **Location:** Lakin, Kansas
- **Organization Type:** Critical Access Hospital (25 bed medical/surgical unit)
- **Community Characteristics:** Population of Lakin 2,216 in 2010; Largest Industry: Food Service and Accommodations

Description of the Program or Practice

As multiple hospitals surrounding Lakin, Kansas closed their obstetric units, women in the nearby counties were experiencing decreased access to maternal health services while also experiencing increasing maternal health risk factors such as high rates of gestational diabetes (approximately twice the national average), low engagement in prenatal care, and high rates of type 2 diabetes after birth. Furthermore, the closest maternal-fetal medicine specialist was over four hours away. To address the diminishing access, Kearny County Hospital sought opportunities to expand its maternal health services, particularly for labor and delivery. The hospital leveraged several strategies to improve access to this care, including:

- **Building the cross-discipline maternal health workforce.** Kearny County Hospital currently has eight providers (seven physicians and one physician's assistant) who have been trained to perform labor and delivery services. Many of these providers were recruited after their residencies at Kearny County Hospital. The hospital also trains and utilizes mid-level providers to deliver care up to 32 weeks.
- **Partnering with foundations and universities to improve quality of care.** Given the distance to the nearest maternal-fetal specialist in this region, Kearny County Hospital applied for a $250,000 grant through the Children's Miracle Network to bring one from the University of Kansas School of Medicine in Wichita to Kearny County Hospital once a month. This specialist not only provides care to pregnant women, he also provides ongoing training and support to local providers to improve their ability to care for high-risk pregnancies. Last year, the hospital partnered with Harvard University's Boston Children's Hospital to conduct virtual education and case study reviews with Kearny County Hospital providers. Harvard providers donated their time for this training and the Kearny providers received continuing education credits.
- **Reaching out to Kearny's most vulnerable maternal populations.** The hospital has also focused on reaching out to the surrounding immigrant populations, which include immigrants and refugees from Somalia, Ethiopia, El Salvador, Ecuador, Guatemala, Haiti, Burma, Vietnam, China, and Kenya. Many providers use some of their 10-week leave to voluntarily provide care in countries where these immigrant populations reside, which has advanced the providers' ability to offer culturally competent care.
- **Increasing access to in-person and virtual prenatal care.** Kearny County Hospital has employed multiple strategies to engage women within the region in perinatal care. The hospital received a $100,000 grant from Tyson Foods to place care coordinators in its plants to better engage patients, including pregnant women who need prenatal care. The hospital is also collaborating with the Kansas Department of Health and Environment and the March of Dimes to implement group prenatal care modeled after the Becoming a Mom program. The hospital has implemented virtual support programs for women in their prenatal and postpartum periods using Facebook, and weight management coaching through the National Diabetes Prevention Program

using Zoom Meetings.

Results

As a result of these efforts to improve its maternal health services, Kearny County Hospital has experienced the following results:

- Increased volume of births from 100 deliveries a year to 300–350 deliveries a year, which indicates the successful provision of labor and delivery care to women from nearby counties
- Reduction in births of babies that were large for gestational age from 28% to 17%
- Increase in breastfeeding rates by 30%

Barriers

Kearny County Hospital had consistently experienced barriers related to financial sustainability of its services. The hospital's negative margins were subsidized by local property taxes. In 2018 the hospital was able to turn a profit, although its maternal health services were not a strong contributor to this financial turnaround. Hospital representatives noted that the Critical Access Hospital model creates a disincentive for the hospital to provide maternity services because it cannot include maternity-related costs in its Medicare Cost Report. Costs related to training and support for labor and delivery nurses also have to be included on a separate ledger from the Medicare Cost Report.

Facilitators

While the majority of the hospital's maternal health services are reimbursed through Medicaid, the hospital also heavily leans on the 340B program and actively seeks grants and philanthropic donations (e.g., donations to purchase an ultrasound machine) to support its maternal health programs. Additional facilitators included partnerships with local employers (e.g., Tyson Foods) to encourage community linkage to and engagement in care.

Areas of Opportunity Identified by Participants

Kearny County Hospital's experiences raise the following implications and/or recommendations to improve access to maternal health services in rural areas:

Access to Hospitals and Obstetric Units

- Allow maternity care services, including training and support for labor and delivery nurses, on Medicare Cost Reports for Critical Access Hospitals.
- Establish a disproportionate share or kickback payment to hospitals to ensure all women have access to maternal health services tying additional payments to maternal health outcomes, such as rates of cesarean section and vaginal births after cesarean section.
- Utilize the 340B program and philanthropic donations from local and national funders.

Telemedicine and Other Innovations

- Establish mechanisms or funding opportunities to support partnerships between academic medical centers and rural providers to conduct training via telemedicine.

5. CenteringPregnancy of South Carolina

- **Location:** Multiple locations in South Carolina
- **Organization Type:** Technical Assistance Program for Group Prenatal Care
- **Community Characteristics:** Population: 4,625,364 in 2010 (1,557,555 in rural communities); Largest Industry: Aerospace and Aviation, Automotive Manufacturing

Description of the Program or Practice

CenteringPregnancy of South Carolina is a subset of the larger Centering Healthcare Institute that provides a group prenatal care model for pregnancy. The South Carolina implementation of CenteringPregnancy began in 2012 at the Greenville Health System and has expanded to 24 sites (22 sites are currently operating) across South Carolina. CenteringPregnancy leveraged several strategies to improve access to this care, including:

- **Providing technical assistance and creating a collaboration network in South Carolina.** Maternal health providers participating in the CenteringPregnancy program have benefited from technical assistance provided by the state's CenteringPregnancy program coordinator, as well as from exposure to and collaboration with participating sites across the state. Using grant funding from the March of Dimes, the program coordinator can provide training, technical assistance, and materials to rural implementation sites free of charge. The coordinator has also hosted CenteringPregnancy convenings for the participating sites to share challenges and best practices in person, although these meetings have recently been less frequent due to challenges in scheduling time for a large group of providers.
- **Establishing enhanced payments for CenteringPregnancy services; locating sustained funding for CenteringPregnancy-based maternal health training and program maintenance**. CenteringPregnancy of South Carolina has been successful in working with South Carolina's Medicaid program and Blue Cross Blue Shield of South Carolina to establish enhanced payments (additional $30 per visit) for prenatal visits occurring through CenteringPregnancy groups, to help offset the additional cost to local practices for the group model.
- **Designing alternative versions of CenteringPregnancy to increase sustainability among rural programs.** Because many rural implementation sites experience lower volumes of pregnant women than recommended for a robust experience, several sites have structured their cohorts to include women with due dates across two months rather than just one. Among these cohorts, providers have experimented with creating smaller groups of women with closer due dates, although this is not consistent with the traditional CenteringPregnancy model. To address this barrier, the March of Dimes is working with the Centering Healthcare Institute to design another model of group prenatal care that may be more effective with rural women.
- **Fostering maternal health research in South Carolina.** CenteringPregnancy of South Carolina has worked with organizations like the Georgia Health Policy Center and the University of South Carolina to collect, analyze, and publish data related to the impacts of the CenteringPregnancy model on maternal health outcomes in South Carolina. However, because of the low volume of women participating in rural sites, these findings cannot be dissected by urban and rural distinctions.

Results

As a result of these efforts to improve maternal health services in South Carolina, CenteringPregnancy has experienced the following results:

- Improved maternal health outcomes, including lower rates of preterm birth, low-weight babies, caesarian deliveries, and gestational diabetes.
- Higher rates of breastfeeding initiation among participants.
- Fewer calls to the on-call nurse and trips to the emergency department among participants.
- Implementation, sustainment, and collaboration among 22 CenteringPregnancy sites across the state, including both urban and rural communities.

Barriers

CenteringPregnancy faces significant barriers to sustainability in South Carolina. Low volumes of pregnant women within rural communities make it difficult to achieve the required number of women (8–12) within each CenteringPregnancy cohort. Barriers related to transportation, child care, and education about the importance of prenatal care also impact women's engagement in group prenatal classes. Furthermore, some women have voiced concerns with engaging in a group model for prenatal care, due to stigma and privacy concerns, and would prefer to retain care with their individual provider despite enhanced outcomes documented for the Centering model.

Additionally, implementing and maintaining the CenteringPregnancy program requires immense buy-in from leaders and providers, which is often difficult to achieve and sustain in rural areas because of provider turnover. Enhanced reimbursements provided by Medicaid and Blue Cross Blue Shield often do not cover the costs of implementing the program, particularly lost provider time, costs of maintaining a group classroom, and costs of providing materials, refreshments, and incentives (e.g., diapers giveaways) to participants. Furthermore, providers that already receive an enhanced payment for being a Rural Health Center or Critical Access Hospital must choose between receiving their enhanced payments for rural designation or an enhanced CenteringPregnancy payment.

CenteringPregnancy of South Carolina has also experienced barriers in trying to modify its program to meet the needs of rural providers. Telemedicine solutions are not yet feasible for this program because of push-back in adoption by providers and reduced engagement among participants. One site aims to implement the program across multiple locations, including provider clinics that will initiate prenatal care in early and late gestational ages, while the hospital provides care during CenteringPregnancy visits in the second and parts of the third trimester. The effectiveness of this model is to be determined. There are concerns related to reimbursement and continuity of care throughout the prenatal period.

Facilitators

CenteringPregnancy of South Carolina relies on its partnership with and funding from the March of Dimes to support training, technical assistance, and materials for the program. Achieving enhanced payments through South Carolina Medicaid and Blue Cross Blue Shield of South Carolina has made the program more sustainable among providers. Finally, CenteringPregnancy of South Carolina works with the Georgia Health Policy Center and the University of South Carolina to collect, analyze, and publish findings related to the program's impact on maternal health outcomes in South Carolina.

For one site in Dillon, South Carolina, facilitators for their program include providing incentives (e.g., free diapers, wipes) to encourage women to attend classes, fostering commitment among hospital leadership to continue the program despite lost provider time, and establishing local partnerships with psychiatric or crisis centers to engage women in support services (e.g., treatment for substance use).

Areas of Opportunity Identified by Participants

CenteringPregnancy's experiences within South Carolina raise the following implications and/or recommendations to improve access to maternal health services in rural areas:

Access to Hospitals and Obstetric Units

- Develop new or shared payment or delivery models for providers and CenteringPregnancy sites to collaborate for prenatal care.
- Establish enhanced payments for rural providers who provide additional maternal health services such as group prenatal care (e.g., CenteringPregnancy); do not disqualify Rural Health Centers, Critical Access Hospitals, and Federally Qualified Health Centers from these payments.
- Improve transportation services provided by or funded through Medicaid programs (e.g., relax "call-ahead" requirements, shorten trips between rural and urban centers).

6. University of Wisconsin's Rural Residency Program in Obstetrics and Gynecology

- **Location:** Madison, Wisconsin
- **Organization Type:** Medical School and Residency Program
- **Community Characteristics:** Population of Wisconsin 5,686,986 in 2010 (1,697,348 living in rural areas); Largest Industry: Agriculture, Food, and Beverage

Description of the Program or Practice

In light of the growing shortage of rural OB-GYN providers, the University of Wisconsin Department of Obstetrics and Gynecology established a rural residency program two years ago. The residency program aims to increase access to maternal health services by:

- **Increasing training and education opportunities related to rural disparities among medical students.** The addition of the rural training track has improved exposure to and understanding of the barriers that rural communities experience in accessing maternal health services. In addition, the medical school is offering a one-month health disparities course for all students, which includes an examination of rural/urban disparities. Many residents not specifically assigned to rural locations are opting to have one of their rotations held in a rural hospital. Additionally, the rural residents are sharing what they learn with their peers.
- **Utilizing the training program to improve relationships and communication between rural providers and academic medical centers.** By placing medical residents in rural training institutions, both the residents and the rural providers obtain access to maternal-fetal medicine specialists based within the medical school. The program has used telemedicine to care for high-risk obstetric patients in rural settings, and in the future, the department is going to host a Thursday morning didactic with rural providers and residents on maternal morbidity and mortality using telemedicine technologies.
- **Partnering with state-level agencies and other workforce training programs to communicate the need to improve the rural workforce.** The residency program has established relationships with other key institutions and associations within the state to demonstrate the need for rural training programs for OB-GYN providers. The Wisconsin Hospital Association has led reporting on practicing physicians within the state, which raised awareness of the need for rural providers and has also been instrumental in generating the Rural Residency Assistance Program that the OB-GYN department at the medical school utilizes to fund the rural residencies. Other partnerships with the Wisconsin Health Collaborative, Medical College of Wisconsin, and Aurora University have also improved collaboration and sharing of best practices among workforce training programs.

Results

Given that this program has existed for only two years, data related to retention of OB-GYN providers in rural areas is not available. Nevertheless, the residency program has achieved the following:

- Increased interest among medical students to participate in a rural training track, as either a rotation or residency location.

- Increased interest from rural hospitals and providers to serve as preceptors for rural residents.
- Increased collaboration among rural providers and academic medical institutions for consultations and continued education.

Barriers

- The Medicare Residency Cap on Graduate Medical Education funding for residency sites does not allow for increasing the number of medical residency positions available.
- Regulations limiting payments for both serving as a rural health clinic or Critical Access Hospital and participating in a rural training program put financial strain on participating hospitals.
- Some existing grant programs will fund rural residency positions but exclude OB-GYN positions due to several factors, including controversy over the range of services provided by OB-GYN providers.
- Because rural residents are required to have a practicing OB-GYN physician serve as a preceptor, some of the rural communities, such as tribal communities within Wisconsin, are not eligible to host an OB-GYN resident.
- The OB-GYN specialty is unique because it is a surgical specialty that also provides continuity of care. Currently, residents are required to complete 120 half-day clinic sessions in order to graduate, but they must be at the same clinic location with the same panel of patients. Achieving the required number of sessions within the same patient panel can be difficult in rural communities.

Facilitators

- The Wisconsin Rural Residency Assist Program is a grant program funded by the state department of health that helps offset the costs for rural hospitals to host students.
- Collaborations with institutions and organizations such as the Wisconsin Health Collaborative, the Medical College of Wisconsin, and Aurora University have helped keep programs up to date with emerging strategies or risks related to training initiatives and funding opportunities.

Areas of Opportunity Identified by Participants

The University of Wisconsin's experiences raise the following implications and/or recommendations to improve access to maternal health services in rural areas:

Access to a Maternal Health Workforce

- Redefine rural residency tracks to allow for integration and training in both rural and urban areas.
- Modify the definition of continuity of care requirements from the Accreditation Council for Graduate Medical Education to allow students to complete training requirements (e.g., continuity of care training for a patient panel) in two or more locations.
- Develop models that allow residents to train in locations with no practicing OB-GYN (e.g., traveling clinics).
- Expand funding for OB-GYN programs in rural residency or for training.
- Expand the Medicare Residency Cap on Graduate Medical Education funding for residency sites.

APPENDIX D. ACRONYMS LIST

Acronym	Definition
ABOG	American Board of Obstetrics and Gynecology
ACME	American Commission for Midwifery Education
ACOG	American College of Obstetricians and Gynecologists
AI/AN	American Indian/Alaska Native
AIM	Alliance for Innovation on Maternal Health
AMCB	American Midwifery Certification Board
CDC	Centers for Disease Control and Prevention
CHIP	Children's Health Insurance Program
CHIPRA	Children's Health Insurance Program Reauthorization Act
CMQCC	California Maternal Quality Care Collaborative
CMS	Centers for Medicare and Medicaid Services
DEM	Direct Entry Midwives
HRSA	Health Resources and Services Administration
LOCATe	Levels of Care Assessment Tool
MMRC	Maternal Mortality Review Committee
OB	Obstetric
OB-GYN	Obstetrician–Gynecologist
PQC	Perinatal Quality Cooperative
WHO	World Health Organization

ENDNOTES

[1] Centers for Disease Control and Prevention. (2018). Births: Final Data for 2017. National Vital Statistics Reports, 67 (8). Retrieved from: https://www.cdc.gov/nchs/data/nvsr/nvsr67/nvsr67_08-508.pdf

[2] Luthra, S. (2018). Medicaid is Rural America's Financial Midwife. Kaiser Health News. Retrieved from: https://khn.org/news/medicaid-is-rural-americas-financial-midwife/

[3] Young, R. A. (2018). Maternity Care Services Provided by Family Physicians in Rural Hospitals. Journal of the American Board of Family Medicine, 30(1):71-77.

[4] Vedam , S., Stoll, K., MacDorman, M., et al. (2018). Mapping integration of midwives across the United States: Impact on access, equity, and outcomes. PLoS ONE 13(2): e0192523. Retrieved from https://doi.org/10.1371/journal.pone.0192523

[5] Friedman, H. S., Liang, M., & Banks, J. L. Measuring the Cost–Effectiveness of Midwife-Led versus Physician-Led Intrapartum Teams in Developing Countries. Women's Health, 553–564. Retrieved from https://doi.org/10.2217/WHE.15.18

[6] American College of Nurse-Midwives. (2012). Midwifery: Evidence-Based Practice: A Summary of Research on Midwifery Practice in the United States. Retrieved from http://www.midwife.org/acnm/files/cclibraryfiles/filename/000000002128/midwifery%20evidence-based%20practice%20issue%20brief%20finalmay%202012.pdf

[7] Centers for Medicare & Medicaid Services (2019). Fact Sheet: Fiscal Year (FY) 2020 Medicare Hospital Inpatient Prospective Payment System (IPPS) and Long Term Acute Care Hospital (LTCH) Prospective Payment System (CMS-1716-F). Retrieved from https://www.cms.gov/newsroom/fact-sheets/fiscal-year-fy-2020-medicare-hospital-inpatient-prospective-payment-system-ipps-and-long-term-acute-0

[8] The Cecile G. Sheps Center for Health Services Research. 102 Rural Hospital Closures: January 2010 – Present. Retrieved from: https://www.shepscenter.unc.edu/programs-projects/rural-health/rural-hospital-closures/

[9] United States Government Accountability Office. GAO-18-634, Rural Hospital Closures: Number and Characteristics of Affected Hospitals and Contributing Factors. August 2018.

[10] Lindrooth RC, Perraillon MC, Hardy RY, Tung GJ. Understanding the relationship between Medicaid expansions and hospital closures. Health Affairs. 2018 Jan 1;37(1):111-20.

[11] Kaufman, B, Pink, C, and Holmes, M. Prediction of Financial Distress Among Rural Hospitals. North Carolina Rural Health Research Program, Cecil G. Sheps Center for Health Services Research, The University of North Carolina at Chapel Hill. Available: http://www.shepscenter.unc.edu/wp-content/uploads/2016/01/2015Prediction-of-Distress.pdf

[12] Hung, P, Kozhimannil, K, Henning-Smith, C and Casey, M. Closure of Hospital Obstetric Services Disproportionately Affects Less-Populated Rural Counties. University of Minnesota Rural Health Research Center. April 2017. Available: http://rhrc.umn.edu/wp-content/files_mf/1491501904UMRHRCOBclosuresPolicyBrief.pdf

[13] Hung, P., Henning-Smith, C., Casey, M., & Kozhimannil, K. (2017). Access to Obstetrics Services in Rural Counties still Declining, with 9 Percent Losing Services, 2004-2014. Health Affairs, 36(9), 1663-1671.

[14] Hung, P, Henning-Smith, C, Casey, M, and Kozhimannil, K. Access to Obstetric Services in Rural Counties Still Declining, With 9 Percent Losing Services, 2004–14. Health Aff (Millwood). 2017 Sep 1; 36(9): 1663-1671.

[15] The American College of Obstetricians and Gynecologists. "Health Disparities in Rural Women". Committee Opinion, 2014, 586. Retrieved from: https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Health-Disparities-in-Rural-Women

[16] Mental Health Care Health Professional Shortage Areas. Kaiser Family Foundation. Updated December, 31, 2018. Retrieved from: https://www.kff.org/other/state-indicator/mental-health-care-health-professional-shortage-areas-hpsas/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D

[17] Human Services to Support Rural Health. Rural Health Information Hub. Retrieved from: https://www.ruralhealthinfo.org/topics/rural-human-services

[18] Thomas SR, Holmes GM, Pink GH. To What Extent do Community Characteristics Explain Differences in Closure among Financially Distressed Rural Hospitals? J Health Care Poor Underserved. 2016;27(4A):194-203.

[19] Centers for Disease Control and Prevention. Pregnancy Mortality Surveillance System. Retrieved from https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-mortality-surveillance-system.htm

[20] Maron, DF. Maternal Health Care Is Disappearing in Rural America. Scientific American, 2017. Retrieved from: https://www.scientificamerican.com/article/maternal-health-care-is-disappearing-in-rural-america/

[21] Kuh, D, Ben-Shlomo, Y, editors. A Life Course Approach to Chronic Disease Epidemiology. New York, NY: Oxford University Press; 1997.

[22] Braveman, P, Barclay, C. Health disparities beginning in childhood: A life-course perspective. Pediatrics. 2009;124:S163–S175.

[23] Cable, N. Life Course Approach in Social Epidemiology: An Overview, Application and Future Implications. Journal of Epidemiology. 2014;24(5):347-352. doi:10.2188/jea.JE20140045.
[24] Henning-Smith, C. Diminishing Access to Rural Maternity Care and Associated Changes in Birth Locations and Outcomes. Webinar Presentation: Rural Health Research Gateway, Apr. 2018.
[25] Henning-Smith, C. Diminishing Access to Rural Maternity Care and Associated Changes in Birth Locations and Outcomes. Webinar Presentation: Rural Health Research Gateway, University of Minnesota Rural Health Research Center, Apr. 2018. Retrieved from: https://www.ruralhealthresearch.org/assets/1166-4775/diminishing-access-to-rural-maternity-care-ppt.pdf
[26] Davis, NM et al., Worsening Rural-Urban Gap in Hospital Mortality, Journal of the American Board of Family Medicine, 30(6), Nov. 2017. Retrieved from: https://www.jabfm.org/content/30/6/816.long
[27] Martin JA, Hamilton BE, Osterman MJK, Driscoll AK, Drake P. Births: Final data for 2016. National Vital Statistics Reports; vol 67 no 1. Hyattsville, MD: National Center for Health Statistics. 2018.
[28] Foutz, J, Artiga S, and Garfield, R. The Role of Medicaid in Rural America, (Washington, DC: Henry J. Kaiser Family Foundation, April 2017), https://www.kff.org/medicaid/issue-brief/the-role-of-medicaid-in-rural-america/.
[29] https://www.omicsonline.org/open-access/first-trimester-prenatal-care-and-local-obstetrical-delivery-options-for-womenin-poverty-in-rural-virginia-2471-9846-1000137.php?aid=80513
[30] Thorsen ML, Thorsen A, McGarvey R. Operational efficiency, patient composition and regional context of US health centers: Associations with access to early prenatal care, and low birth weight. Social Science & Medicine. 2019 Mar 1. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0277953619301169
[31] Novoa, C, Taylor, J, Exploring African Americans' High Maternal and Infant Death Rates, *Center for American Progress*, 2018. Retrieved from: https://www.americanprogress.org/issues/early-childhood/reports/2018/02/01/445576/exploring-african-americans-high-maternal-infant-death-rates/
[32] America's Health Rankings. Explore Maternal Mortality in the United States. 2018 Health of Women and Children Report, 2019. Retrieved from: https://www.americashealthrankings.org/explore/health-of-women-and-children/measure/maternal_mortality/state/ALL
[33] Creanga, A, Berg, C, Syverson, C, Seed, K, Bruce, FC, Callaghan W. Pregnancy-Related Mortality in the United States, 2006-2010, Obstetrics & Gynecology, 125(1), 5-12, Jan 2015. Doi: 10.1097/AOG.0000000000000564
[34] Singh GK. Maternal Mortality in the United States, 1935-2007: Substantial Racial/Ethnic, Socioeconomic, and Geographic Disparities Persist. A 75th Anniversary Publication. Health Resources and Services Administration, Maternal and Child Health Bureau. Rockville, Maryland: U.S. Department of Health and Human Services; 2010. Retrieved from: https://www.hrsa.gov/sites/default/files/ourstories/mchb75th/mchb75maternalmortality.pdf
[35] Metcalfe A, Wick J, Ronksley P. Racial disparities in comorbidity and severe maternal morbidity/mortality in the United States: an analysis of temporal trends. Acta obstetricia et gynecologica Scandinavica. 2018 Jan 1;97(1):89-96.
[36] Requejo, JH, Bhutta, ZA. The Post-2015 Agenda: Staying the Course in Maternal and Child Survival. Archives of Disease in Childhood. 2015 Feb 1;100(Suppl 1):S76-81.
[37] Johnson, K et al., Recommendations to Improve Preconception Health and Health Care --- United States. MMWR, 2006 April;55(RR06);1-23.
[38] Johnson, K et al., Recommendations to Improve Preconception Health and Health Care --- United States. MMWR, 2006 April;55(RR06);1-23.
[39] Johnson, K et al., Recommendations to Improve Preconception Health and Health Care --- United States. MMWR, 2006 April;55(RR06);1-23.
[40] Johnson, K et al., Recommendations to Improve Preconception Health and Health Care --- United States. MMWR, 2006 April;55(RR06);1-23.
[41] Markus, AR, Andres, E, Wes,t KD, Garro, N, Pellegrini, C. Medicaid Covered Births, 2008 Through 2010, in the Context of the Implementation of Health Reform. Women's Health Issues, September–October, 2013, 23(5), e273–e280. https://doi.org/10.1016/j.whi.2013.06.006
[42] Bennett, K et al., Rural Women's Health, National Rural Health Association Policy Brief, Rural Health Congress, Jan. 2013. Retrieved from: https://www.ruralhealthweb.org/getattachment/Advocate/Policy-Documents/RuralWomensHealth-(1).pdf.aspx
[43] Kozhimannil, K, et al., Maternal Opiod Use Disorder and Neonatal Abstinence Syndrome Among Rural US Residents, 2017-2014. The Journal of Rural Health, Oct. 2018. Retrieved from: https://onlinelibrary.wiley.com/doi/full/10.1111/jrh.12329
[44] Admon LK, Winkelman TN, Moniz MH, Davis MM, Heisler M, Dalton VK. Disparities in chronic conditions among women hospitalized for delivery in the United States, 2005–2014. Obstetrics & Gynecology. 2017 Dec 1;130(6):1319-26.
[45] Rural Health Information Pub. Violence and Abuse in Rural America. Retrieved from: https://www.ruralhealthinfo.org/topics/violence-and-abuse
[46] Hamilton BE, Rossen LM & Branum AM. Teen Birth Rates for Urban and Rural Areas in the United States, 2007-2015. NCHS Data Brief No. 264. November 2016. Retrieved from https://www.cdc.gov/nchs/data/databriefs/db264.pdf

[47] Center for Reproductive Rights. Research Overview of Maternal Mortality and Morbidity in the United States. Retrieved from: https://www.reproductiverights.org/sites/crr.civicactions.net/files/documents/USPA_MH_TO_ResearchBrief_Final_5.16.pdf

[48] Novoa, CT. Exploring African Americans' High Maternal and Infant Death Rates, *Center for American Progress*, 2018. Retrieved from: https://www.americanprogress.org/issues/early-childhood/reports/2018/02/01/445576/exploring-african-americans-high-maternal-infant-death-rates/

[49] Center for Reproductive Rights. Research Overview of Maternal Mortality and Morbidity in the United States. Retrieved from: https://www.reproductiverights.org/sites/crr.civicactions.net/files/documents/USPA_MH_TO_ResearchBrief_Final_5.16.pdf

[50] Roeder, A. America is Failing Its Black Mothers. Magazine of the Harvard T.H. Chan School of Public Health. 2019. Retrieved from: https://www.hsph.harvard.edu/magazine/magazine_article/america-is-failing-its-black-mothers/?utm_source=SilverpopMailing&utm_medium=email&utm_campaign=Daily%20Gazette%2020190107

[51] Eunice Kennedy Shriver National Institute of Child Health and Human Development. What is Prenatal Care and Why is it Important? Updated January 2019. Retrieved from: https://www.nichd.nih.gov/health/topics/pregnancy/conditioninfo/prenatal-care

[52] Larson EH, Hart LG, Rosenblatt RA. Is Non-Metropolitan Residence a Risk Factor for Poor Birth Outcomes in the U.S.? Soc Sci Med. 1997;45(2):171–188.

[53] Lishner, DM, Larson, EH, Rosenblatt, RA, Clark, SJ. Rural Maternal and Perinatal Health. In: Ricketts TC, ed. Rural Health in the United States. New York, NY: Oxford University Press; 1999:134–149.

[54] Peck, J, Alexander, K. Maternal, Infant, and Child Health in Rural Areas: a Literature Review. In: Gamm L, Hutchinson L, Dabney B, Dorsey A, eds. Rural Healthy People 2010: A Companion Document to Healthy People 2010, Volume 2. Published in 2003. Accessed May 2012. Retrieved from: http://srph.tamhsc.edu/centers/rhp2010/Volume2.pdf.

[55] Eunice Kennedy Shriver National Institute of Child Health and Human Development. What is Prenatal Care and Why is it Important? Updated January 2019. Retrieved from: https://www.nichd.nih.gov/health/topics/pregnancy/conditioninfo/prenatal-care

[56] Office on Women's Health. Prenatal care and tests. 2019 Jan. Retrieved from https://www.womenshealth.gov/pregnancy/youre-pregnant-now-what/prenatal-care-and-tests

[57] Schreck PK, Solem K, Wright T, Schulte C, Ronnisch KJ, Szpunar S. Both Prenatal and Postnatal Interventions Are Needed to Improve Breastfeeding Outcomes in a Low-Income Population. Breastfeed Med. 2017 Apr;12:142-148. doi: 10.1089/bfm.2016.0131. Epub 2017 Feb 16.

[58] American College of Obstetricians and Gynecologists. Prenatal genetic screening tests, 2017. Retrieved from https://www.acog.org/Patients/FAQs/Prenatal-Genetic-Screening-Tests?IsMobileSet=false

[59] The American College of Obstetricians and Gynecologists. "Health Disparities in Rural Women". Committee Opinion, 2014, 586. Retrieved from: https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Health-Disparities-in-Rural-Women

[60] Harris DE, Aboueissa AM, Baugh N, Sarton C. Impact of Rurality on Maternal and Infant Health Indicators and Outcomes in Maine. Rural Remote Health. 2015 Jul-Sep;15(3):3278. Epub 2015 Jul 21.

[61] Kozhimannil KB & Henning-Smith C. Missing Voices In America's Rural Health Narrative, Health Affairs Blog, April 10, 2019.DOI: 10.1377/hblog20190409.122546. Retrieved from https://www.healthaffairs.org/do/10.1377/hblog20190409.122546/full/

[62] Roeder, A. America is Failing Its Black Mothers. Magazine of the Harvard T.H. Chan School of Public Health. 2019. Retrieved from: https://www.hsph.harvard.edu/magazine/magazine_article/america-is-failing-its-black-mothers/?utm_source=SilverpopMailing&utm_medium=email&utm_campaign=Daily%20Gazette%2020190107

[63] *NPR/Robert Wood Johnson Foundation/Harvard T.H. Chan School of Public Health: "Discrimination in America: Experiences and Views of Native Americans." Survey of 342 Native American U.S. adults conducted Jan. 26-April 9, 2017.*

[64] Committee on American Indian/Alaska Native Women's Health. Committee Opinion: Health Care for Urban American Indian and Alaska Native Women. The American College of Obstetricians and Gynecologists. January 2012. Retrieved from: https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Health-Care-for-Urban-American-Indian-and-Alaska-Native-Women?IsMobileSet=false

[65] Hanson, JD. Understanding Prenatal Health Care for American Indian Women in a Northern Plains tribe. Journal of Transcultural Nursing. 2012 Jan;23(1):29-37.

[66] United States Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Division of Vital Statistics, Natality public-use data 2007-2017, on CDC WONDER Online Database, October 2018. Accessed at http://wonder.cdc.gov/natality-current.html on Jun 9, 2019 1:03:50 AM.

[67] Reddy, UM, Rice, MM, et al. Serious Maternal Complications after Early Preterm Delivery (24-33 weeks' gestation). Am J Obstet Gynecol. 2015 Oct;213(4):538.e1-9. doi: 10.1016/j.ajog.2015.06.064. Epub 2015 Jul 9.

[68] Mann S, Mckay K, Brown H. The Maternal Health Compact. New England Journal of Medicine. 2017 Apr 6;376(14):1304-5.
[69] National Institutes of Health, Eunice Kennedy National Institute of Child Health and Human Development. What are some common complications during labor and delivery? 2017. Retrieved from https://www.nichd.nih.gov/health/topics/labor-delivery/topicinfo/complications
[70] Office on Women's Health. Labor and birth, 2018. Retrieved from https://www.womenshealth.gov/pregnancy/childbirth-and-beyond/labor-and-birth
[71] Park EM, Meltzer-Brody S, Suzuki, J. Evaluation and management of opioid dependence in pregnancy. Psychosomatics, 2012 Sept-Oct, 53(5), 424-432. doi: 10.1016/j.psym.2012.04.003
[72] Office on Women's Health. Labor and birth, 2018. Retrieved from https://www.womenshealth.gov/pregnancy/childbirth-and-beyond/labor-and-birth
[73] Centers for Disease Control and Prevention. Strategies to Prevent Obesity and Other Chronic Diseases: The CDC Guide to Strategies to Support Breastfeeding Mothers and Babies. Atlanta: U.S. Department of Health and Human Services; 2013. Retrieved from https://www.cdc.gov/breastfeeding/pdf/bf-guide-508.pdf
[74] Kozhimannil, KB, Hung, P, Henning-Smith, C, Casey, MM, Prasad, S. Association between Loss of Hospital-based Obstetric Services and Birth Outcomes in Rural Counties in the US. JAMA. 2018;319(12):1239-1247.
[75] Martin, JA, Hamilton, BE, Sutton, PD, et al. Births: Final Data for 2007. *Natl Vital Stat Rep.* 2010;58(4).
[76] Ellison, K., Martin, N. (2017). Nearly Dying In Childbirth: Why Preventable Complications Are Growing In U.S. NPR. Retrieved from: https://www.npr.org/2017/12/22/572298802/nearly-dying-in-childbirth-why-preventable-complications-are-growing-in-u-s
[77] Singh, GK. Maternal Mortality in the United States, 1935-2007: Substantial Racial/Ethnic, Socioeconomic, and Geographic Disparities Persist. A 75th Anniversary Publication. Health Resources and Services Administration, Maternal and Child Health Bureau. Rockville, Maryland: U.S. Department of Health and Human Services; 2010. Retrieved from: https://www.hrsa.gov/sites/default/files/ourstories/mchb75th/mchb75maternalmortality.pdf
[78] Singh, GK. Maternal Mortality in the United States, 1935-2007: Substantial Racial/Ethnic, Socioeconomic, and Geographic Disparities Persist. A 75th Anniversary Publication. Health Resources and Services Administration, Maternal and Child Health Bureau. Rockville, Maryland: U.S. Department of Health and Human Services; 2010. Retrieved from: https://www.hrsa.gov/sites/default/files/ourstories/mchb75th/mchb75maternalmortality.pdf
[79] Curtin, SC, Gregory, KD, Korst, LM, Uddin, SF. Maternal Morbidity for Vaginal and Cesarean Deliveries, According to Previous Cesarean History: New Data From the Birth Certificate, 2013. National vital statistics reports: from the Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System. 2015 May;64(4):1-3. Retrieved from: https://www.cdc.gov/nchs/data/nvsr/nvsr64/nvsr64_04.pdf
[80] Ellison, K, Martin, N. (2017). Nearly Dying In Childbirth: Why Preventable Complications Are Growing In U.S. NPR. Retrieved from: https://www.npr.org/2017/12/22/572298802/nearly-dying-in-childbirth-why-preventable-complications-are-growing-in-u-s
[81] Hung P, Henning-Smith CE, Casey MM & Kozhimannil KB. Access to obstetric services in rural counties still declining, with 9 percent losing services, 2004-14. Health Affairs, 2017 September, 36(9), https://doi.org/10.1377/hlthaff.2017.0338
[82] Hung P, Henning-Smith CE, Casey MM, Kozhimannil KB. Access to obstetric services in rural counties still declining, with 9 percent losing services, 2004–14. Health Affairs. 2017 Sep 1;36(9):1663-71.
[83] Thomas SR, Holmes GM, Pink GH. To What Extent do Community Characteristics Explain Differences in Closure among Financially Distressed Rural Hospitals? J Health Care Poor Underserved. 2016;27(4A):194-203.
[84] Spelke, B, Werner, E. The Fourth Trimester of Pregnancy: Committing to Maternal Health and Well-Being Postpartum. R I Med J (2013). 2018 Oct 1;101(8):30-33.
[85] Romao M, Cacciatore A, Giordano R & La Rosa B. Postpartum period: three distinct but continuous phases. J Prenat Med. 2010 Apr-Jun; 4(2): 22–25. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3279173/
[86] Spelke, B, Werner, E. The Fourth Trimester of Pregnancy: Committing to Maternal Health and Well-Being Postpartum. R I Med J (2013). 2018 Oct 1;101(8):30-33.
[87] Romao M, Cacciatore A, Giordano R & La Rosa B. Postpartum period: three distinct but continuous phases. J Prenat Med. 2010 Apr-Jun; 4(2): 22–25. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3279173/
[88] Spelke, B, Werner, E. The Fourth Trimester of Pregnancy: Committing to Maternal Health and Well-Being Postpartum. R I Med J (2013). 2018 Oct 1;101(8):30-33.
[89] Spelke, B, Werner, E. The Fourth Trimester of Pregnancy: Committing to Maternal Health and Well-Being Postpartum. R I Med J (2013). 2018 Oct 1;101(8):30-33.
[90] Kim, Y, Dee, V. Sociodemographic and Obstetric Factors Related to Symptoms of Postpartum Depression in Hispanic Women in Rural California. Journal of Obstetric, Gynecologic & Neonatal Nursing. 2018 Jan 1;47(1):23-31. Retrieved from: https://www.jognn.org/article/S0884-2175(17)30484-7/pdf

[91] Kozhimannil KB & Henning-Smith C. Missing Voices In America's Rural Health Narrative, Health Affairs Blog, April 10, 2019.DOI: 10.1377/hblog20190409.122546. Retrieved from https://www.healthaffairs.org/do/10.1377/hblog20190409.122546/full/

[92] Roeder, A. America is Failing Its Black Mothers. Magazine of the Harvard T.H. Chan School of Public Health. 2019. Retrieved from: https://www.hsph.harvard.edu/magazine/magazine_article/america-is-failing-its-black-mothers/?utm_source=SilverpopMailing&utm_medium=email&utm_campaign=Daily%20Gazette%2020190107

[93] Johnson, K et al., Recommendations to Improve Preconception Health and Health Care --- United States. MMWR, 2006 April;55(RR06);1-23.

[94] Kotelchuck, M. Improving the Health of Women Following Pregnancy: Inter-conception Care. Secretary's Advisory Committee on Infant Mortality. 2013. Retrieved from: https://www.hrsa.gov/advisorycommittees/mchbadvisory/InfantMortality/Meetings/20130424/kotelchuck.pdf

[95] Devaney, B, Bilheimer, L, Schore, J, Tognetti, J. The Savings in Medicaid Costs for Newborns and Their Mothers Resulting from Prenatal Participation in the WIC Program. Washington, DC: US Department of Agriculture, Food and Nutrition Service. 1990.

[96] Admon, LK, Winkelman, TN, Moniz, MH, Davis, MM, Heisler, M, Dalton, VK. Disparities in chronic conditions among women hospitalized for delivery in the United States, 2005–2014. Obstetrics & Gynecology. 2017 Dec 1;130(6):1319-26. Retrieved from: https://journals.lww.com/greenjournal/pages/articleviewer.aspx?year=2017&issue=12000&article=00019&type=Fulltext

[97] Kozhimannil KB & Henning-Smith C. Missing Voices In America's Rural Health Narrative, Health Affairs Blog, April 10, 2019.DOI: 10.1377/hblog20190409.122546. Retrieved from https://www.healthaffairs.org/do/10.1377/hblog20190409.122546/full/

[98] Roeder, A. America is Failing Its Black Mothers. Magazine of the Harvard T.H. Chan School of Public Health. 2019. Retrieved from: https://www.hsph.harvard.edu/magazine/magazine_article/america-is-failing-its-black-mothers/?utm_source=SilverpopMailing&utm_medium=email&utm_campaign=Daily%20Gazette%2020190107

[99] Ollove, M. A Shortage in the Nation's Maternal Health Care. Pew Charitable Trusts. August, 15, 2016. https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2016/08/15/a-shortage-in-the-nations-maternal-health-care

[100] P Hung, C Henning-Smith, M Casey, and K Kozhimannil. Access to Obstetric Services in Rural Counties Still Declining, With 9 Percent Losing Services, 2004–14. Health Aff (Millwood). 2017 Sep 1; 36(9): 1663-1671.

[101] March of Dimes. 2018. Nowhere to Go: Maternity care deserts across the U.S. Retrieved from: https://www.marchofdimes.org/materials/Nowhere_to_Go_Final.pdf

[102] Health Resources and Services Administration. Area Resource File (ARF) 2011-2012. Rockville, MD: US Department of Health and Human Services, Health Resources and Services Administration; 2012.

[103] Henning-Smith, C. Diminishing Access to Rural Maternity Care and Associated Changes in Birth Locations and Outcomes. Webinar Presentation: Rural Health Research Gateway, University of Minnesota Rural Health Research Center, Apr. 2018. Retrieved from: https://www.ruralhealthresearch.org/assets/1166-4775/diminishing-access-to-rural-maternity-care-ppt.pdf

[104] American College of Obstetricians and Gynecologists. Health Disparities in Rural Women. 2014. Retrieved from: https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Health-Disparities-in-Rural-Women

[105] Henning-Smith, C. Diminishing Access to Rural Maternity Care and Associated Changes in Birth Locations and Outcomes. Webinar Presentation: Rural Health Research Gateway, University of Minnesota Rural Health Research Center, Apr. 2018. Retrieved from: https://www.ruralhealthresearch.org/assets/1166-4775/diminishing-access-to-rural-maternity-care-ppt.pdf

[106] Kozhimannil KB, Henning-Smith C, Hung P. The Practice of Midwifery in Rural US Hospitals. Journal of midwifery & women's health. 2016 Jul;61(4):411-8.

[107] Vedam S, Stoll K, MacDorman M, Declercq E, Cramer R, Cheyney M, et al. (2018) Mapping integration of midwives across the United States: Impact on access, equity, and outcomes. PLoS ONE 13(2): e0192523. https://doi.org/10.1371/journal.pone.0192523

[108] Renfrew MJ, McFadden A, Bastos MH, Campbell J, et al. (2014) Midwifery and quality care: findings from a new evidence-informed framework for maternal and newborn care. Lancet; 384: 1129–45. http://dx.doi.org/10.1016/S0140-6736(14)60789-3.

[109] Midwives Alliance of North America. Midwives & the Law. February 2017. Retrieved from: https://mana.org/about-midwives/midwives-and-the-law

[110] American College of Nurse Midwives. Are CNMs and CMs legally recognized? Retrieved from: http://www.midwife.org/Legal-Recognition

[111] Medicaid Benefits: Nurse Midwife Services (2018). Henry J. Kaiser Family Foundation. Retreived from: https://www.kff.org/medicaid/state-indicator/nurse-midwife-services/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D#notes.

[112] Patterson, D. G., Longenecker, R., Schmitz, D., Xierali, I. M., Phillips, R. L., Skillman, S. M., & Doescher, M. P. (2012). Rural residency training for family medicine physicians: graduate early-career outcomes. Rural Training Track Technical Assistance Program Policy Brief.

[113] Rabinowitz, H. K., Diamond, J. J., Markham, F. W., & Santana, A. J. (2013). Retention of rural family physicians after 20–25 years: outcomes of a comprehensive medical school rural program. The Journal of the American Board of Family Medicine, 26(1), 24-27.

[114] Rabinowitz, H. K., Diamond, J. J., Markham, F. W., & Wortman, J. R. (2008). Medical school programs to increase the rural physician supply: a systematic review and projected impact of widespread replication. Academic Medicine, 83(3), 235-243.

[115] HRSA Bureau of Health Workforce. Rural Residency Planning and Development Program. Retrieved from: https://bhw.hrsa.gov/fundingopportunities/?id=bd0f561a-78b7-4053-a06f-722afa117f31

[116] Helseth, C. Nurse Midwives Deliver Needed Services in Rural Areas. August 2010. Retrieved from: https://www.ruralhealthinfo.org/rural-monitor/nurse-midwives-deliver-services/

[117] University of Wisconsin School of Medicine and Public Health. Rural OB-GYN Residency: First in the Nation. Retrieved from: http://www.obgyn.wisc.edu/residency/rural.aspx

[118] 115th Congress. H.R.315. Improving Access to Maternity Care Act. Retrieved from: https://www.congress.gov/bill/115th-congress/house-bill/315

[119] Commissioned Corps of the US Public Health Service. National Health Service Corps. Retrieved from: https://www.usphs.gov/student/nhsc.aspx

[120] HRSA Bureau of Health Workforce. Nurse Corps Loan Repayment Program. Retrieved from: https://bhw.hrsa.gov/loansscholarships/nursecorps/lrp

[121] American College of Obstetricians and Gynecologists. Health Disparities in Rural Women. 2014. Retrieved from: https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Health-Disparities-in-Rural-Women

[122] Suplee, PD et al., Improving Postpartum Education About Warning Signs of Maternal Morbidity and Mortality, Nursing for Women's Health, vol.20, 6, 552-567, January 2017. Retrieved from: https://nwhjournal.org/article/S1751-4851(16)30287-2/fulltext

[123] Navarro, K. Prehospital Management of Obstetric Complications. Texas EMS Magazine, January/February 2009. Retrieved from: https://www.ncbi.nlm.nih.gov/pubmed/28264877

[124] Interstate Medical Licensure Compact. The IMLC. Retrieved from: https://imlcc.org/

[125] Gunja, M. Z., Tikkanen, R., Seervai, S., Collins, R. What is the status of women's health and health care in the U.S. compared to other countries? The Commonwealth Fund. Dec. 2018. Retrieved from: https://www.commonwealthfund.org/publications/issue-briefs/2018/dec/womens-health-us-compared-ten-other-countries

[126] Women's Health Insurance Coverage. Henry J Kaiser Family Foundation. Dec 2018. Retrieved from: https://www.kff.org/womens-health-policy/fact-sheet/womens-health-insurance-coverage-fact-sheet/

[127] Day JC. Rates of Uninsured Fall in Rural Counties, Remain Higher Than Urban Counties. U.S. Census Bureau. Apr. 2019. Retrieved from: https://www.census.gov/library/stories/2019/04/health-insurance-rural-america.html

[128] Women's Health Insurance Coverage. Henry J Kaiser Family Foundation. Dec 2018. Retrieved from: https://www.kff.org/womens-health-policy/fact-sheet/womens-health-insurance-coverage-fact-sheet/

[129] Gunja, M. Z., Tikkanen, R., Seervai, S., Collins, R. What is the status of women's health and health care in the U.S. compared to other countries? The Commonwealth Fund. Dec. 2018. Retrieved from: https://www.commonwealthfund.org/publications/issue-briefs/2018/dec/womens-health-us-compared-ten-other-countries

[130] Garfield, R., Orgera, K., Damico, A. The Coverage Gap: Uninsured Poor Adults in States that Do Not Expand Medicaid. Mar 2019. Retrieved from: https://www.kff.org/medicaid/issue-brief/the-coverage-gap-uninsured-poor-adults-in-states-that-do-not-expand-medicaid/

[131] American College of Obstetricians and Gynecologists. Health Disparities in Rural Women. 2014. Retrieved from: https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Health-Disparities-in-Rural-Women

[132] Gunja, M. Z., Tikkanen, R., Seervai, S., Collins, R. What is the status of women's health and health care in the U.S. compared to other countries? The Commonwealth Fund. Dec. 2018. Retrieved from: https://www.commonwealthfund.org/publications/issue-briefs/2018/dec/womens-health-us-compared-ten-other-countries

[133] Centers for Medicare & Medicaid Services. Final Evaluation Report: Strong Start for Mothers and Newborns - Enhanced Prenatal Care Models. 2018. Retrieved from: https://innovation.cms.gov/initiatives/strong-start

[134] American College of Obstetricians and Gynecologists. Health Disparities in Rural Women. 2014. Retrieved from: https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Health-Disparities-in-Rural-Women

[135] Galwitz, P. Nearly Half of US Births Are Covered by Medicaid, Study Finds. Kaiser Health News. September 2013. Retrieved from: https://khn.org/news/nearly-half-of-u-s-births-are-covered-by-medicaid-study-finds/

[136] Kleppel L, Suplee PD, Stuebe AM, Bingham D. National Initiatives to Improve Systems for Postpartum Care. Matern Child Health J. 2016 Nov;20(Suppl 1):66-70.
[137] Daw JR, Hatfield LA, Swartz K, Sommers BD. Women in the United States experience high rates of coverage 'churn' in months before and after childbirth. Health Aff (Millwood) 2017; 36: 598-606.
[138] Molina RL, Pace LE. A Renewed Focus on Maternal Health in the United States. New England Journal of Medicine. 2017 Nov 2;377(18):1705-7.
[139] Extending Medicaid Coverage For Postpartum Moms. Health Affairs Blog, May 6, 2019. DOI: 10.1377/hblog20190501.254675
[140] Moniz, MH, Dalton, VK. Reimbursement for Immediate Postpartum Contraception Outside the Global Fee: Improving Outcomes and Reducing Costs for Moms and Babies. University of Michigan Institute for Healthcare Policy and Innovation. Retrieved from: https://ihpi.umich.edu/news/ihpi-briefs/reimbursement-immediate-postpartum-contraception-outside-global-fee-improving-outcomes-reducing
[141] Cherington, M, Dravid, N, Hawthorne, M. Developing targeted interventions to advance maternal health in a geographic Medicaid Accountable Care Organization: Lessons from the Implementation of Cambden Deliveries. https://www.camdenhealth.org/wp-content/uploads/2016/10/Camden-Delivers-White-Paper-v2.pdf
[142] Costich JF, Scuthchfield FD, Ingram, RC. Population Health, Public Health, and Accountable Care: Emerging Roles and Relationships. Am J Public Health. May 2015. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4386526/
[143] Kozhimannil, KI, Hung, P, McClellan, M, Casey, M, Prasad, S, Moscovice, I. Obstetric Services and Quality among Critical Access, Rural, and Urban Hospitals in Nine States. 2013. Retrieved from: http://rhrc.umn.edu/wp-content/files_mf/ob1.pdf
[144] Mhyre, JM., Wong, CA. The Anesthesia Workforce and Levels of Maternal Care. Anesthesia & Anagesia, June 2016. Vol 122: 1763-1765. Retrieved from: https://journals.lww.com/anesthesia-analgesia/subjects/Outcomes/Fulltext/2016/06000/The_Anesthesia_Workforce_and_Levels_of_Maternal.11.aspx
[145] Ananth CV, Lavery JA, Friedman AM, Wapner RJ, Wright JD. Serious Maternal Complications in Relation to Severe Pre-eclampsia: a Retrospective Cohort Study of the Impact of Hospital Volume. Send to BJOG. 2017 Jul;124(8):1246-1253. doi: 10.1111/1471-0528.14384. Epub 2016 Oct 21.
[146] Snowden JM, Cheng YW, Emeis CL, Caughey AB. The Impact of Hospital Obstetric Volume on Maternal Outcomes in Term, Non-Low-Birthweight Pregnancies. Am J Obstet Gynecol. 2015 Mar;212(3):380.e1-9. DOI: 10.1016/j.ajog.2014.09.026. Epub 2014 Sep 28.
[147] Lee WC, Phillips CD, Ohsfeldt RL. Do Rural and Urban Women Experience Differing Rates of Maternal Rehospitalizations? Rural Remote Health. 2015 Jul-Sep;15(3):3335. Epub 2015 Aug 18.
[148] Hung, P., Henning-Smith, C., Casey, M., & Kozhimannil, K. (2017). Access to Obstetrics Services in Rural Counties Still Declining, with 9 Percent Losing Services, 2004-2014. Health Affairs, *36*(9), 1663-1671. Retrieved from: https://www.ruralhealthresearch.org/assets/1166-4775/diminishing-access-to-rural-maternity-care-ppt.pdf
[149] Mann S, Mckay K, Brown H. The Maternal Health Compact. New England Journal of Medicine. 2017 Apr 6;376(14):1304-5.
[150] Henning-Smith, C. Diminishing Access to Rural Maternity Care and Associated Changes in Birth Locations and Outcomes. Webinar Presentation: Rural Health Research Gateway, University of Minnesota Rural Health Research Center, Apr. 2018. Retrieved from: https://www.ruralhealthresearch.org/assets/1166-4775/diminishing-access-to-rural-maternity-care-ppt.pdf
[151] March of Dimes. (December 2010). Toward Improving the Outcome of Pregnancy III. White Plains, NY: March of Dimes. Retrieved from https://www.marchofdimes.org/toward-improving-the-outcome-of-pregnancy-iii.pdf
[152] American College of Obstetricians and Gynecologists. Obstetric Care Consensus No. 2. Obstet Gynecol 2015;125:502–15. Retrieved from https://www.acog.org/Clinical-Guidance-and-Publications/Obstetric-Care-Consensus-Series/Levels-of-Maternal-Care?IsMobileSet=false
[153] American College of Obstetricians and Gynecologists. Obstetric Care Consensus No. 2. Obstet Gynecol 2015;125:502–15. Retrieved from https://www.acog.org/Clinical-Guidance-and-Publications/Obstetric-Care-Consensus-Series/Levels-of-Maternal-Care?IsMobileSet=false
[154] Centers for Disease Control and Prevention Division of Reproductive Health. CDC levels of Care Assessment Tool. Retrieved from: https://www.cdc.gov/reproductivehealth/maternalinfanthealth/LOCATe.html
[155] Elrod, JK, Fortenberry, JL. The Hub-and-Spoke Organization Design: an Avenue for Serving Patients Well. BMC Health Services Research, vol. 17, suppl. 1, p. 457, July 11, 2017. Retrieved from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5516840/
[156] Mann S, Mckay K, Brown H. The Maternal Health Compact. New England Journal of Medicine. 2017 Apr 6;376(14):1304-5.
[157] Alliman, J, Phillippi, J. Maternal Outcomes in Birth Centers: An Integrative Review of the Literature. Retrieved from: https://onlinelibrary.wiley.com/doi/full/10.1111/jmwh.12356
[158] Internet Citation: Six Domains of Health Care Quality. Content last reviewed November 2018. Agency for Healthcare Research and Quality, Rockville, MD. http://www.ahrq.gov/talkingquality/measures/six-domains.html
[159] https://apps.who.int/iris/bitstream/handle/10665/249155/9789241511216-eng.pdf;jsessionid=641801E241A67F1820FA9A4DA898A154?sequence=1

[160] https://apps.who.int/iris/bitstream/handle/10665/249155/9789241511216-eng.pdf;jsessionid=641801E241A67F1820FA9A4DA898A154?sequence=1
[161] Council on Patient Safety in Women's Healthcare. The Process of AIM. Retrieved from: https://safehealthcareforeverywoman.org/how-does-aim-work/
[162] Centers for Disease Control and Prevention Division of Reproductive Health. Perinatal Quality Collaboratives. Retrieved from: https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pqc.htm
[163] Review to Action. What Makes Maternal Mortality Review Unique? Retrieved from: https://reviewtoaction.org/learn/what-makes-maternal-mortality-review-unique
[164] The White House. Bill Announcement, December 21, 2018. Retrieved from: https://www.whitehouse.gov/briefings-statements/bill-announcement-10/
[165] Maternal Mortality Review Information Application. What is the Maternal Mortality Review Information Application? Retrieved from: http://mmria.org/
[166] Centers for Medicaid and CHIP Services. CMS Maternal and Infant Health Initiative: Improving Maternal and Infant Health Outcomes in Medicaid and CHIP. Retrieved from: https://www.medicaid.gov/medicaid/quality-of-care/downloads/maternal-and-infant-health-initiative.pdf
[167] Centers for Medicare and CHIP Services. 2019 Core Set of Maternal and Perinatal Health Measures for Medicaid and CHIP (Maternity Core Set). Retrieved from: https://www.medicaid.gov/medicaid/quality-of-care/downloads/performance-measurement/2019-maternity-core-set.pdf
[168] https://www.acog.org/-/media/Departments/Patient-Safety-and-Quality-Improvement/Call-to-Action-Paper.pdf?dmc=1&ts=20190530T2048365376
[169] Rakover, J. The Maternity Medical Home. The Chassis for a More Holistic Model of Pregnancy Care? 2016 Mar 22. Retrieved from: http://www.ihi.org/communities/blogs/_layouts/15/ihi/community/blog/itemview.aspx?List=7d1126ec-8f63-4a3b-9926-c44ea3036813&ID=222
[170] Johns Hopkins Bloomberg School of Public Health. Family Spirit: About Us. Retrieved from: https://www.jhsph.edu/research/affiliated-programs/family-spirit/about/
[171] California Department of Health Care Services. American Indian Infant Health Initiative. Retrieved from: https://www.dhcs.ca.gov/services/rural/Pages/AIIHIProgram.aspx
[172] https://www.thinkculturalhealth.hhs.gov/assets/pdfs/EnhancedCLASStandardsBlueprint.pdf
[173] https://mchb.hrsa.gov/training/cultural-competence.asp
[174] Health Services and Resources Administration. Federal Office of Rural Health Policy. n.d. Telehealth Programs. Retrieved from: https://www.hrsa.gov/rural-health/telehealth/index.html
[175] Mann S, Mckay K, Brown H. The Maternal Health Compact. New England Journal of Medicine. 2017 Apr 6;376(14):1304-5.
[176] Okoroh EM, Kroelinger CD, Smith AM, Goodman DA, Barfield WD. US and Territory Telemedicine Policies: Identifying Gaps in Perinatal Care. American Journal of Bbstetrics and Gynecology. 2016 Dec 1;215(6):772-e1.
[177] MACPAC. Chapter 2: Telehealth in Medicaid. Retrieved from: https://www.macpac.gov/wp-content/uploads/2018/03/Telehealth-in-Medicaid.pdf
[178] Wicklund, E. NC Health System Uses mHealth to Manage Gestational Diabetes. mHealth Intelligence, December 2017. Retrieved from: https://mhealthintelligence.com/news/nc-health-system-uses-mhealth-to-manage-gestational-diabetes
[179] Lifeline4Moms. Retrieved from: http://www.lifeline4moms.org/
[180] Association of State and Territorial Health Officials. Using Telehealth to Improve Maternal and Child Health Outcomes in Georgia. Retrieved from: http://www.astho.org/Maternal-and-Child-Health/Georgia-Uses-Telehealth-to-Improve-Maternal-and-Child-Health-Outcomes/
[181] Association of State and Territorial Health Officials. Using Telehealth to Improve Maternal and Child Health Outcomes in Georgia. Retrieved from: http://www.astho.org/Maternal-and-Child-Health/Georgia-Uses-Telehealth-to-Improve-Maternal-and-Child-Health-Outcomes/
[182] Text4Baby. Retrieved from: https://www.text4baby.org/
[183] Bush J, Barlow DE, Echols J, Wilkerson J, Bellevin K.. Impact of a Mobile Health Application on User Engagement and Pregnancy Outcomes Among Wyoming Medicaid Members. Telemedicine Journal E-Health. 2017 Nov;23(11):891-898. doi: 10.1089/tmj.2016.0242. Epub 2017 May 8.
[184] Medical University of South Carolina. Maternal Fetal Medicine. Retrieved from: https://muschealth.org/medical-services/womens/maternal-fetal-medicine
[185] Mann S, Mckay K, Brown H. The Maternal Health Compact. New England Journal of Medicine. 2017 Apr 6;376(14):1304-5.
[186] Association of Maternal and Child Health Programs. Quality Improvement in Maternity Care via Project ECHO. Reteived from: http://www.amchp.org/programsandtopics/BestPractices/InnovationStation/ISDocs/IS_Project%20ECHO.pdf
[187] Mental Health Care Health Professional Shortage Areas. Kaiser Family Foundation. Updated December, 31, 2018. Retrieved from: https://www.kff.org/other/state-indicator/mental-health-care-health-professional-shortage-areas-hpsas/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D

[188] Snell-Rood C, Feltner F, Schoenberg N. What Role Can Community Health Workers Play in Connecting Rural Women with Depression to the "De Facto" Mental Health Care System?. Community mental health journal. 2019 Jan 31;55(1):63-73.
[189] National Institute of Mental Health. Retrieved from: https://www.nimh.nih.gov/health/statistics/major-depression.shtml.
[190] American Psychiatric Association. Mental Health Disparities: Diverse Populations, 2017. Retrieved from: https://www.psychiatry.org/File%20Library/Psychiatrists/Cultural-Competency/Mental-Health-Disparities/Mental-Health-Facts-for-Diverse-Populations.pdf.
[191] Alegría M, Chatterji P, Wells K, Cao Z, Chen C, et al. Disparity in Depression Treatment among Racial and Ethnic Minority Populations in the United States. Psychiatric services. 2008 Nov; 59(11): 1264–1272.
[192] Narain K, Xu H, Azocar F, Ettner SL. Racial/ethnic disparities in specialty behavioral health care treatment patterns and expenditures among commercially insured patients in managed behavioral health care plans. Health Serv Res. 2019;54:575–585. https://doi.org/10.1111/1475-6773.13121
[193] American Psychiatric Association. Mental Health Disparities: Diverse Populations, 2017. Retrieved from: https://www.psychiatry.org/File%20Library/Psychiatrists/Cultural-Competency/Mental-Health-Disparities/Mental-Health-Facts-for-Diverse-Populations.pdf.
[194] Rural Hunger and Access to Healthy Food. Rural Health Information Hub. Retrieved from: https://www.ruralhealthinfo.org/topics/food-and-hunger
[195] Human Services to Support Rural Health. Rural Health Information Hub. Retrieved from: https://www.ruralhealthinfo.org/topics/rural-human-services
[196] Lomonaco-Haycraft KC, Hyer J, Tibbits B, Grote J, Stainback-Tracy K, Ulrickson C, Lieberman A, van Bekkum L, Hoffman MC. Integrated perinatal mental health care: a national model of perinatal primary care in vulnerable populations. Primary health care research & development. 2018 Jun:1-8.
[197] Rasmussen KM, Whaley SE, Pérez-Escamilla R, Ross AC, Baker SS, Hatfield T, Latulippe ME. New opportunities for breastfeeding promotion and support in WIC: review of WIC food packages, improving balance and choice. Journal of nutrition education and behavior. 2017 Jul 1;49(7):S197-201.
198 Steketee G, Ross AM, Wachman MK. Health outcomes and costs of social work services: a system atic review. American journal of public health. 2017 Dec;107(S3):S256-66.
[199] Association for State and Territorial Health Officials. Utilizing Community Health Workers to Improve Access to Care for Maternal and Child Populations: Four State Approaches. Retrieved from: http://www.astho.org/Maternal-and-Child-Health/AIM-Access-CHW-Issue-Brief/
[200] Agency for Healthcare Research and Quality. 2016 National Healthcare Quality and Disparities Report. Retrieved from: https://www.ahrq.gov/sites/default/files/wysiwyg/research/findings/nhqrdr/nhqdr16/2016qdr.pdf
[201] Novoa, C., Taylor, J., Exploring African Americans' High Maternal and Infant Death Rates, *Center for American Progress*, 2018. Retrieved from: https://www.americanprogress.org/issues/early-childhood/reports/2018/02/01/445576/exploring-african-americans-high-maternal-infant-death-rates/
[202] America's Health Rankings. Explore Maternal Mortality in the United States. 2018 Health of Women and Children Report, 2019. Retrieved from: https://www.americashealthrankings.org/explore/health-of-women-and-children/measure/maternal_mortality/state/ALL
[203] Creanga, AA et al., Race, Ethnicity, and Nativity Differentials in Pregnancy-Related Mortality in the United States, Obstetrics and Gynecology, 120(2), Aug.2012.
[204] Singh GK. Maternal Mortality in the United States, 1935-2007: Substantial Racial/Ethnic, Socioeconomic, and Geographic Disparities Persist. A 75th Anniversary Publication. Health Resources and Services Administration, Maternal and Child Health Bureau. Rockville, Maryland: U.S. Department of Health and Human Services; 2010. Retrieved from: https://www.hrsa.gov/sites/default/files/ourstories/mchb75th/mchb75maternalmortality.pdf
[205] America's Health Rankings. Health of Women and Children. Retrieved from: https://www.americashealthrankings.org/explore/health-of-women-and-children/measure/maternal_mortality/state/ALL.
[206] Preterm Birth. Centers for Disease Control and Prevention. Retrieved from: https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pretermbirth.htm
[207] Kozhimannil KB, Trinacty CM, Busch AB, Huskamp HA, Adams AS. Racial and ethnic disparities in postpartum depression care among low-income women. Psychiatric Services. 2011 Jun;62(6):619-25.
[208] America's Health Rankings. Explore Maternal Mortality in the United States. 2018 Health of Women and Children Report, 2019. Retrieved from: https://www.americashealthrankings.org/explore/health-of-women-and-children/measure/maternal_mortality/state/ALL
[209] Committee on American Indian/Alaska Native Women's Health. Committee Opinion: Health Care for Urban American Indian and Alaska Native Women. The American College of Obstetricians and Gynecologists. January 2012. Retrieved from: https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Health-Care-for-Urban-American-Indian-and-Alaska-Native-Women?IsMobileSet=false

[210] Hanson JD. Understanding prenatal health care for American Indian women in a Northern Plains tribe. Journal of Transcultural Nursing. 2012 Jan;23(1):29-37.
[211] United States Department of Health and Human Services (US DHHS), Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), Division of Vital Statistics, Natality public-use data 2007-2017, on CDC WONDER Online Database, October 2018. Accessed at http://wonder.cdc.gov/natality-current.html on Jun 9, 2019 1:03:50 AM.
[212] Committee on American Indian/Alaska Native Women's Health. Committee Opinion: Health Care for Urban American Indian and Alaska Native Women. The American College of Obstetricians and Gynecologists. January 2012. Retrieved from: https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Health-Care-for-Underserved-Women/Health-Care-for-Urban-American-Indian-and-Alaska-Native-Women?IsMobileSet=false
[213] Kuh, D, Ben-Shlomo, Y, editors. A Life Course Approach to Chronic Disease Epidemiology. New York, NY: Oxford University Press; 1997.
[214] Braveman, P, Barclay, C. Health disparities beginning in childhood: A life-course perspective. Pediatrics. 2009;124:S163–S175.
[215] Cable, N. Life Course Approach in Social Epidemiology: An Overview, Application and Future Implications. Journal of Epidemiology. 2014;24(5):347-352. doi:10.2188/jea.JE20140045.
[216] 2017 National Healthcare Quality and Disparities Report. Content last reviewed November 2018. Agency for Healthcare Research and Quality, Rockville, MD. https://www.ahrq.gov/research/findings/nhqrdr/nhqdr17/index.html.
[217] Council in Patient Safety in Women's Health Care. (2019). Reduction of Peripartum Racial/Ethnic Disparities (+AIM). Retrieved from https://safehealthcareforeverywoman.org/patient-safety-bundles/reduction-of-peripartum-racialethnic-disparities/
[218] Core Quality Measures Collaborative. CQMC Core Sets. Retrieved from https://www.qualityforum.org/CQMC_Core_Sets.aspx
[219] Building U.S. Capacity to Review and Prevent Maternal Deaths. Report from Nine Maternal Mortality Review Committees. Retrieved from: https://www.cdcfoundation.org/sites/default/files/files/ReportfromNineMMRCs.pdf
[220] Healthy Start. HRSA Maternal and Child Health. Retrieved from: https://mchb.hrsa.gov/maternal-child-health-initiatives/healthy-start
[221] Evaluation. Best Babies Zone. Retrieved from: https://www.bestbabieszone.org/Evaluation
[222] Healthy Start. HRSA Maternal and Child Health. Retrieved from: https://mchb.hrsa.gov/maternal-child-health-initiatives/healthy-start
[223] Harder+Company Community Research. Best Babies Zone Evaluation Outcomes. Retrieved from: https://www.bestbabieszone.org/Evaluation
[224] London K, Carey M, Russel K. Community Health Worker Certification Requirements by State. Boston: UMass Medical School Center for Health Law and Economics. 2016. Retrieved from https://www.cthealth.org/wp-content/uploads/2016/02/CHW-Certificaiton-by-State-Final-Final.pdf