Medication Access for Virginia Licensed Midwives

Virginia Families Deserve Better

Why should Licensed Midwives be legally allowed to administer certain medications?

Maternity Care Deserts

Maternity care deserts are areas where there is limited or no access to maternity health care services. According to a 2020 report published by the March of Dimes, **47% of Virginia counties are Maternity Care Deserts** (March of Dimes, 2020).

Safety & Ethics

Maternal mortality in the United States is higher than all other highly industrialized countries. More than 700 people die each year in the United States from childbirth-related causes, and it is estimated that approximately 60% of those deaths are preventable (Maternal Mortality Review Information Application (MMRIA), 2018). Hemorrhage is the leading cause of maternal death worldwide (James, 2022), and there are basic medications Licensed Midwives can administer to prevent or treat postpartum hemorrhage. Access to life-saving medications is a human right, and is essential to safe practice in all birth settings.

Strain on Hospital Systems

Families who choose to give birth at home or at a freestanding birth center ease the strain on hospital systems. It is unnecessary to burden hospitals with the responsibility of providing basic medications that could safely be administered outside the hospital setting.

Scope of Practice

Licensed Midwives in Virginia are restricted from administering the medications that are within their scope of practice*. Virginia is one of only two states that license midwives, yet restrict them from accessing these medications. Providers should be able to work within their full scope of practice.

Workarounds

Families have to jump through numerous hoops to gain access to the medications that make their birth safer. Some have to drive over two hours to see a physician who would be willing to prescribe medications. Some have to go to the hospital within 2 hours of their baby's birth so that their baby can receive a potentially life-saving vitamin K injection or erythromycin eye ointment that can prevent permanent blindness due to maternal infection. Some people have to choose between having to endure the pain of being sutured without the use of local anesthetic or risking permanent damage to their body by not having those lacerations repaired properly. Some must self-administer prescribed medications, while their Licensed Midwife stands by, unable to assist them due to an outdated law.

Pitocin®, Cytotec®, RhoGAM®, IV fluids, lidocaine, epinephrine, Methergine®, Oxygen, antibiotics, vitamin K (injectable - for infant), erythromycin ophthalmic ointment (also for infant).

Note: Maternal and maternity refers to any birthing person. While we attempt to be inclusive in our language, there may be quotes and terminology that is not inclusive.

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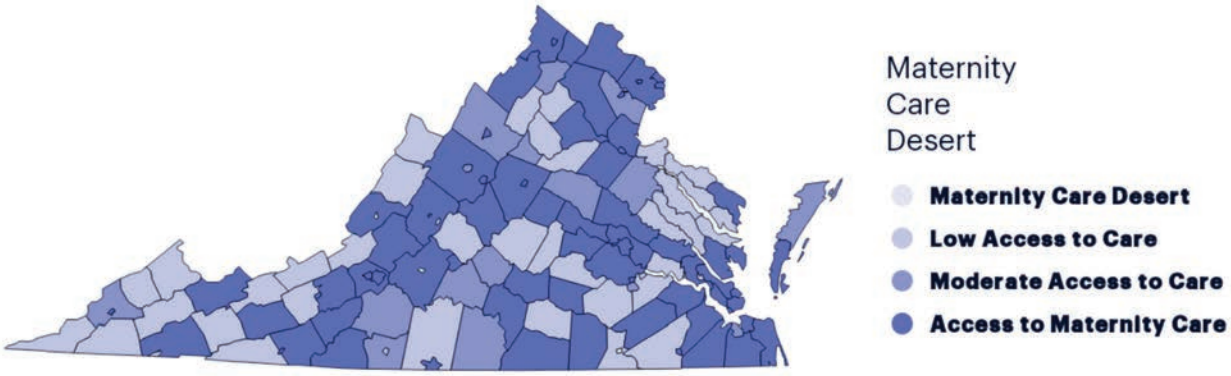
Maternity Care Deserts

Maternity care deserts are areas where there is limited or no access to maternity health care services. According to a 2020 report published by the March of Dimes, 47% of Virginia counties are Maternity Care Deserts or have low access to care. **There are 373,686 women who live in these counties with no or little care in Virginia.** (March of Dimes, 2020).



March of Dimes defines a maternity care desert as "any county without a hospital or birth center offering obstetric care and without any obstetric providers. Women may have low access to appropriate preventive, prenatal and postpartum care if they live in counties with few hospitals or birth centers (one or fewer) providing obstetric care, few obstetric providers (fewer than 60 per 10,000 births) or a high proportion of women without health insurance (10 percent or more). Moderate access to care is defined as living in a county with access to few hospitals/birth

My labors are so quick there is no way I could make it to the hospital. My nearest hospital is 90 minutes away and my last labor was 60 minutes from start to finish. I would have had to give birth on the side of the road if I had not had a home birth with my midwife.
— Valerie A.

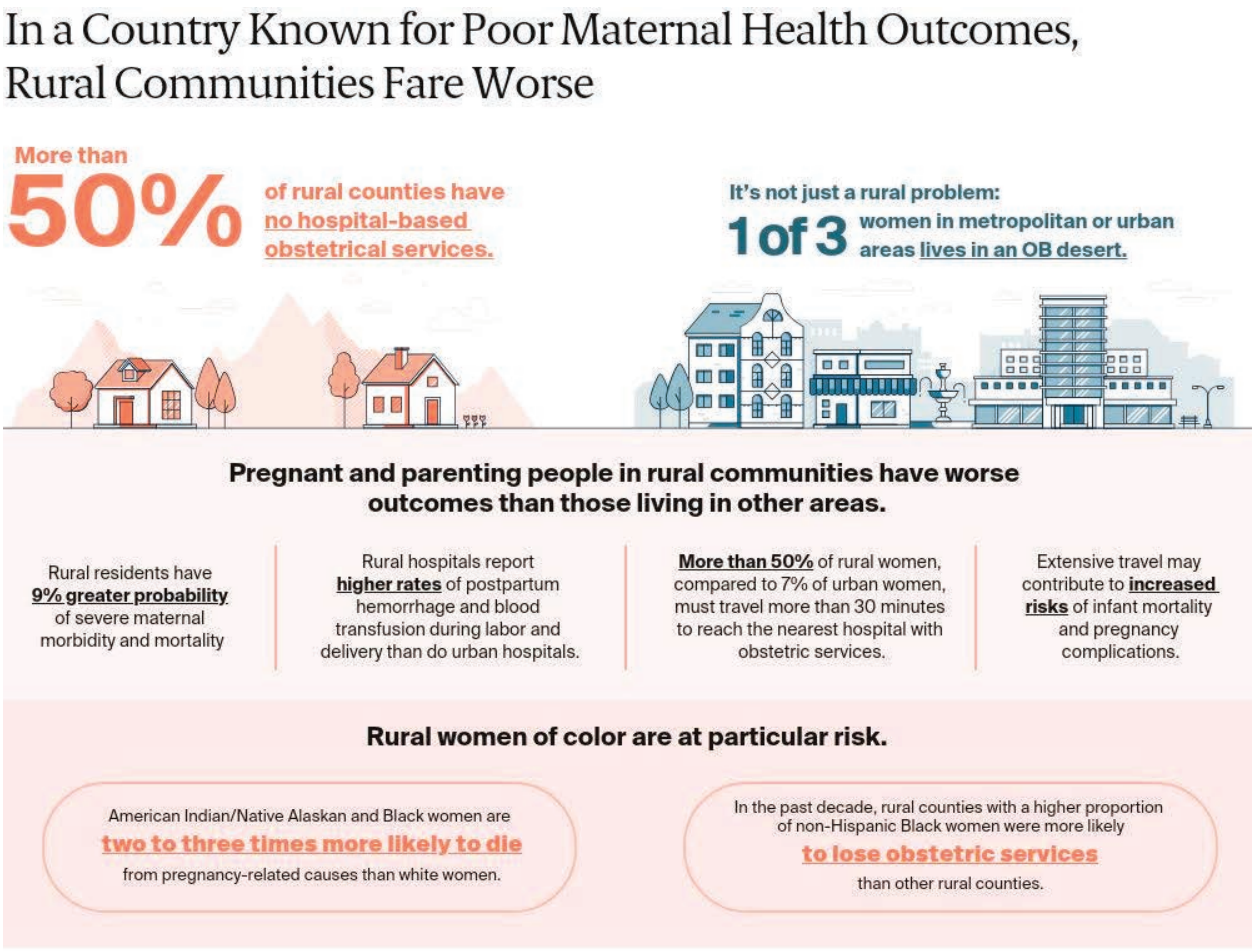
Midwife Story

The women all saw doctors here who were affiliated with large practices in Richmond. Near the end of pregnancy, the doctor would suggest their labor be induced, because of the fear of delivery en route. More times than not, they ended up with a Cesarean for a failed induction. Unfortunately, then these women were not eligible for delivery in our birth center, since we could not allow vaginal birth after Cesarean. The second problem was access to prenatal care. Many Latinas did not have insurance, and were not eligible for Medicaid. The OB practice here in town required $500 at the first prenatal visit to enlist for care. That amount was out of reach for most of these women, so they went without prenatal care. Women here still drive to Richmond for maternity options, an hour and 15 minutes, but that only works for the ones with insurance, a reliable car, and the ability to take off a day from work. Even if women here did not desire a home delivery, they deserve affordable prenatal care.

centers or OB providers and adequate health insurance coverage (less than 10 percent of women of reproductive age uninsured). Full access to maternity care can be defined by availability of hospitals or birth centers providing obstetric care and availability of providers offering obstetric care (March of Dimes, 2022)."

Maternity Care Deserts are a national crisis. People give birth regardless of whether they have access to maternity care. Licensed Midwives are an important resource for improving birth outcomes in maternity care deserts. Licensed Midwives are skilled healthcare providers, trained in managing obstetric emergencies in community (non-hospital) settings. Legislators can remove the barriers that keep Licensed Midwives from being fully prepared to provide basic medications that can save lives when there is little to no access to a higher level of care.

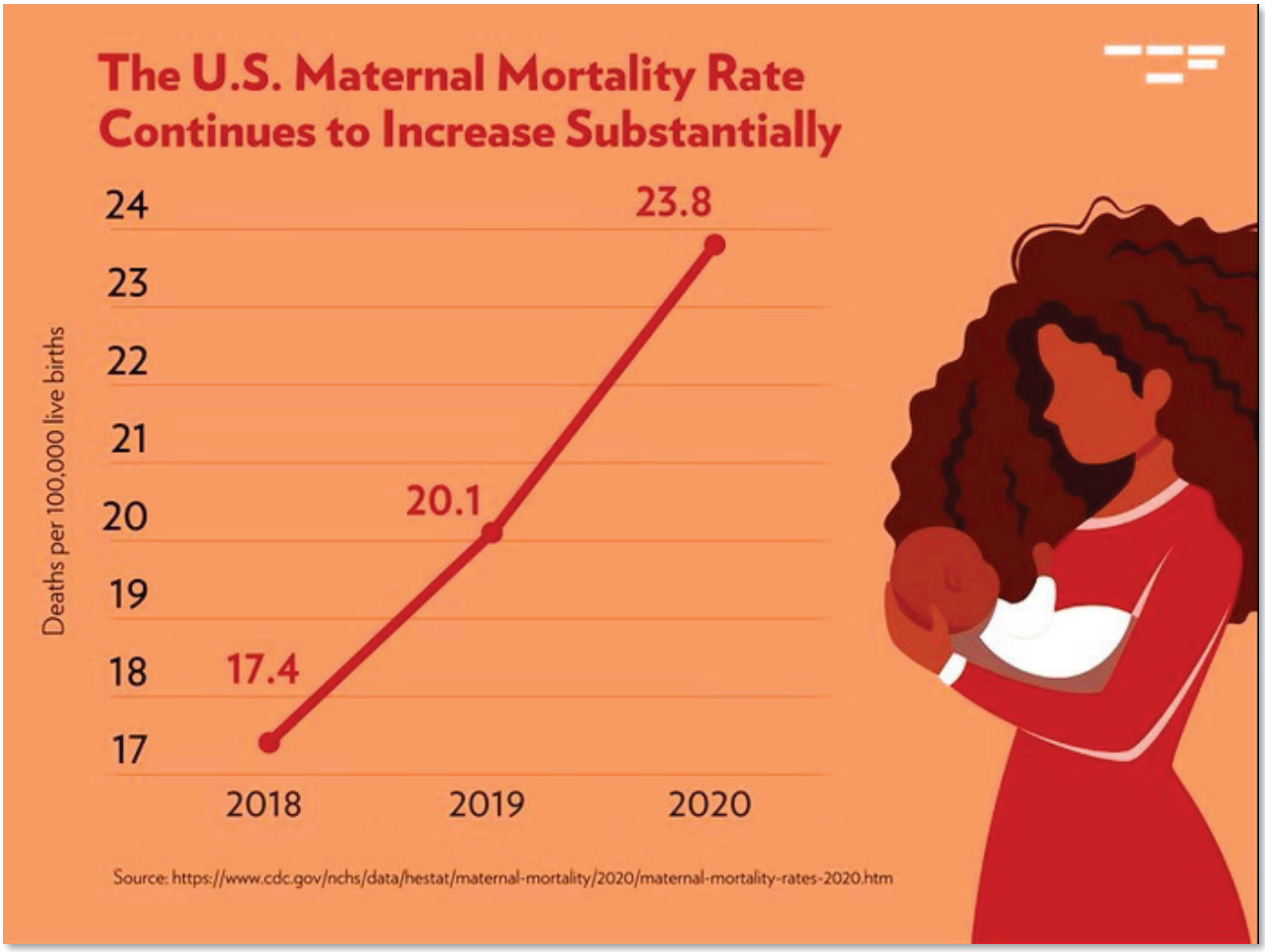
> *Even if a community is not planning on providing maternity care, they still are going to be providing maternity care, but they won't be ready for obstetrical emergencies.*
> *— John Cullen, M.D., Rural Family Physician*



Source: Martha Hostetter and Sarah Klein, "Restoring Access to Maternity Care in Rural America," *Transforming Care* (newsletter), Commonwealth Fund, September 30, 2021. https://doi.org/10.26099/CYCC-FF50

Midwife Story

As a Licensed Midwife, my practice is based on a good relationship with my patients. I give them information about tests and procedures, and when the patient has asked their questions and done their research, they make their decision. I can tell you for sure that their decisions are also sometimes driven by access to these things - even more so than compliance with the law. For instance, before I could perform the state-required newborn screening on babies in the home the day after birth, very, very few families could find a place to have that done. Compliance was almost nil. Now that I can do this in the home, almost 100% of the babies in my practice are screened. For the few who decide to decline, I know who they are and why they declined, which would be important if this turned out to be a bad decision. This has happened in succession with both the Critical Congenital Heart Defect screening and the required hearing screen. Parents DO want their babies to have these tests. But when it is difficult and expensive, they become overwhelmed and give up. Required medications would, I am absolutely sure, be just as welcome as Newborn Screening has been.



Safety

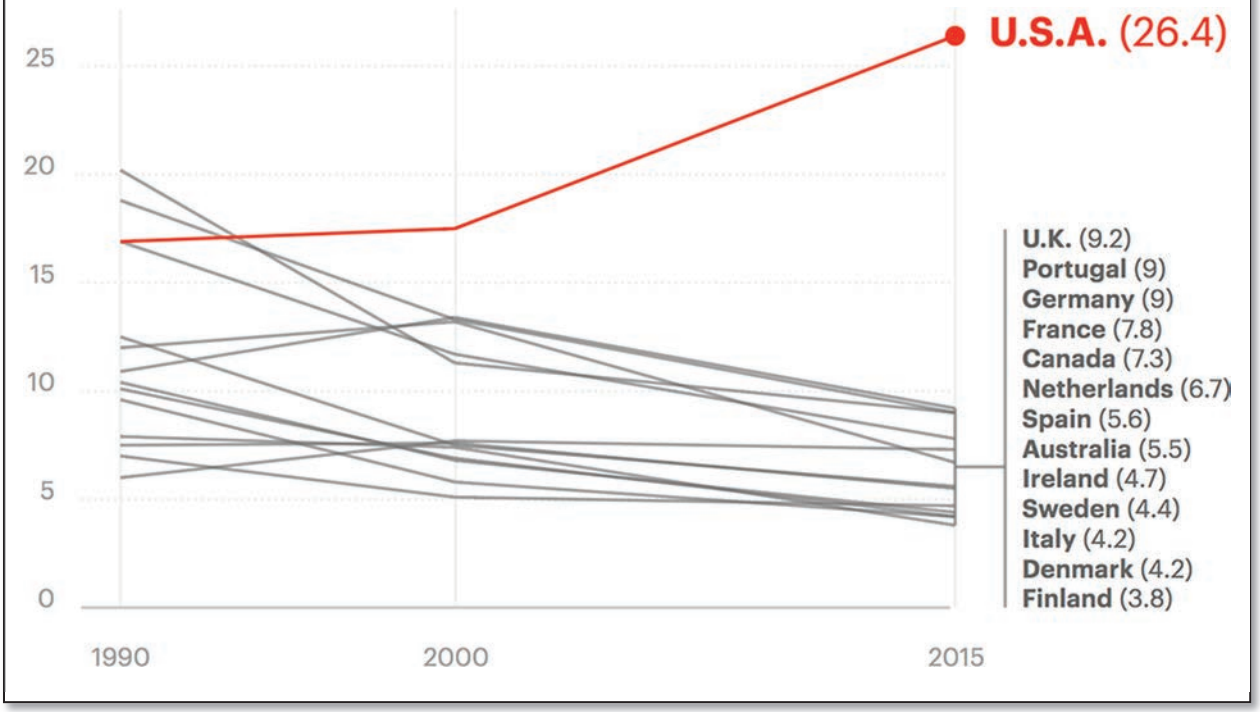
The Maternal Mortality Crisis

Maternal mortality in the United States is higher than all other highly industrialized countries. In 2018, a comprehensive report on maternal mortality stated more than 700 people die each year in the United States from childbirth-related causes, and it is estimated that approximately 60% of those deaths are preventable (Maternal Mortality Review Information Application (MMRIA), 2018).

Despite all of the money spent on hospital-based maternity care in this country, maternal mortality continues to worsen. The Centers for Disease Control reports that in 2020, 861 women were identified as having died of maternal causes in the United States, compared with 754 in 2019. The maternal mortality rate for 2020 was 23.8 deaths per 100,000 live births compared with a rate of 20.1 in 2019 (Hoyert, 2022).

The United States Compared to Other Countries

While other developed countries have seen large decreases in maternal mortality over the past 40 years, the United States stands out as an outlier (Source: KFF Analysis of OECD Health Statistics (Database). We are the only developed country where more people die due to childbirth related causes now than in 1980. Every effort must be made to reduce this alarming trend.



Maternal Mortality for People of Color

Racial and ethnic disparities show even worse outcomes. We should all be working together to improve safety and reduce maternal mortality for Virginia families, rather than continue to maintain existing barriers to safe community birth care.

> *Black women bear the brunt of this horrific burden. Due to systemic racism and discrimination at the individual level, Black women and birthing people face unacceptable (and mostly preventable) risk during childbirth and throughout and after pregnancy. It must also be noted that Hispanic women saw the largest maternal mortality increase of any racial or ethnic demographic group in the study, rising by a staggering 44 percent in just one year* (Taylor, Bernstein, Waldrop, & Smith-Ramakrishnan, 2022).

Why Are the Outcomes So Bad for Black Families?

There are many factors that contribute to these disparities. Structural racism and implicit bias are two important reasons (Centers for Disease Control and Prevention (CDC), 2022). Issues related to access to care and health insurance are contributing factors.

> *Pregnancy-related deaths among Black and Indigenous mothers in the U.S. are higher than among mothers in Tajikistan, where the per-capita annual gross domestic product is just north of $800. The African American infant mortality rate in this country is on par with Libya's.*
> (Jones, 2020), (World Health Organization, 2019)

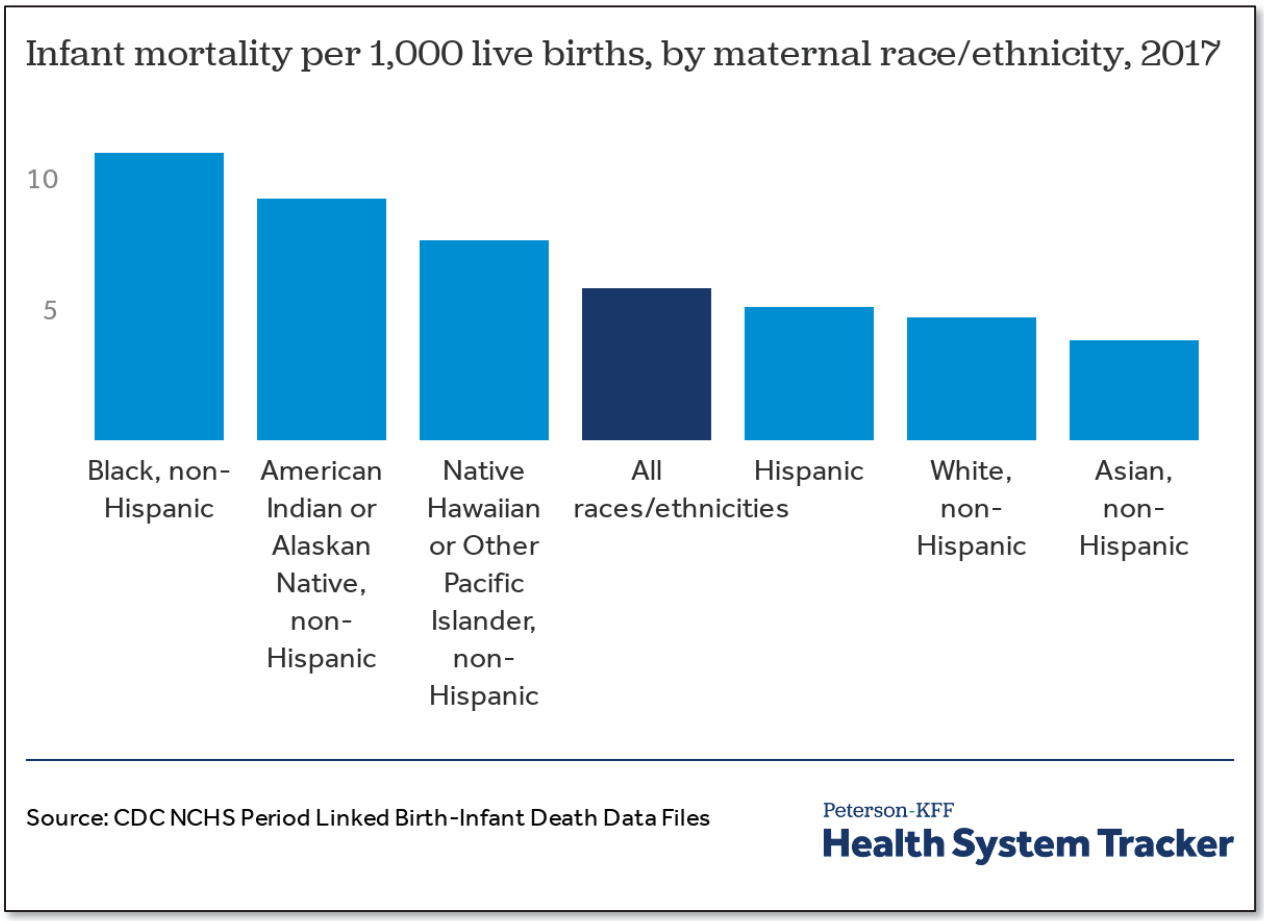
Black families often choose care with midwives in the community setting because these midwives can better meet their needs. Black birthing people cite worry that the strain on hospital resources will make it even more difficult to receive good care, and they feel midwives in the community setting will take the time to listen to them when they report concerns (Cronkite News, 2020).

> *I think Black women seek the holistic approach because we want someone to see us, we want to learn, we want the full approach not the medical approach. We are not numbers, we are people. Midwives do that. They see you.*
> *Viergeni W.*
> (Cronkite News, 2020)

Partners feel better able to support each other through the birthing process when they have a community birth. Midwives include the entire family in the birthing person's care, and this additional support results in a more satisfying birth. This support is especially important for Black families, where structural racism in hospital settings may lead to reduced partner involvement and the ability to advocate for their needs.

With the intersectionality of maternity care deserts and racial disparities, Black families are especially vulnerable and need the support midwives can give. Midwives need to be empowered to provide evidence-based care, including administering the medications that make community birth even safer for Black birthing families. Knowing what we know about these issues, failing to remove barriers to safe care is a direct threat to the health of all Black birthing people and their babies.

The coronavirus pandemic exposes a fragile health care system that already marginalized and traumatized black women.
—Dr. Joia Crear-Perry, President of the National Birth Equity Collaborative. (Simpson, 2020)



Hemorrhage: The Leading Cause of Preventable Maternal Death

Hemorrhage is the leading cause of preventable maternal death worldwide (James, 2022), and there are basic medications Licensed Midwives can administer to prevent or treat postpartum hemorrhage. Access to life-saving medications is essential to safe practice in all birth settings. This is supported by recommendations from the World Health Organization, the International Confederation of Midwives, and many other midwifery and obstetric organizations. These medications include:

- Antihemorrhagics – Pitocin®, Methergine®, Cytotec®
- Medications used to treat shock from blood loss – IV Fluids and Oxygen

These medications help Licensed Midwives prevent and treat postpartum hemorrhages. They also allow Licensed Midwives to stabilize patients prior to and during emergency transport to a higher level of care. Hemorrhage can be life-threatening within minutes, and with over 40% of Virginia residents living in maternity care deserts, it is absolutely essential that midwives be able to possess and use these medications in the community setting. The law in Virginia that prevents Licensed Midwives from possessing and administering these medications is outmoded. It needs to change to reflect best practice recommendations for the prevention and treatment of postpartum hemorrhage. Lives depend on this. Virginia families deserve the standard of care medications that make all births safer, no matter where their baby is born.

BOX 2-1
Typical Home Birth Supplies and Medications

Whereas hospitals and birth centers are already equipped with supplies and medications that are commonly used during birth, midwives must bring these items with them to a home birth. At the onset of labor, the midwife travels to the client's home with supplies that include the following:

Birth supplies: blood pressure cuff and stethoscope, pediatric stethoscope, thermometer, fetal Doppler, paper or electronic chart forms, infant scale, cord clamps, sterile instruments for cutting the cord and suturing, suctioning equipment (bulb syringe, DeLee suction trap), urinary catheter equipment, amnihook, heating pad, sterile gloves, absorbable underpads, gauze sponges.

Supplies for labor support and pain relief: deep tub; hot/cold compresses; a transcutaneous electrical nerve stimulation (TENS) machine; items such as a sling, yoga ball, and peanut balls for comfort and positioning.

Resuscitation equipment: firm surface for neonatal resuscitation; bag and mask in adult and newborn sizes; a laryngeal mask airway; epinephrine for adult anaphylaxis and/or newborn resuscitation.

Medications: oxygen tank(s); medications for preventing or treating post-partum hemorrhage (Pitocin, methergine, misoprostol); IV equipment and fluids; antibiotics for Group B strep prophylaxis; local injectable anesthetic for suturing; vitamin K and erythromycin eye ointment for the newborn; hepatitis B vaccine and immune globulin for infants born to mothers with hepatitis B.

Some states have laws that restrict midwives' ability to carry or administer certain medications. For example, in Virginia, licensed certified professional midwives are prohibited from carrying any controlled substance, including anti-hemorrhagic medicines, oxygen, or antibiotics (Virginia Law, 2013).

In Birth Settings in America: Outcomes, Quality, Access, and Choice, a consensus report from The National Academies of Science, there is a description of the supplies typically available at home births, pointing out that Virginia is an anomaly.

Midwife Story

Aisha is a Black Muslim first time mother. She chose homebirth because she researched the maternal morbidity and mortality rates for women of color in the USA. She knew that midwifery care & homebirth would decrease her risks of morbidity and mortality for both her and her unborn baby. Aisha's pregnancy progressed normally, without complications. Her labor was long, which is not unusual for a first-time mom. Aisha bled heavily after birth, and I used all of the procedures and herbs that I had in order to get the bleeding under control. Finally, after 2 hours of taking herbs and interventions every 15 minutes, the bleeding subsided. Aisha's blood pressure was very low, and her pulse was high. I spent the night at her house and stayed with her for 24 hours postpartum to make sure that she was stable. I did not have medications that work quickly and efficiently to stop postpartum hemorrhage. I did not have IV fluids that could have made her pulse lower and her blood pressure higher. Aisha and her husband decided that they were safer at home with their midwife and her herbs than they would be at the hospital with medications. As Black Muslims, they have experienced significant prejudice from the hospital systems and medical staff. They have heard countless stories about their friends and family members being mistreated and not heard in hospitals. They had spent much time in prayer while preparing for the birth, and they had peace about avoiding the hospital unless absolutely necessary. Aisha did make a full recovery within 6 weeks postpartum.

Virginia Babies Deserve Better

It is the standard of care for all babies to receive an intramuscular injection of vitamin K and instillation of erythromycin eye ointment soon after birth. Also, if the pregnant patient is colonized with Group Beta Strep (GBS), it is recommended they receive intravenous antibiotic prophylaxis during labor to prevent Early Onset GBS Infection (EOGBS). This infection can be life-threatening, and the risk of infection is nearly eliminated if the birthing person receives the recommended IV antibiotics in labor.

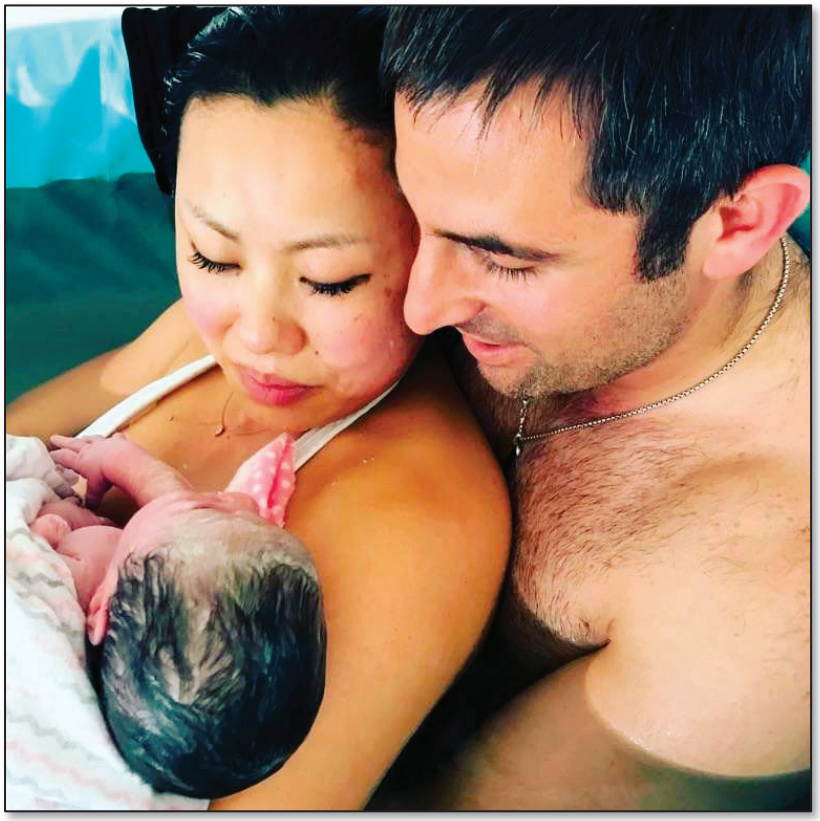
All Virginia Licensed Midwives are trained to administer intramuscular vitamin K and erythromycin eye ointment.

The only prohibition is current law which is outdated and not consistent with other states. It is even inconsistent with Virginia law, which requires administration of vitamin K injections to newborns and application of erythromycin ointment in both of their eyes within an hour of birth, but regulations prohibit carrying these. Licensed Midwives are trained to provide evidence-based care to their clients and their newborns.

VITAMIN K

Vitamin K is administered to newborns to prevent hemorrhagic disease of the newborn (HDN), also known as Vitamin K Deficiency Bleeding (VKDB). This is a life-threatening complication that is easily prevented with the vitamin K injection. Newborns are born with low levels of vitamin K. The newborn gut in a healthy newborn will eventually produce vitamin K, but until then, an injection of vitamin K soon after birth is the most effective way to prevent HDN. Vitamin K from the mother's diet is insufficient to prevent VKDB. Oral forms of vitamin K are not as effective as the vitamin K injection due to the immature newborn gut. When Licensed Midwives are unable to provide this potentially life-saving medication, families have limited options. They can take their baby to the emergency room if there is one nearby. They can get a prescription for vitamin K and inject their baby themselves. They can opt for

> *Babies without enough vitamin K cannot form clots to stop bleeding and they can bleed anywhere in their bodies. The bleeding can happen in their brains or other important organs and can happen quickly. Even though bleeding from low levels of vitamin K or VKDB does not occur often in the United States, it is devastating when it does occur. One out of every five babies with VKDB dies. Of the infants who have late VKDB, about half of them have bleeding into their brains, which can lead to permanent brain damage. Others bleed in their stomach or intestines, or in other parts of the body. Many of the infants need blood transfusions, and some need surgeries.*
> *—Centers for Disease Control and Prevention (CDC)*



less effective options, such as oral vitamin K. The other option is that they will decline the vitamin K injection. Most will choose to decline the vitamin K injection if it is not easily available at birth.

Since 1961, the American Academy of Pediatrics has recommended supplementing low levels of vitamin K in newborns with a single shot of vitamin K given at birth. Low levels of vitamin K can lead to dangerous bleeding in newborns and infants.

Erythromycin Eye Ointment

Virginia law requires maternity care providers to instill erythromycin eye ointment in the newborn's eyes soon after birth. This is done to prevent blindness from ophthalmia neonatorum resulting from chlamydia or gonorrhea infection caused by exposure to these pathogens during the birthing process. It has been proven effective and there are no known serious risks to the baby. In sub-Saharan Africa, where erythromycin eye prophylaxis may not be available, ON is the leading cause of blindness (Whitcher JP, 2001).

Gonococcal ophthalmia neonatorum can cause corneal scarring, ocular perforation, and blindness as early as 24 hours after birth. In the absence of ocular prophylaxis, transmission rates of gonococcal infection from mother to newborn are 30% to 50%.
— (United States Preventive Services Task Force (USPSTF), 2019)

IV Antibiotics to Prevent Early Onset GBS (EOGBS) Disease

Many people are colonized with Group Beta Strep (GBS) in their gastrointestinal or genital tract. Typically, there are no symptoms, and someone would not know if they were colonized unless tested. For over 30 years, the CDC, ACOG, and other organizations, have recommended screening all pregnant patients for GBS between 36 and 38 weeks. If they screen positive for GBS at that time, they have a 91% chance of being colonized when they go into labor (Young, 2011).

Midwife Story

Baby Sam had a GBS lung infection and spent 10 days in the NICU, because his mother did not have access to IV antibiotics in labor. The mother did not have insurance, and partly chose homebirth because it was more affordable for her family. She screened positive for GBS at 36 weeks of pregnancy, and really wanted IV antibiotics, but did not think that she could afford a hospital birth, and decided to forgo antibiotics. At 39 weeks of pregnancy, the mother's water broke. Her labor started 10 hours later, and progressed very quickly. The baby was born 12 hours after his mother's water broke. Baby Sam needed extra stimulation at birth to breathe, but was able to breathe on his own normally within 1 minute of birth. He nursed well. At 24 hours of age, he stopped eating and his breathing rate was elevated. He was admitted to the NICU for 10 days for IV antibiotic treatment. This bill was significantly higher than the cost of IV antibiotics that the mother needed in labor. Access to IV antibiotics at home could have prevented the baby from becoming sick, needing the NICU, and much worry and money.

IV antibiotics are the gold standard treatment for the prevention of EOGBS disease. Without IV antibiotics 1-2% of babies will develop GBS sepsis. Since the implementation of universal screening and antibiotic prophylaxis in the early 1990s, the incidence of EOGBS disease has been reduced 80%, from 1.8 newborns per 1000 live births to 0.23 newborns per 1000 live births in 2015 (American College of Obstetricians and Gynecologists, 2020). These recommendations for universal screening and intrapartum IV antibiotics are supported by the Centers for Disease Control and Prevention (CDC), the American Congress of Obstetricians and Gynecologists (ACOG), American Academy of Pediatrics (AAP), American College of Nurse-Midwives (ACNM), American Academy of Family Physicians (AAFP), and the American Society for Microbiology (ASM). There are no evidence-based, effective alternatives to intrapartum IV antibiotic prophylaxis. Oral antibiotics given before labor are ineffective in preventing EOGBS disease. Some families will choose an alternative protocol, however no alternative protocols have been proven effective at preventing EOGBS disease. Virginia's babies deserve better. Licensed Midwives can safely administer IV antibiotics during a community birth to protect babies from EOGBS disease.

If a full-term baby becomes infected with GBS, about 2-3% will die from the infection. Up to 44% of infants who survive GBS with meningitis end up with long-term health complications. These include cerebral palsy, learning disabilities, seizures, hearing loss, and vision loss (Libster, 2012).

Midwife Story

The only baby lost in my practice was a baby who died from GBS infection. His mother had GBS in her urine. We did all that we knew to do without medications to help her. We increased her probiotics and helped her reduce her intake of processed foods. We provided evidence-based information regarding the effectiveness of antibiotics in labor and how this was not available at home. We had many lengthy discussions regarding GBS, starting in the first trimester. In the end, she opted for using a Hibiclens® douche in labor, which she knew was not an evidence-based choice. She was really committed to her plan to give birth outside the hospital due to her trauma history. She had a normal labor at home, and there were no signs of any problems. Fetal heart tones were within normal range throughout and she did not have a fever. Her membranes were ruptured for only 6 hours before birth and we did no vaginal exams. We did everything we could to help her baby arrive safely, except give her antibiotics. Her baby was born limp and unresponsive. He had a heartbeat, but had no respiratory effort. We performed NRP and transported him to the hospital within minutes. Despite our best efforts, he never recovered. He spent 2 weeks in the NICU. His parents had to make the agonizing decision to discontinue life support. His cause of death was GBS sepsis. Totally preventable with antibiotics. I've spoken to midwives who practice in other states where they have access to medications, and while I'm happy for them that they have the tools to help their families avoid what happened to this baby, I'm also very angry that we cannot do this here in Virginia. This baby's death could have been prevented if his mother had received IV antibiotics in labor. Some might criticize the parents for choosing a home birth. I criticize the law here in Virginia that keeps us from providing these medications outside the hospital. People have the right to give birth wherever they like. Legislators have a responsibility to do all they can to make that choice as safe as possible.

Strain on Hospital Systems

Families who choose to give birth at home or at a freestanding birth center ease the strain on hospital systems. It is unnecessary to burden hospitals with the responsibility of providing basic medications that could safely be administered outside the hospital setting.

Hospitals strained by the COVID-19 pandemic have seen worsening outcomes for elderly patients admitted for non-COVID related illnesses. Patients have delayed care, presenting at later stages of their illnesses, and then staffing and supply chain issues have made it increasingly difficult for hospitals to meet the needs of these patients. There is no need to increase the burden on hospitals by having families travel to the hospital for basic medications their Licensed Midwife could provide if allowed by law.

> *The COVID-19 pandemic has strained health systems around the world in unprecedented ways, with all health systems grappling with limitations in staffing (physicians, nurses, respiratory therapists, and pharmacists), supplies (medications, tests, ventilators, high-flow oxygen machines, and vaccines), and space (hospital beds, subacute nursing facility beds, and dialysis units).*
> (Myers & Liu, 2022)

The pandemic is more persistent than we imagined it would be. It has taken a huge toll on hospital staff and caused enormous labor shortages. Many hospital workers, strained to their limits during the

pandemic, have quit their jobs. A survey of 6500 critical care nurses shows 92% reported the pandemic had “depleted nurses at their hospitals, and as a result, their careers will be shorter than they intended” (Health Affairs, 2022).

Hospitals have found it increasingly difficult to replace those workers who have quit. There has been a huge surge in the use of travel nurses to alleviate staffing shortages. Nurses averaged $73,000 per year, or $1400 per week prior to the pandemic. Now, travel nurses are being paid between $5000 and $10,000 per week (Health Affairs, 2022). This is causing an enormous cost to hospitals for nursing care.

Changing the law so that Licensed Midwives may administer needed medications in the community setting just makes sense. Hospitals are struggling. Why add to their workload? Licensed Midwives can and should be able to provide these essential services without hospital involvement, provided the law is changed to allow Licensed Midwives to practice within their full scope of practice.

Families choosing community birth with licensed midwives face unnecessary barriers to care. One midwife shared this story about a patient who needed a RhoGAM injection.

Midwife Story

This client was a Black single mom of 6, living in SW Virginia, with no car, and no childcare. She had an ultrasound at the local hospital on Thursday afternoon, confirming a miscarriage. Being Rh negative, she needed a shot of RhoGAM® within 72 hours. On Friday morning, I was unable to find a way to get her RhoGAM®. She had previously been dismissed from care at one local OGBYN office, and even though I called and begged them to see her again, they refused. I called the only other local OBGYN clinic in town. They have no attending OB in the office on Fridays until 1:00 pm, so I left a detailed message with the nurse. At 1:30 pm, when the nurse called me back, she told me that the attending OB had refused to see my patient because she had not been seen at their clinic yet in that pregnancy. I explained that she was only 6 weeks pregnant, and that it was impossible for her to have already established care in any practice. I also argued that she was seen at their office for postpartum RhoGAM® 4 months prior, so she was an established patient. We had the ultrasound confirming miscarriage and all her lab work. I argued that because the patient had no vehicle and no childcare, that she was unable to access RhoGAM® in any other way. The nurse replied that the attending OBGYN had recommended she go to the ED for RhoGAM®. The patient decided to forgo the RhoGAM®. She could not surmount the barriers of no childcare, no vehicle, no access to an appointment, and the time constraint of needing RhoGAM® within 72 hours of miscarriage. The bus system in our city shuts down at 8:00 pm. Her only option to access RhoGAM® was to leave her children unattended for many hours, take a 2-hour bus one way to the ED, and risk not being able to get home from the ED until the next morning.

Scope of Practice

Licensed Midwives in Virginia are restricted from administering the medications that are within their scope of practice. Virginia is one of only two states that license midwives, yet restrict them from accessing these medications. Providers should be able to work within their full scope of practice.

The North American Registry of Midwives (NARM) is the organization that administers the Certified Professional Midwife (CPM) credential that Licensed Midwives are required to have. CPMs are authorized to practice in 37 states. Virginia has had licensure for CPMs since 2005. CPMs are uniquely qualified to practice in the community setting. CPMs work at freestanding birth centers and in patient's homes. Their training includes the use of basic medications needed for safer practice in the community setting.

When I heard that Virginia Licensed Midwives can't legally use medications, I was flabbergasted. I asked a Virginia LM, "You mean no Pitocin?" The midwife said, "No Pitocin. We can't even use oxygen legally." What kind of backward place is Virginia that it won't let LMs use these medications that can save women's lives? Why wouldn't someone change this law and help the midwives help families have safer care?
—Licensed Midwife in Washington State

Scope of practice for CPMs is determined by the NARM Job Analysis. It becomes the blueprint for the board certification exam's test specifications. The most recent NARM Job Analysis requires CPM candidates demonstrate knowledge of the benefits, risks, and appropriate administration of the following medications:

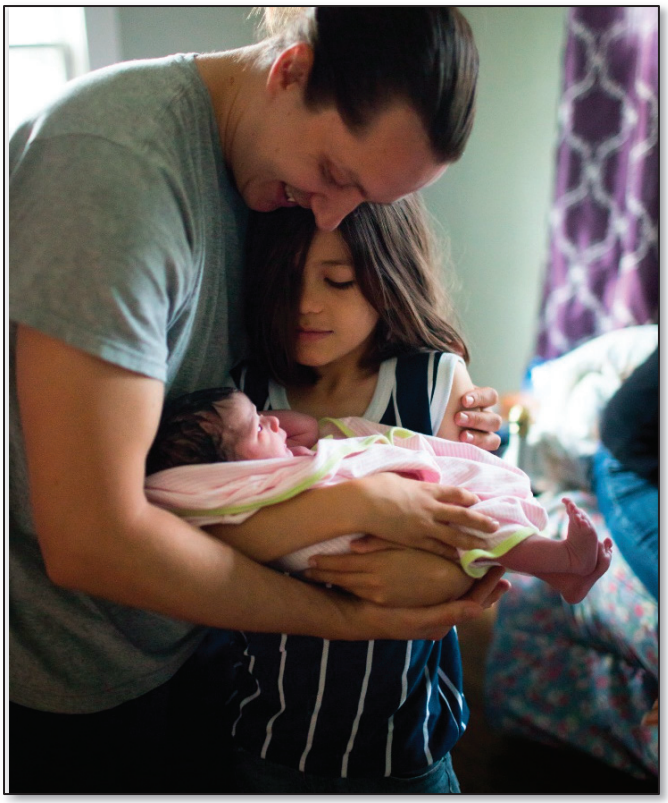
- Local anesthetic for suturing
- Medical oxygen
- Antihemorrhagics
- IV fluids
- Antibiotics for GBS prophylaxis
- RhoGAM
- Newborn medications (vitamin K, erythromycin eye ointment)
- Epinephrine for allergic reactions and for use in neonatal resuscitation per the NRP Algorithm

A Job Analysis is a list of tasks essential to the performance of a profession. The list defines the scope of practice for that profession, according to a consensus of the practitioners. The list of tasks is not meant to limit the job performed by those professionals, but to identify the core skills needed for entry into the profession. The purpose of the Job Analysis, for a certification program, is to determine the knowledge and skills that must be demonstrated by those seeking certification.
—North American Registry of Midwives website

Workarounds

Imagine giving birth and then having to put your newborn in a car seat and travel 2 hours to a hospital that has maternity care services. After a beautiful home birth, who would want to take their baby out to a hospital just to receive a vitamin K injection, get the erythromycin eye ointment, or get a RhoGAM injection? Why should families have to expose their new baby to COVID, influenza, or any other easily transmissible disease that may be present in the Emergency Department at the hospital? Families should be staying home and bonding with their new baby.

It was Christmas Eve when we got the lab results showing Ethan's blood type was B positive. I just wanted to stay home with him, but I needed RhoGAM. Instead of enjoying Christmas with my baby, I had to drive an hour and sit in the hospital with my newborn to wait to get something my midwife could have given me at home. Ridiculous.
—Sarah H., Home Birth Parent



Families must jump through numerous hoops to gain access to the medications that make their birth safer. Some have to drive over two hours to see a physician who would be willing to prescribe medications. Some have to go to the hospital within 2 hours of their baby's birth so that their baby can receive a potentially life-saving vitamin K injection or erythromycin eye ointment that can prevent permanent blindness due to common sexually transmitted infections. Some people must choose between having to endure the pain of being sutured without the use of proper injectable local anesthetic or risking permanent damage to their body by not having those lacerations repaired properly. Some must self-administer prescribed medications, while their Licensed Midwife stands by, unable to assist them due to an outdated law.

Midwife Story

Nobody wants to go to the hospital, especially in the time of COVID. My practice volume has nearly doubled since the pandemic began. It infuriates me to no end that we can't administer the medications we're trained to use. It's like the legislature said "Sure, you can practice, but you have to do it with your hands tied behind your back," when they passed our law in 2005. It's time to fix this.

— Virginia Licensed Midwife

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HEALTHY MOMS. STRONG BABIES.

MARCH OF DIMES

NOWHERE TO GO:
MATERNITY CARE DESERTS ACROSS THE U.S.

2020 REPORT

STACEY D. STEWART

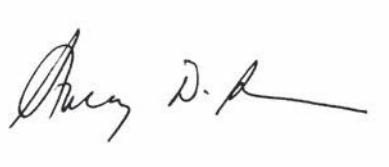
PRESIDENT & CEO
MARCH OF DIMES

Moms and babies need us now more than ever. Today in the U.S., we face an urgent maternal and infant health crisis that has only intensified with the COVID-19 pandemic. Every 12 hours a woman dies due to complications resulting from pregnancy. Additionally, 2 babies die each day. These numbers are disproportionately higher for moms and babies of color. Nothing sums up the state of the situation that we face in America as well as this one fact: In 2020 the U.S. remains among the most dangerous developed nations for a woman to give birth.

There are numerous health, societal and economic factors that collectively contribute to this crisis. Unequal access to health care is one of these factors. In our 2020 report: Nowhere to Go: Maternity Care Deserts Across the U.S., we shine a light on the impact of no or limited access to maternity care on the health of moms and babies. Today, 7 million women of childbearing age live in counties without access or with limited access to maternity care. These women are giving birth to more than 500,000 babies a year and this is putting them at risk of serious health complications. Without access to routine, quality health care these moms and babies have an increased chance of maternal and infant mortality and morbidity, including low birth weight and preterm birth.

Communities and policymakers must take immediate action to better serve the women and children in our country. While no single solution exists to address limited access to care, in our report we speak to key policy actions that can create positive change. These policy items include improving access to quality and affordable preconception, prenatal and postpartum care (e.g., expand Medicaid, provide coverage to telehealth services, expand access to midwifery care), focusing on prevention and treatment (e.g., create paid family leave systems and address social determinants of health) and expanding research and collection of surveillance data on maternal mortality and morbidity.

We imagine a nation where every mom and every baby is healthy, regardless of wealth, race or geography. Providing women with access to quality health care during the perinatal period is a critical part of this equation. We hope you join us in this fight for maternal and infant health. Learn about the actions you can take at **BlanketChange.org.**



RAHUL GUPTA, MD, MPH, MBA, FACP

SVP & CHIEF MEDICAL AND HEALTH OFFICER
INTERIM CHIEF SCIENTIFIC OFFICER, RESEARCH & GLOBAL PROGRAMS

In these difficult and unprecedented times, ensuring the health of moms and babies remains essential. The year 2020 has brought hardship across the nation and families are experiencing life in unfamiliar ways. Where a mom lives and her ability to access health care during pregnancy are important determining factors for the health of mom and baby. We believe that where you live should not determine the level of care you receive.

In our 2020 report on maternity care deserts, we build upon the 2018 report and continue to identify counties where a woman's access to maternity health services may be limited or absent. March of Dimes continually advocates for increases in health insurance coverage, quality and equity of maternal health care; this report informs researchers, policymakers and families alike so that we all move toward the best outcomes for moms and babies. In addition to information on COVID-19 and pregnancy, this report includes birth centers as a component of our analysis of maternity care deserts, a section on the topic of telemedicine, information on the role of doulas in maternity care and an extended section on policy recommendations. Since our report in 2018, six percent of counties have shifted in their maternity care designation; however, only three percent of these counties moved towards a better designation indicating greater levels of care.

We know that societal, economic and environmental determinants of health influence maternal health outcomes. In addition, structural and systemic inequities exist in the health care system resulting in health disparities. There are well known examples of disparities in birth outcomes, such as racial differences in the rates of maternal mortality, prematurity and infant mortality, that have been present for decades. Throughout this report, we highlight where some of these inequities exist in the context of maternity care deserts.

As our nation continues to face COVID-19, the serious public health threat could exacerbate the nations maternal and infant health crisis. Many health systems and/or hospital-based maternity care centers located in both urban and rural areas, are facing unprecedented financial declines that could necessitate the increased closure of maternity care centers as well as entire hospitals.

ACKNOWLEDGEMENT

This report was supported by RB and their Enfa portfolio of brands, our partner in the Better Starts for All pilot initiative, aimed at providing easier access to care for moms-to-be in maternity care deserts.

POLICY SOLUTIONS AND ACTIONS

With approximately 10 percent of births nationwide occurring in counties with limited access to maternity care, action is needed now to help ensure that all women receive the care and support they need before, during and after pregnancy. Policymakers must take swift action to better serve the women and children in our country. No single solution will address the problem of limited access to care; however, key opportunities include:

SUPPORT ELIMINATING MATERNITY CARE DESERTS

- **Implement perinatal regionalization,** a strategy to improve both maternal and neonatal outcomes. By coordinating a system of care within a geographic area, pregnant women would receive risk-appropriate care in a facility equipped with the proper resources and health care providers.
- **Expand Medicaid** for individuals who fall at or below 138 percent of the Federal Poverty Level (FPL). New research shows that states that expand Medicaid improve the health of women of childbearing age by increasing access to preventive care, reducing adverse health outcomes before, during and after pregnancies, and further reducing maternal mortality rates.
- **Expand access to midwifery** care and further integrate midwives and their model of care into maternity care in all states. This can help improve access to maternity care in under-resourced areas, reduce interventions that contribute to risk of maternal mortality and morbidity in initial and subsequent pregnancies, lower costs and improve the health of moms and babies.

IMPROVE ACCESS TO QUALITY AND AFFORDABLE PRECONCEPTION, PRENATAL AND POSTPARTUM CARE

- **Extend the Medicaid postpartum coverage period** to 12 months. The need for postpartum services exists well beyond the current limit in federal law of 60 days after the end of pregnancy.
- **Reimbursement for doula care.** Support increased access to doula care as one tool to help improve birth outcomes and reduce the higher rates of maternal morbidity and mortality among women of color in the U.S. In some states, coverage of doula services is provided under the full range of private and public insurance programs, including Medicaid, the Children's Health Insurance Program (CHIP), TRICARE and others. Payment levels should be sufficient to support the care provided. Efforts should be made to make the doula profession more accessible to people of diverse socio-economic and cultural backgrounds.
- **Provide coverage for evidence-based telehealth services for pregnant and postpartum women and support alignment of telehealth reimbursement approaches across payers.**

PREVENTION AND TREATMENT

- **Create paid family leave systems** that make benefits available to all workers while also distributing the responsibility for funding this system among employers.
- **Address determinants of health** caused by social, environmental and economic factors to reduce disparities to improve health equity.
    - Expanding the scope of research on social determinants of health as fundamental drivers for population maternal and infant health.
    - Engaging in health system reform, including educating providers on implicit racial bias to better serve the highest risk populations; empowering communities through inclusion, education, social activism and advocacy; and advancing work to change social and economic conditions (poverty, employment, low wages, housing, education, etc.) as well as underlying health inequities.

RESEARCH AND SURVEILLANCE

- Improve maternal mortality and morbidity data collection and surveillance and prioritize policy recommendations from Maternal Mortality Review Committees.

INTRODUCTION

Maternity care encompasses health care services for women during pregnancy, delivery and postpartum.[1] There are nearly four million births in the United States, each year.[2] Access to quality maternity care is a critical component of maternal health and positive birth outcomes, especially in light of the high rates of maternal mortality and severe maternal morbidity in the U.S. In our 2018 report, Nowhere to Go: Maternity Care Deserts Across the U.S., maternity care deserts are defined as counties in which access to maternity health care services is limited or absent, either through lack of services or barriers to a woman's ability to access that care. This report builds upon the 2018 report by updating the maternity care desert status of all counties based on the most recent data on availability of hospitals, birth centers, health care providers and health insurance.

BACKGROUND

Every year in this country, approximately 700 women die of complications related to pregnancy and childbirth[3] and more than 50,000 women experience severe maternal morbidity, a life-threatening complication as a result of labor and delivery.[4] Maternal Mortality Review Committees around the country have estimated that 60 percent of maternal deaths are preventable[5,6] and despite many countries around the world successfully reducing their maternal mortality rates since the 1990s, the U.S. rate remains higher than most other high income countries.[7] In fact, the U.S. maternal mortality rate has been increasing for the past three decades (Figure 1)[8] and significant racial and ethnic disparities exist in maternal health care in the U.S. Non-Hispanic Black women and American Indian/Alaskan Native women have higher rates of maternal mortality (3 and 2.5 times, respectively) as compared with non-Hispanic White women.[9] Some of this disparity can be addressed through equal access to quality health care as a way towards achieving health equity.[10] The data indicate women in the U.S. do not have equal access to maternity care. This report examines some key factors related to maternity care access such as access to hospitals, maternal health care providers and health insurance. Along with efforts to reduce preventable maternal mortality and morbidity, ensuring access to maternity care for all women has the potential to reduce disparities across the U.S. and improve birth outcomes for all.

KEY FINDINGS

More than 2.2 million women of childbearing age live in maternity care deserts (1,095 counties) that have no hospital offering obstetric care, no birth center and no obstetric provider.

- In this 2020 report, birth centers were included as an additional factor used to identify maternity care deserts.

In 2017, almost **150,000** babies were born to women living in maternity care deserts.

- Among women of childbearing age living in maternity care deserts, 1 in 3 live in a large metropolitan area or urban setting.
- Maternity care deserts have a higher poverty rate and lower median household income than counties with access to maternity care.

An additional **4.8 million** women of childbearing age live in counties with limited access to maternity care.

- This report combines three factors (access to obstetric care, obstetric providers and insurance) to identify limited access counties.

In 2017, approximately **514,000** babies were born to women living in rural areas.

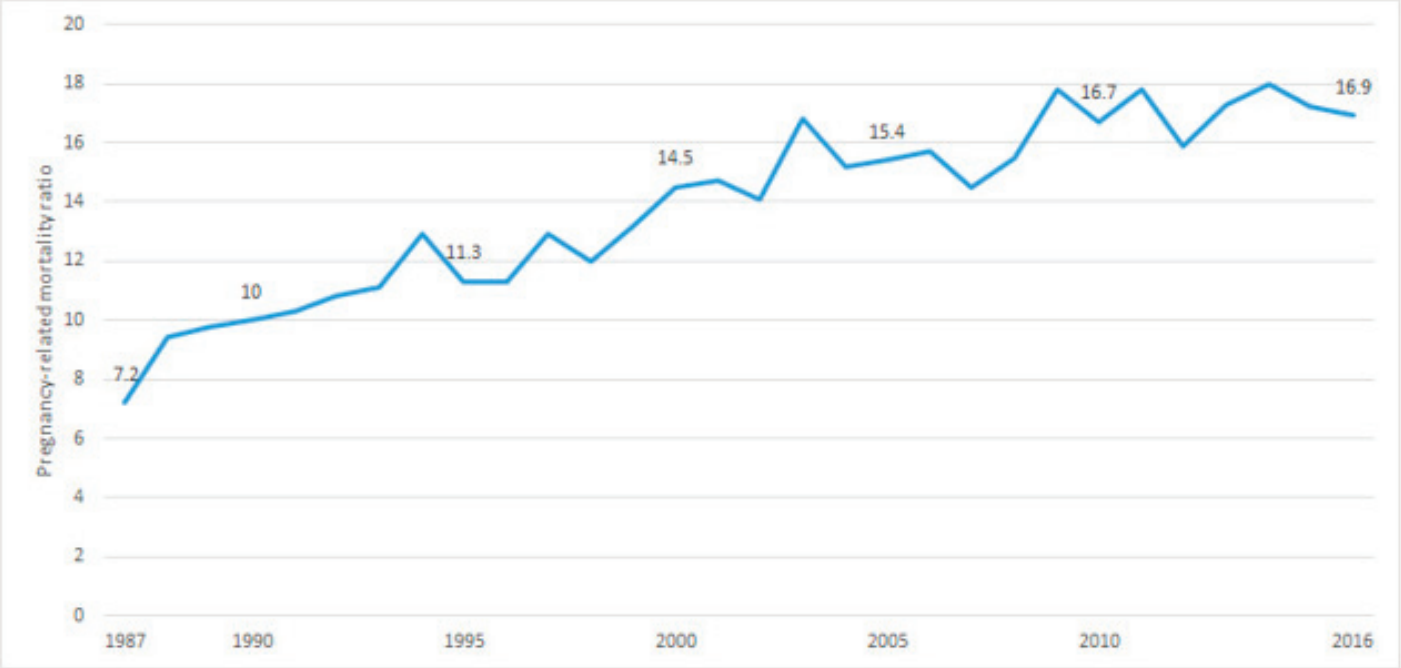
- Only 8 percent of obstetric providers report practicing in rural areas.

Due to the addition of birth centers in this 2020 report, **13** counties shifted to a higher level of access to care between 2018 and 2020.

Overall, between 2018 and 2020, 6 percent of counties shifted in their level of access to care.

- 3 counties moved from a maternity care desert to a higher level of access to care
- 3 percent of counties shifted to a higher access of care
  - » Of these counties,
    - » **14** shifted due to an increase in hospitals
    - » **44** shifted due to an increase in obstetric providers
    - » **5** shifted due to a combination of increases in obstetric providers, birth centers or hospitals
- 3 percent of counties shifted to a lower access of care
  - » Of these counties,
    - » **24** shifted due to a decrease in hospitals
    - » **52** shifted due to a decrease in obstetric providers
    - » **5** shifted due to a combination of decreases in obstetric providers and hospitals

Figure 1. Pregnancy-related mortality ratio*, United States, 1987-2016



**Pregnancy-related mortality ratio is the number of pregnancy-related deaths per 100,000 live births.*

Source: CDC, Pregnancy Mortality Surveillance System, 1987-2016 (http://www.cdc.gov/reproductivehealth/maternalinfanthealth/pmss.html)

MATERNITY CARE DESERTS

In this report, March of Dimes (MOD) defines a maternity care desert as any county without a hospital or birth center offering obstetric care and without any obstetric providers. Women may have low access to appropriate preventive, prenatal and postpartum care if they live in counties with few hospitals or birth centers (one or fewer) providing obstetric care, few obstetric providers (fewer than 60 per 10,000 births) or a high proportion of women without health insurance (10 percent or more). Moderate access to care is defined as living in a county with access to few hospitals/ birth centers or OB providers and adequate health insurance coverage (less than 10 percent of women of reproductive age uninsured). Full access to maternity care can be defined by availability of hospitals or birth centers providing obstetric care and availability of providers offering obstetric care (Table 1). To further understand counties with full access to maternity care, we examined those counties' levels of uninsured women. We found that some counties that are classified as having full access to maternity care, also have high rates of uninsured women.

Table 1: Definitions of maternity care deserts and access to maternity care

Definitions	Maternity care deserts	Low access to maternity care	Moderate access to maternity care	Full access to maternity care
Hospitals and birth centers offering obstetric care	zero	<2	<2	>2
Obstetric Providers (obstetrician, CNM/CM) per 10,000 Births	zero	<60	<60	≥60
Proportion of women 18-64 without health insurance*	any	≥10%	<10%	any

Notes: CNM/CM = certified nurse midwives/certified midwife

**U.S. average is approximately 11%. Source: Kaiser Family Foundation*
https://www.kff.org/womens-health-policy/fact-sheet/womens-health-insurance-coverage-fact-sheet/

The inclusion of birth centers into our methodology improved access in 13 counties in the 2020 report (Figure 2). Birth centers were included because they provide an alternative option for women to receive prenatal care and delivery services outside of the hospital setting. These centers operate independently of hospital systems and have autonomy in choosing patient populations as well as manner of care delivery. There were three counties that shifted from being classified as maternity care deserts to a level of greater access due to the inclusion of birth centers.

Between 2018 and 2020, 6 percent of counties across the U.S. shifted between classifications of access to care. These shifts occurred for varying reasons such as changes in the number of providers or in health insurance. Of these counties, 3 percent were classified at a higher level of access than they were in 2018.

44 of these counties shifted due to an increase in obstetric providers. 14 of these counties shifted due to an increase in hospitals, and 5 counties shifted due to a combination of increases in obstetric providers, birth centers or hospitals. 3 percent of counties shifted to a lower level of access. Of these counties, 52 counties shifted due a decrease in hospitals. 24 counties shifted to a lower level of access due a decrease in obstetric providers.

Figure 2: Change in county maternity care classification between 2018 and 2020 Nowhere to Go: Maternity Care Deserts Across the U.S Report

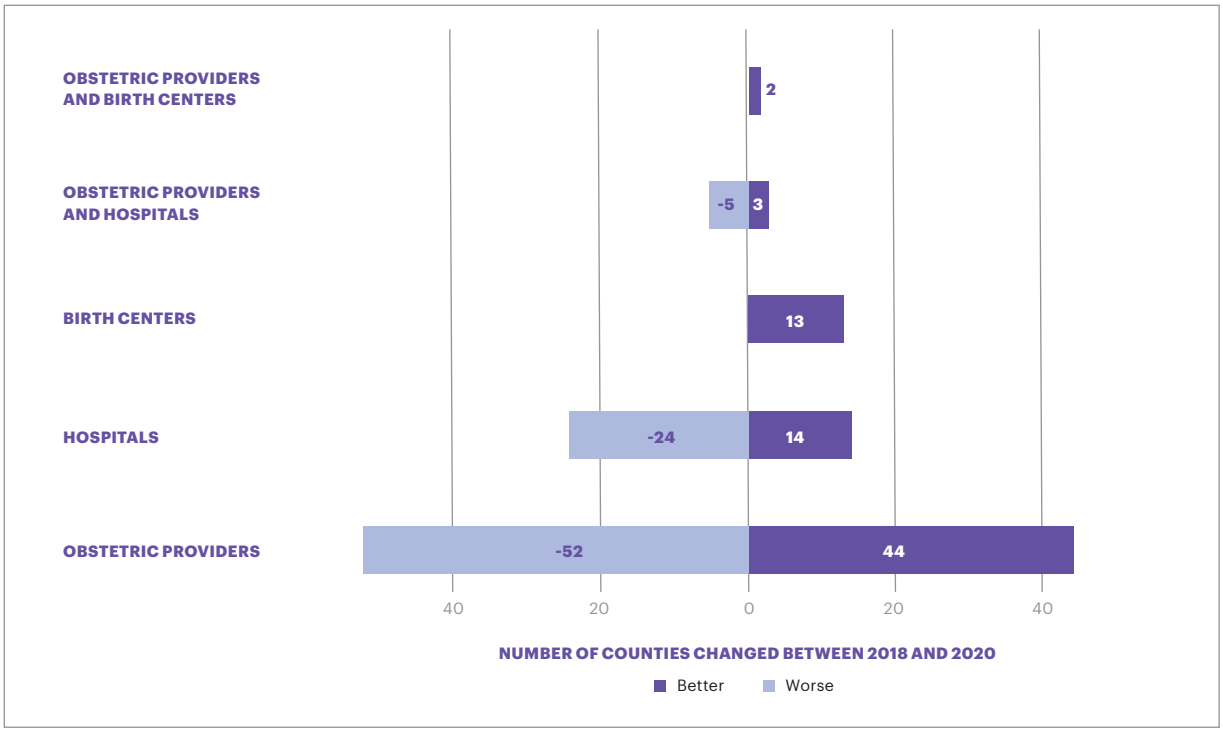
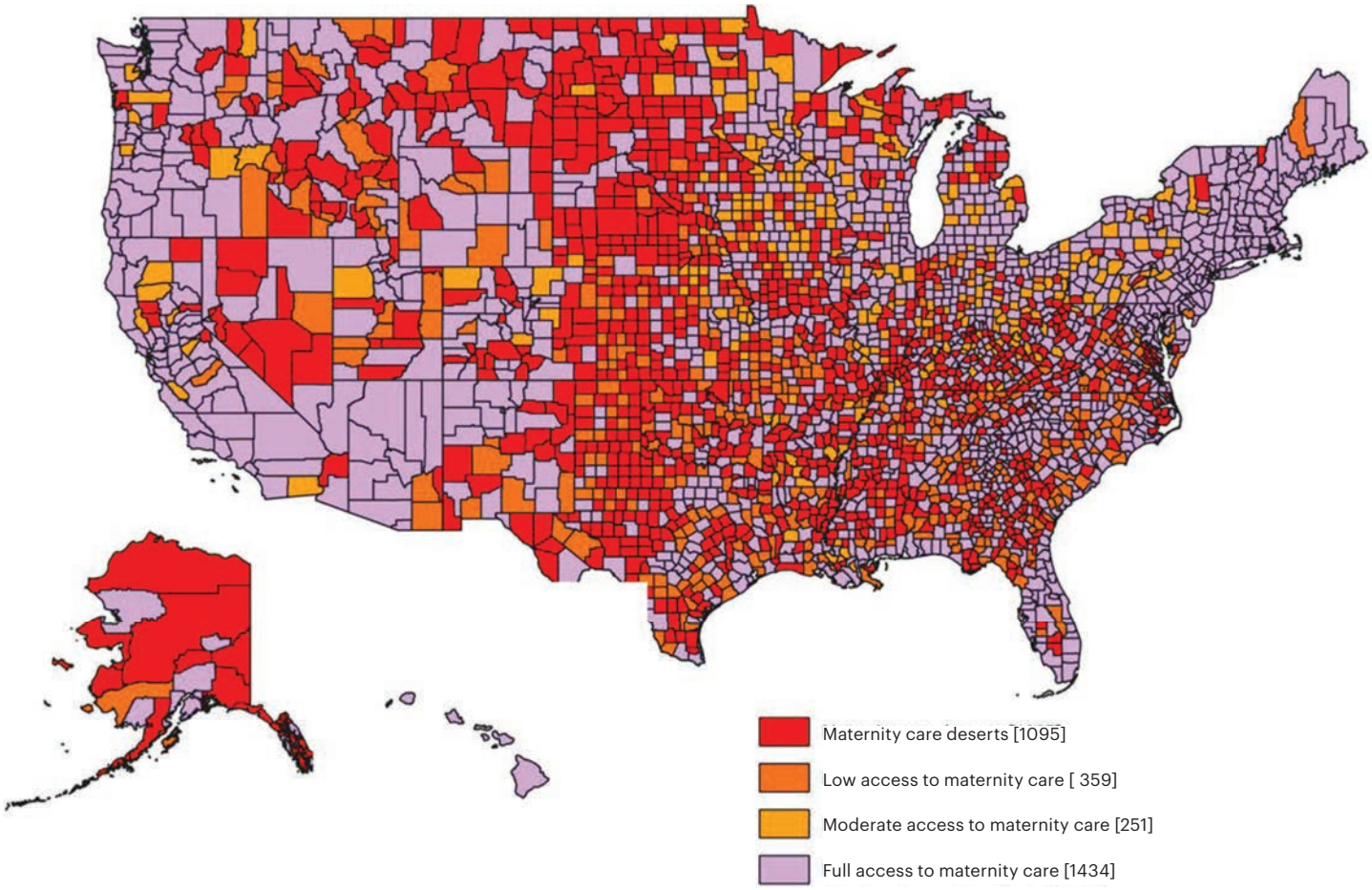


Figure 3: Maternity care deserts, United States, 2018



Source: U.S. Health Resources and Services Administration (HRSA), Area Health Resources Files, 2019

Table 2: Distribution of counties, women and births by access to maternity care

	Maternity care deserts		Low access to maternity care		Moderate access to maternity care		Full access to maternity care		Total
	Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count
Counties	1095	34.9	359	11.4	251	8.0	1,434	45.7	3139
Women 15–44yr*	2,232,000	3.5	2,852,000	4.5	1,919,000	3.0	57,133,000	89.1	64,136,000
Births	146,451	3.8	187,964	4.9	123,722	3.2	3,397,363	88.1	3,855,500

ACCESS TO AND QUALITY OF CARE

One way that quality of health care can be affected is through the availability of access to care. Since 2010 there has been an increase in the percentage of rural obstetric units that have closed their doors.[11] The focus of maternity care deserts is often in rural areas, but this problem also occurs in urban areas and areas adjacent to urban centers.[2] Closing of hospital maternity care units in cities disrupts continuity of care and can create barriers to access needed for prenatal and obstetric services due to issues such as transportation, finding/coordinating new services and health insurance. This is concerning if hospital closings are concentrated in low income areas or contribute to the exacerbation of racial/ethnic disparities in that community. Hospital closings in urban areas means that the remaining birthing care facilities experience a surge in patient volume and can introduce a new mix of patient populations into an already stressed health care setting.[13]

Hospital quality, defined through structural, organizational and clinical process measures, differs between facilities that mainly serve Black, Hispanic or American Indian women compared to a mostly White-patient population.[14] In one study, hospitals that serve Black women were lower-quality as compared to hospitals that have a higher proportion of White women receiving care.[14] These differences between hospitals lead to higher rates of morbidity and mortality for the minority women, especially Black women.[15] Black women have died at a rate 2.4 to 3.3 times higher from pregnancy complications than White women[9] and it's been estimated that that up to 50 percent of maternal deaths could be prevented with focused improvements at the provider, system and patient levels with the provider level being the most impactful.[15] Quality improvement initiatives in hospitals, such as standardization of care through safety bundles utilizing protocols/checklists, and staff training on implicit bias can improve care at all hospitals.

To create a culture of equity, it's important to address providers' implicit bias[15]—especially when research has demonstrated providers have the same varying degree of implicit bias as the public,[16] and nearly 50 percent of all providers practicing in obstetrics and gynecology admit to having some bias.[17]

CHARACTERISTICS OF MATERNITY CARE DESERTS

Table 3: Access to maternity care and economic characteristics

Characteristic	Maternity care deserts (n=1095 counties)	Counties with full access to maternity care (n=1434 counties)
	Mean	Mean
Median household income+	$45,804	$55,761
Women without health insurance (18-64 yrs)*	13.6%	10.7%
Population in poverty**	16.9%	15.1%
Urban Counties	18.1%	49.4%

**Source: U.S. HRSA, Area Health Resource File, 2019, Data from 2017 **Source U.S. HRSA, Area Health Resource File, 2019, Data from 2013-2017*

Table 4: Urban and rural county maternity care desert characteristics

Characteristic	Urban Counties (n=206 counties)	Rural Counties (n=889 counties)
	Mean	Mean
Median household income+	$50,018	$44,827
Population in poverty**	16.1%	17.1%
Women without health insurance (18-64 yrs)*	12.7%	13.8%

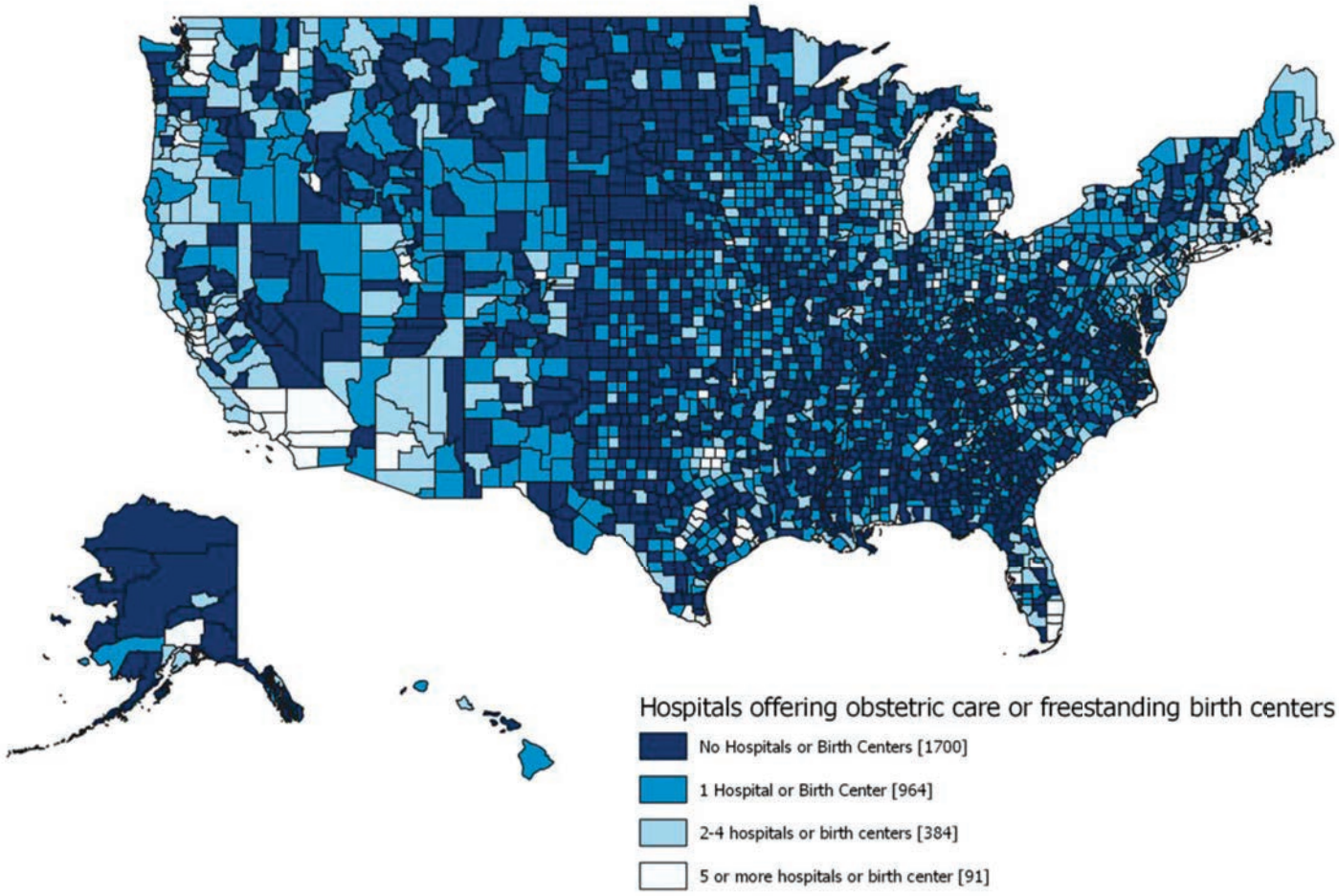
**Source: U.S. HRSA, Area Health Resource Files, 2019. Data from 2017 **Source U.S. HRSA, Area Health Resource Files, 2019. Data is from 2013-2017*

HOSPITALS

One measure of lack of maternity care access is the proximity of hospital obstetric services. Women who live in rural areas have excess risk for childbirth complications due to both clinical factors and social determinants of health.[18] Analysis of trends in hospital obstetric service closures found a 7.2 percent decline in the percentage of rural counties with hospital-based obstetric services in the U.S. between 2004 and 2014.[19] A total of 179 rural counties (about one in ten) lost hospital-based obstetric services during those ten years.[20] Of these counties, 150 were areas with less than 10,000 residents, indicating that closures disproportionately affected more remote areas.[20] As of January 1, 2020, 120 rural health care facilities have closed.[21] States in the Southeastern U.S. and lower Great Plains and those states that have not expanded Medicaid have the greatest risk of rural health closures.[21] The areas where rural facilities are most likely to close are also those areas of greater need, experiencing higher levels of negative maternal health outcomes.[22] Factors that contribute to hospital closures include having higher rates of uninsured patients, large amounts of uncompensated care, financial distress, hospital size and community poverty rates.[22]

According to data from the 2018 American Hospital Association Annual Survey,[23] there are 5,198 hospitals in the U.S. and 45 percent (1,418 hospitals) offer obstetric care services.[24] While more than two-thirds of counties in the U.S. have at least 1 hospital (65.1 percent, n=2,043), not all of these hospitals provide obstetric care. Almost half (45.2 percent, n=1,418) of counties have at least one hospital providing obstetric care (Figure 4), which is almost a 2 percent decrease since the 2018 report. Urban counties are more likely to have a hospital providing obstetric care than rural counties (58.0 percent and 37.6 percent, respectively) but urban counties have fewer hospitals providing that care per 10,000 births than rural counties (6 hospitals per 10,000 births in urban counties compared to 17 in rural counties).[24] In counties with at least 1 hospital had a higher median income ($54,824 compared to $48,030) and lower percent of the population in poverty (15.3 percent compared to 16.5 percent) than counties with no hospitals.[24]

Figure 4: Access to hospitals or birth center offering obstetric care by county, United States



Source: U.S. Health Resources and Services Administration (HRSA), Area Health Resources Files, 2019; American Association of Birth Centers, 2020

BIRTH CENTERS

Birth centers are another option for women with low-risk pregnancies to receive delivery services, prenatal and postpartum care. In general, birth centers are defined as health facilities that are independent from hospital systems or physicians and are dedicated to health care for the perinatal period.[25] Birth centers also provide a home-like environment and practice the midwifery model of care, which emphasizes a little to no intervention approach to birthing.[26] Midwives employed at birthing centers often have relationships with hospital systems in the event that medical intervention is needed.[26]

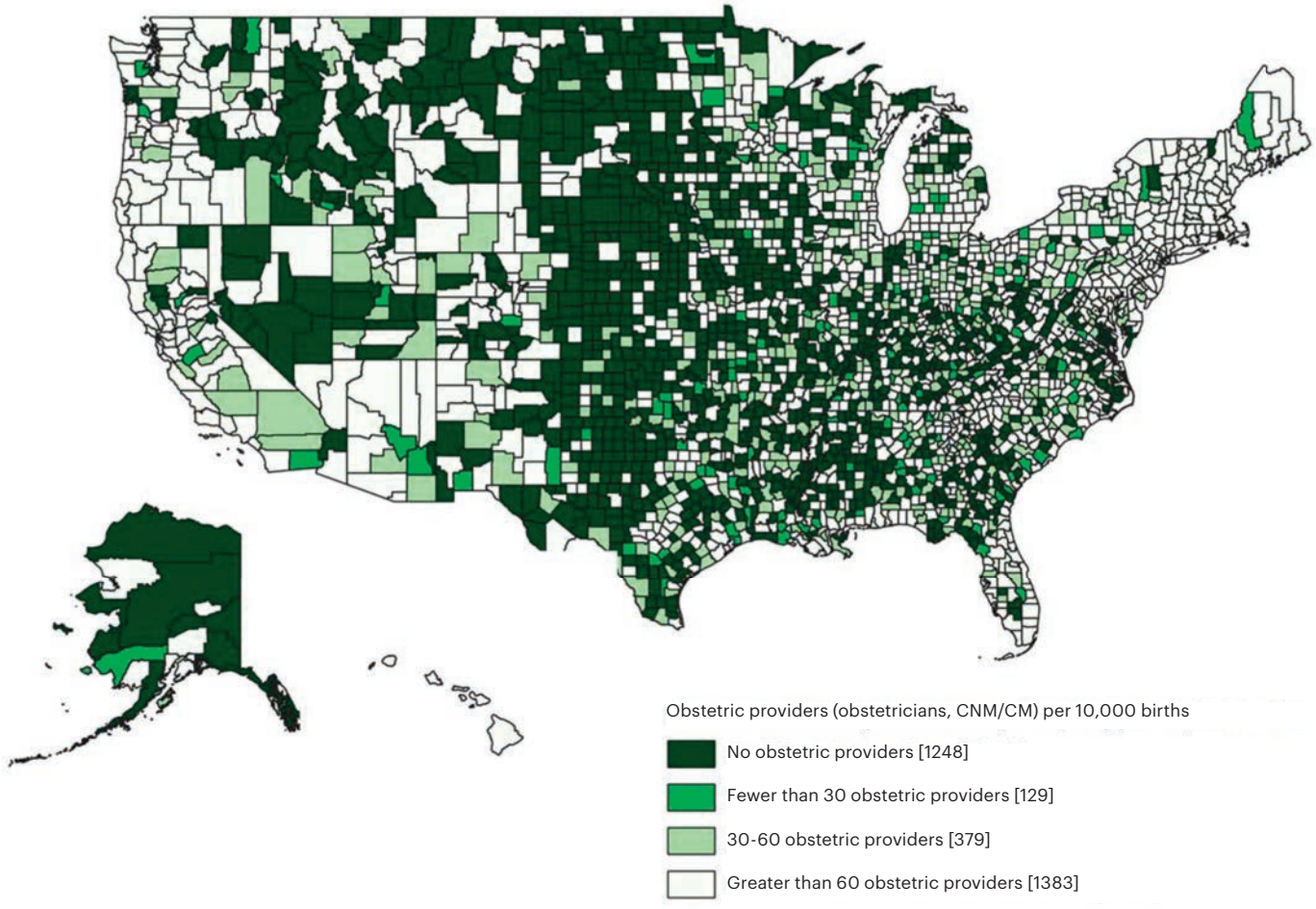
Of the 234 birthing centers in the U.S., 98 percent are located in counties that already have access to maternity care,[26] with 16 percent of urban counties having 1 or more birthing centers and only 2 percent of rural counties having at least 1 birth center.[26] Over the past few decades, less than 1 percent of births in the U.S. have been in a birth center or at home, however, interest in out-of-hospital births has been rising.[27] Midwifery-led models of care have proven to improve outcomes for socially at-risk communities.[28] Analysis in 2018 of nationwide birth center data shows that women receiving prenatal care at a birth center had lower rates of preterm birth, low birth weight and Cesarean delivery and reduced racial disparities for Black and Hispanic women.[28] With midwifery care as the foundation of birth centers, there's opportunity to achieve similar outcomes on a larger scale.[28] State regulatory environments for births outside of hospitals are varied across the U.S. and this may be a factor in the availability of other options for women.[29] A map showing the density of both birth centers and hospitals across the U.S. can be seen in Figure 3 on page 9.

PROVIDERS

Maternity care providers include obstetricians, certified nurse-midwives/certified midwives (CNM/CM), and family physicians. These providers are distributed unevenly across the U.S. and approximately half of all counties lack a single obstetrician,[30] leading to access inequities in certain communities such as rural counties. It's estimated that fewer than 10 percent of obstetric providers practice in rural areas.[18] Shortages of maternity care providers can result in long waiting times for appointments and/or long travel times to prenatal and postpartum care or birth sites. Previous studies on the availability of obstetricians and CNM/CM at the county level show distribution of providers were mostly concentrated around metropolitan areas.[31,32] Rural communities face further challenges due to trends in obstetrician movement from rural and impoverished areas to urban and wealthier areas.[30] Higher rates of maternal mortality and morbidity and other adverse birth outcomes among women of color, and Black women in particular, have prompted interest in models of care that can improve outcomes, including midwifery and specific evidence-based supportive and preventive care programs developed and led by midwives.[32] March of Dimes supports efforts to increase the number of midwives of color and diversify the maternity care workforce with individuals who represent the lived and cultural experiences of the patients they serve.[33]

In 2017, about half of the 3,139 U.S. counties lacked a single obstetrician (n=1,512, 48.2 percent), and more than half of the counties did not have a CNM (n=1,730, 55.1 percent). More than 1,200 counties had neither an obstetrician nor a CNM (n=1,248, 39.8 percent) and an additional 508 counties had 60 or less obstetric providers per 10,000 births (16.2 percent) (Figure 4).[24] More than 2.9 million women of reproductive age lived in counties without an obstetric care provider. In 2017, there were almost 146,000 births in these counties.[24] Counties with more than 60 or more OB providers had a higher median income ($55,866 compared to $47,345) and a lower percent (16.7 percent compared to 15.1 percent) of the population on poverty compared to counties with less than 60 obstetric providers.[24]

Figure 5: Distribution of obstetric providers by U.S. county, 2017



Source: U.S. Health Resources and Services Administration (HRSA), Area Health Resources Files, 2019

MIDWIVES

Most babies in the U.S. are born in a hospital (98.4 percent) and attended by a doctor of medicine (MD, 80.9 percent) or doctor of osteopathic medicine (DO, 8.0 percent). Nationally, nearly 1 in 10 births is attended by a certified nurse midwife (9.4 percent) or other midwife (0.8 percent).[24,35] Efforts to further integrate health care professionals, such as midwives, into maternity care could help improve access to providers and quality of care. In a statement further reinforced by research, the American College of Obstetricians and Gynecologists (ACOG) and the American College of Nurse-Midwives supported that the highest quality of care for women occurs when physicians and midwives are working together to provide maternal health care.[34] March of Dimes encourages states to ensure that their laws foster access to midwifery care and also supports efforts to further integrate their model of care, with full autonomy, into maternity care in all states.

Considerable variation in births attended by midwives is observed by state. In 2018, the proportion of births attended by a certified nurse midwife was 5 percent or less in Alabama, Arkansas, Louisiana, Mississippi, Missouri, Nevada, Oklahoma and Texas. More than 1 in 5 births was attended by a midwife in Alaska, Maine, New Hampshire, New Mexico, Oregon and Vermont in 2018 (Table 4).[35]

Births to American Indian/Alaskan Native women are more likely than other racial and ethnic groups to be attended by a certified nurse midwife (CNM) (19.7 percent compared to 11.2 percent among non-Hispanic White women). A lower percent of midwives is used by other women of color (9.4 percent among Hispanic women, 8.4 percent among Black women and 8.0 percent among Asian/Pacific Islander women).[35] This may be because historical American Indian values and birth practices are more aligned with the way that midwives provide care.[36] There's a long history of intention behind incorporating CNMs into the Indian Health Services across the country since the 1960s.[36]

Over decades, changes to maternity care have created educational pathways, programs and structure for providers to work collaboratively between obstetricians and CNMs, which have led to improved infant outcomes.[36] Collaborative care has become the predominant model of maternity care and is a way to provide culturally-aligned care.[36] One such model showed a correlation between higher levels of collaboration and significantly higher rates of positive birth outcomes, such as vaginal delivery and vaginal birth after Cesarean, as well as significantly lower rates of Cesarean sections, preterm birth, low birthweight infants and neonatal death.[29]

DOULAS

Doulas are non-clinical professionals who provide physical, emotional and informational support to moms before, during and after childbirth, including continuous labor support.[37] They offer guidance and support around topics related to childbirth, breastfeeding, pregnancy health and newborn care. Supportive care during labor may include comfort measures, information and advocacy.[38] While there's no reliable estimate of the number of doulas in the U.S., a centralized online doula registration service, not affiliated with any one certifying organization, had over 10,000 registered doulas in 2020.[39]

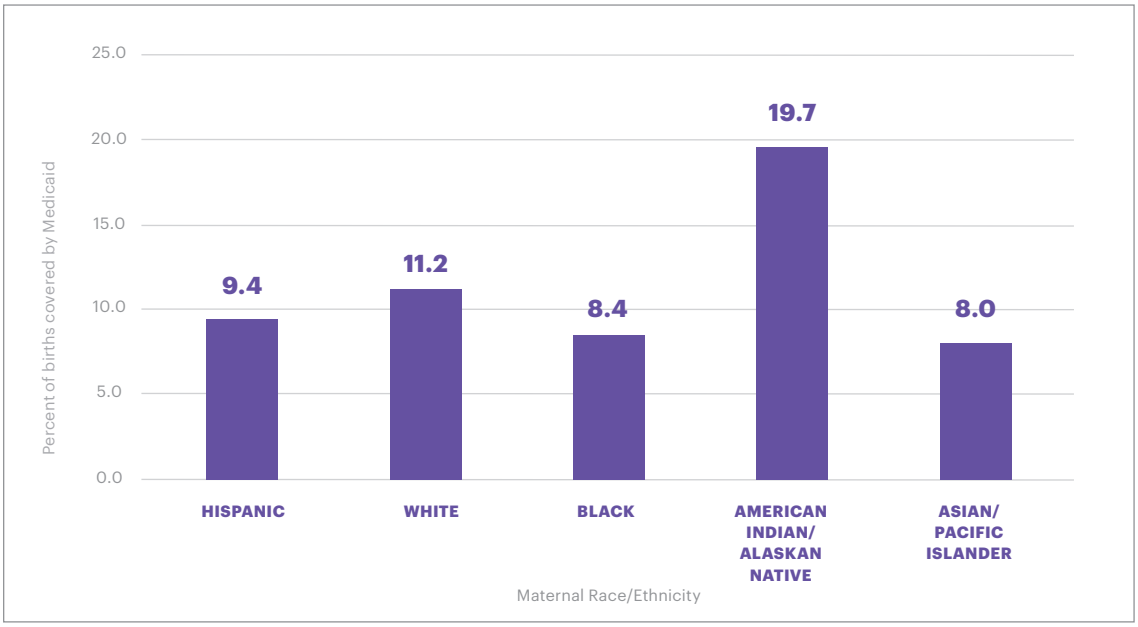
Women who receive continuous labor support are less likely to have medical intervention during delivery and more likely to have a satisfying birth experience.[38] Moms who use doulas are also more likely to practice healthy infant care by initiating breastfeeding and practicing safe sleep for infants.[40] Increased access to doula care in under-resourced communities can help reduce the effects of social determinants of health by addressing health literacy, improving patient/provider communication, social support needs and decreasing anxiety and depression.[41] Further evidence tells us that women who are low income, socially disadvantaged or who experience cultural or language barriers to accessing care experience the positive effects of doula care more strongly.[42]

Women who utilize doula services tend to pay out of pocket and work in urban areas.[42,43] Access to doula care is further limited as services are not routinely covered by health insurance providers. This can leave those who may benefit the most from doula care with the least access to it—both financially and culturally.[44,45] Insurance coverage for doula support through Medicaid, the Children's Health Insurance Program, private insurance and other programs may be a way to improve birth outcomes and close the gap in birth outcomes between African American and White

women.[44] Just like midwives, doulas have the ability to practice in the homes of patients, which can have an impact for socially and economically vulnerable families.[46] Increasing access to doula care, especially in under-resourced communities, may improve birth outcomes, improve the experience of care and lower costs by reducing non-beneficial and unwanted medical interventions.[47-49]

March of Dimes supports increased access to doula care as one tool to help improve birth outcomes and reduce the higher rates of maternal morbidity and mortality among women of color in the U.S. and advocates for all payers to provide coverage for doula services. Additionally, March of Dimes recognizes the importance of increased training, support and capacity development for doulas, including doulas from racially, ethnically, socioeconomically and culturally diverse communities.

Figure 6: Percent of births attended by midwives, by race/ethnicity, U.S., 2018



Source: National Center for Health Statistics. Final natality data, 2018

Table 5: States with the highest and lowest percentage of births attended by midwife (CNM), 2018

5 states with highest percent of births attended by midwife (CNM):	
Alaska	29.0%
New Mexico	27.5%
Vermont	24.7%
Maine	21.1%
Oregon	20.7%

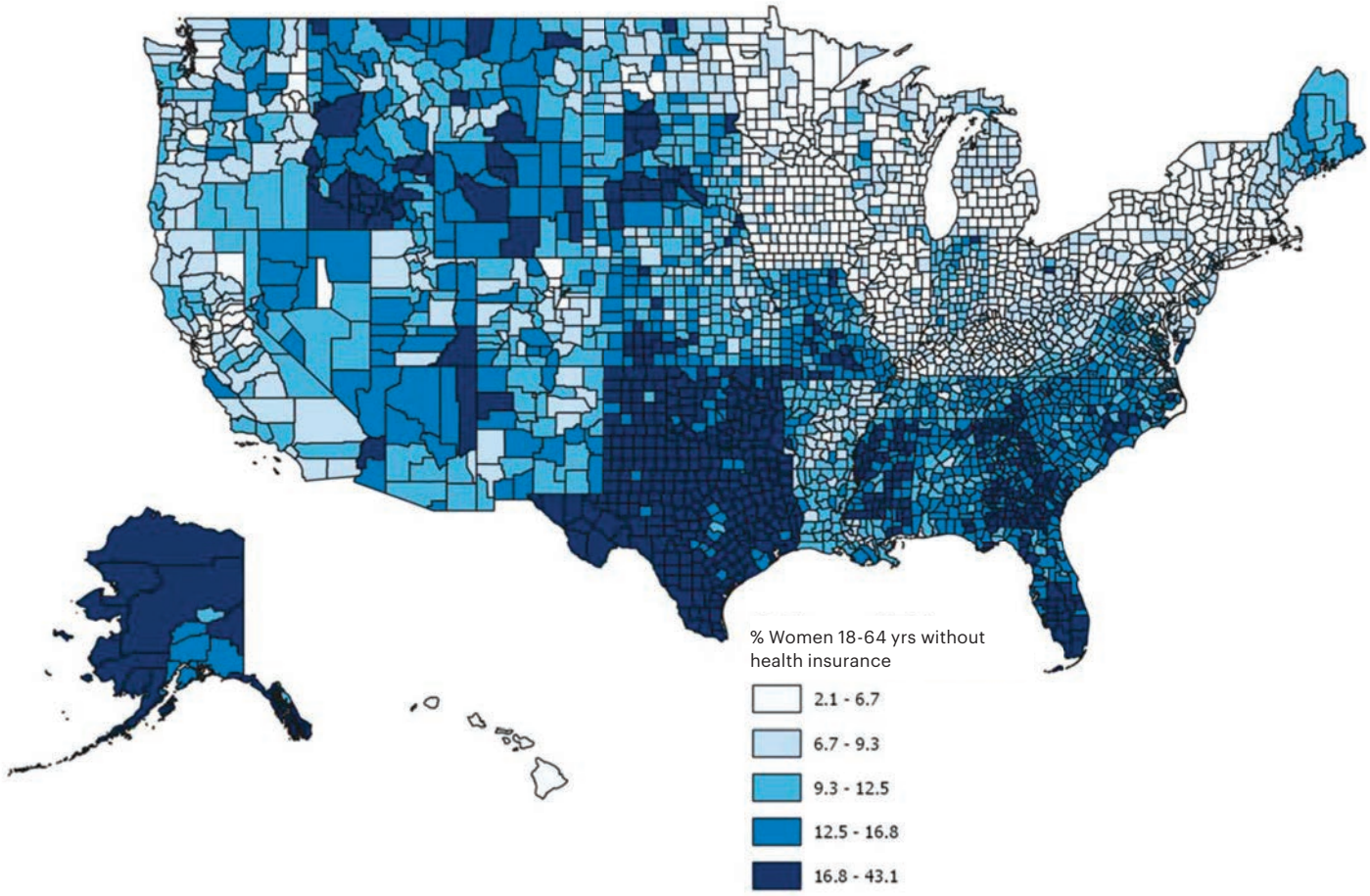
5 states with lowest percent of births attended by midwife (CNM):	
Arkansas	0.4%
Alabama	1.2%
Mississippi	1.8%
Louisiana	2.8%
Texas	3.6%

Source: National Center for Health Statistics. Final natality data, 2018

HEALTH INSURANCE COVERAGE AMONG WOMEN

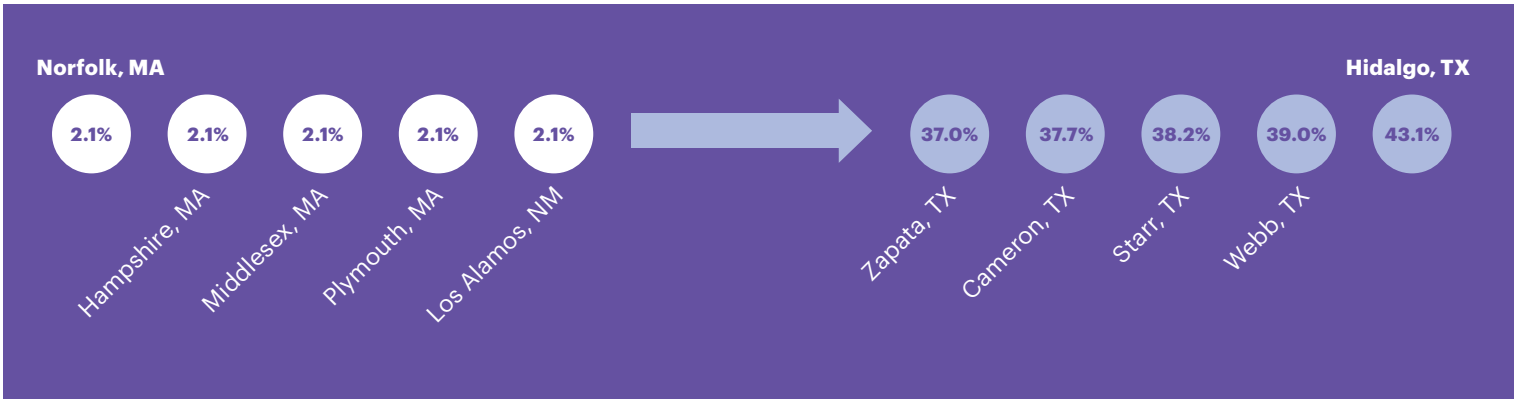
Health insurance coverage is a critical aspect of making health care accessible and affordable for women. Health insurance is especially important during a woman's reproductive years. Lack of health insurance can be a significant barrier to obtaining regular preventive health care, which may identify and manage adverse health conditions that may affect pregnancy such as diabetes, hypertension, obesity and sexually transmitted diseases.[50] In addition, there's evidence that adequate prenatal care beginning in the first trimester can decrease the likelihood of adverse birth outcomes.[51] Women who do not receive prenatal care are also 3 to 4 times more likely to have a pregnancy-related death than women who receive any prenatal care.[52] Although the rate of uninsured women ages 19 to 64 has declined since the passage of the Affordable Care Act, about 1 in 10 (11 percent) women in the U.S. still did not have health insurance in 2018.[53] At the state level, the percentage of uninsured women under age 64 ranged between 3 percent and 23 percent.[53] This variation is evident when examining health insurance rates at the county level (Figure 6). In 2017, about 45 percent (n=1,412) of all U.S. counties had a greater than 10 percent proportion of women without health insurance. Across counties with full access to maternity care, the variation in health insurance rates is evident. Half (52.7 percent) of the counties with full access to maternity care have a high proportion of women without health insurance (10 percent or more). In the U.S., the majority of counties with a high proportion of women without health insurance are located in the south.[24] Four counties in Massachusetts and 1 county in New Mexico have the lowest percentage of uninsured women in the country (2.1 percent) (Figure 6). Counties with the highest percentage of uninsured women were found in Texas, ranging from 37 percent to 45.1 percent of women uninsured (Figure 6).

Figure 7: Women without health insurance, 2017



Source: US Health Resources and Services Administration (HRSA), Area Health Resources Files, 2019

Figure 8: Counties with the lowest and highest proportion of women without health insurance, 2017



Source: US Health Resources and Services Administration (HRSA), Area Health Resources Files, 2019

HEALTH INSURANCE BEFORE, DURING AND AFTER PREGNANCY AMONG WOMEN

Access to health insurance is critical before, during and after pregnancy to identify and treat chronic health conditions, address behavioral health needs and plan for a healthy pregnancy. Ensuring access to continuous care is also important for addressing our nation's growing rates of maternal mortality and severe maternal morbidity. In 2017, 39 states and the territory of Puerto Rico collected information on insurance status prior to pregnancy through the Pregnancy Risk Assessment Monitoring System (PRAMS). The data reveals that almost 1 in 7 (13.2 percent) women did not have any health insurance coverage in the month prior to their pregnancy. This is an increase in health insurance coverage for women during this critical period compared to the 1 in 5 women covered in 2015. The rates of coverage widely range from a high of 95.1 percent in Massachusetts to a low of 69.5 percent in Oklahoma.[54]

In 2018, Medicaid covered the delivery care costs of more than 1.6 million pregnant women, or 42 percent of births in the U.S., who would have otherwise been uninsured during a critical period for them and their baby.[35] The proportion of births covered by Medicaid varied by state and by county. Between 2008/2009 and 2015/2016, states that expanded Medicaid had a much greater decline in the uninsured rates for low-income adults living in rural areas and small towns compared to states that did not expand (a decline from 35 percent to 16 percent and 38 percent to 32 percent, respectively).[55] This finding suggests Medicaid expansion as a way to help close the gap in health insurance access between rural and urban areas in states with disparities in coverage that haven't yet expanded.

By federal law, all states must provide Medicaid coverage to pregnant women with incomes up to 133 percent of the federal poverty level (FPL) through 60 days postpartum. In states that have adopted Medicaid expansion, many women are now able to remain on Medicaid once they become moms because of the higher eligibility threshold for parents in these states. However, in the 14 states that have not adopted Medicaid expansion, many women lose Medicaid coverage 60 days after the birth of their child because their income is above the eligibility level for parents in those states.[53]

March of Dimes has long advocated in support of efforts to extend postpartum Medicaid coverage beyond 60 days to 1 year. The need for postpartum services exists well beyond the current limit in federal law of 60 days after the end of pregnancy, which was established with the Social Security Act of 1902. The need for extending Medicaid coverage to 1 year is rooted in clinical evidence. Since 1986, when Congress established the 60-day postpartum period for Medicaid coverage for pregnant women, we've learned much more about pregnancy-related deaths and delivering postpartum care. Nearly 12 percent of pregnancy-related deaths—not counting those that were caused by suicide or overdose—occur 43 to 365 days postpartum.[9] Some states' analyses of pregnancy-associated deaths, which include behavioral health-related causes, find that 50 percent or more of deaths occur beyond the 60-day period.[56,57] Currently, the states that have expanded postpartum Medicaid coverage past the 60-day period include South Carolina and California with major restrictions. South Carolina only covers care for addiction treatment and California only covers care for mental health conditions.

We must ensure that women maintain access to coverage and are not subject to disruption in access to insurance coverage.[58] Adequate postpartum coverage enables new moms to obtain the services they need for a full recovery and to prepare for future healthy pregnancies. This includes postpartum visits where their physical, emotional and psychosocial well-being can be evaluated. For this reason, medical professionals have recognized the importance of providing postpartum care and supports during this time based on each woman's specific needs.[59] This allows women to receive the treatment needed to manage chronic conditions that can put them at higher risk for pregnancy-related complications, including cardiovascular disease, diabetes and chronic hypertension. A wide array of conditions, including mental health challenges, domestic violence and substance use disorders all play a role in maternal mortality and broader maternal health outcomes. Nearly 70 percent of women report at least 1 physical problem in the postpartum period and 1 in 7 experience symptoms of postpartum depression in the year after giving birth.[60,61] In addition, women with substance use disorder are more likely to experience relapse and overdose 7-12 months postpartum.[62]

42% **OF BIRTHS IN THE U.S. WERE COVERED BY MEDICAID IN 2018**

Source: National Center for Health Statistics. Final natality data, 2018

PERINATAL REGIONALIZATION AND RISK-APPROPRIATE LEVELS OF MATERNAL AND NEONATAL CARE

Development of systems for perinatal regionalization and for the provision of risk-appropriate maternal care is a key strategy to decrease maternal morbidity and mortality, including existing disparities, by providing risk-appropriate care specific to maternal health needs.[63] Emerging data indicate disproportionate rates of COVID-19 infection, severe morbidity and mortality in some communities of color, particularly among Black, Latino and American Indian people.[64] Social determinants of health, current and historic inequities in access to health care and other resources and structural racism contribute to these disparate outcomes. These inequities also contribute to disproportionate rates of comorbidities in these communities that place individuals at higher risk of severe illness from COVID-19.[65]

The perinatal regionalization movement began in the 1970s when March of Dimes, along with other partners, published a report entitled Toward Improving the Outcome of Pregnancy (TIOP) which described an integrated regional system that stratified maternal and neonatal care into levels based on complexity so that high-risk patients would be referred to higher-level centers with appropriate technology and specialized health care providers to address their needs.[66] In order to standardize an integrated system of perinatal regionalization and risk-appropriate maternal care, this classification system establishes levels of maternal care that pertain to basic care (level I), specialty care (level II), subspecialty care (level III) and regional perinatal health care centers (level IV). Similarly, neonatal levels of care are organized beginning with well newborn nursery (level I), special care nursery (level II), neonatal intensive care unit (level III) and regional neonatal intensive care unit (level IV). Levels of maternal and neonatal care may not match within facilities, but a woman who's pregnant should be cared for at a facility that best meets both her and her newborn infant's needs.[67]

The second and third editions of TIOP, published in 1993 and 2010, respectively, have continued to emphasize the importance of establishing both levels of maternal and neonatal care. Further statements from organizations such as the American Academy of Pediatrics, American College of Obstetricians and Gynecologists and Society for Maternal-Fetal Medicine have provided clinical support for a coordinated regional system of care.[68,69] Perinatal regionalization

is managed at the state level, and initiatives such as the HRSA-led Collaborative Improvement & Innovation Network (CoIIN) to Reduce Infant Mortality is working to enhance perinatal regionalization to reduce infant mortality and improve birth outcomes.[70]

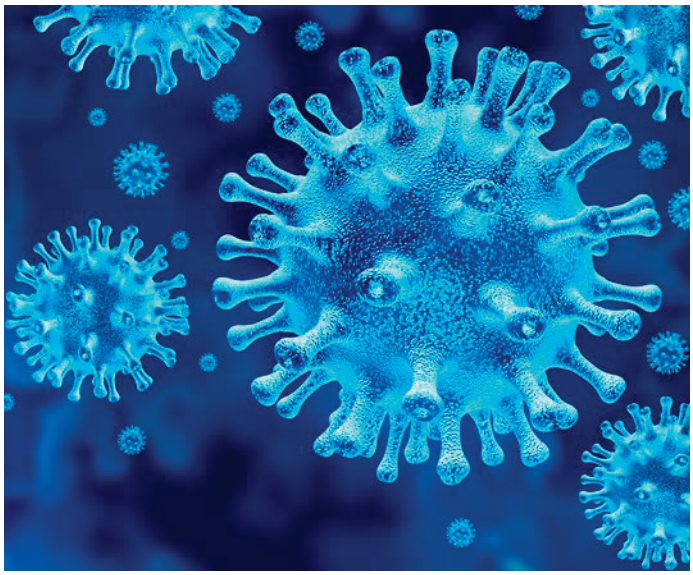
A meta-analysis found that very low birth weight or very preterm infants born outside of a level III (higher level of complexity) hospital are at an increased risk of neonatal death or death before discharge from the hospital.[71] A study examining geographic gaps in access in the availability of obstetric and neonatal care found that while the majority of women of reproductive age in the U.S. have access to critical care, there are significant differences.[72] Nearly all obstetric and NICU units were concentrated in urban areas with clusters of hospitals operating close to each other, which meant that the majority of the population did have access to (defined as living within 50 miles of) perinatal critical care units. However, large geographic areas in this country were not covered by either of the perinatal facility zones, indicating a significant gap in access for women in rural areas. In addition, the fastest access to both obstetric and neonatal critical care for almost 10 percent of women was in a neighboring state, underscoring the need for coordination between states as well as within. Also of note, access to obstetric critical care lagged behind that for neonatal critical care based on measures such as the number of nearby maternal-fetal medicine specialists compared to neonatologists, and the number of hospitals with obstetric critical care units compared to neonatal intensive care units (NICUs).[72] The clustering of facilities and providers are barriers to accessing needed services in maternal and neonatal critical care, and addressing this access gap could help improve outcomes for both mom and baby.

COVID-19 PANDEMIC AND ACCESS TO MATERNITY CARE

In early 2020, COVID-19, a novel coronavirus, was identified in the U.S. Active surveillance has increased our understanding of the impact this virus has on pregnant women. According to the CDC, pregnant women may be at increased risk for severe illness related to COVID-19 infections.[73] These women have a greater likelihood to be hospitalized, admitted to the ICU and require mechanical ventilation.[74] An increase in risk of fatality has not been seen with pregnant women as compared to non-pregnant women, based on available data. Despite some studies documenting possible vertical transmission of COVID-19, the overall risk appears to be low.[75] More research is needed in order to counsel patients on any pregnancy-related risks of COVID-19 and intrauterine transmission. Among pregnant women diagnosed with COVID-19, 46.2 percent were Hispanic, 23 percent were Non-Hispanic White, 22.1 percent were Non-Hispanic Black and 3.8 percent were Non-Hispanic Asian.[74]

Other aspects of this pandemic are indirectly affecting women's health care access. The loss of employment, loss of health insurance and heightened food insecurity have potential to exacerbate the challenges in receiving adequate and quality maternity care.[76] The inequities raised in this report result in higher rates of maternal mortality, severe maternal morbidity and poor birth outcomes and are intensified with these additional challenges that disproportionately affect communities of color. Women in particular are facing increased unemployment at a rate of 11.2 percent compared to men (10.1 percent) as of May/June 2020.4 Job loss is also affecting women of color at a higher rate (Latinas have a rate of 15.3 percent and Black women at 14 percent).[77]

Pregnant women are experiencing unforeseen changes to the way they are receiving prenatal care and to their birth plans.[78] Providers and health systems have responded to the need for reduced in-person contact for maternity care by incorporating telemedicine into their prenatal care programs. While uptake for telemedicine had occurred quickly, the transition to virtual care has been more challenging for women insured by Medicaid than those who hold private insurance.[78] Barriers for all women include language barriers, Wi-Fi access, child care and lower proficiency with electronic software.[79] Social distancing and child care center closures, school closures, stress and working from home during the pandemic have the possibility to further exacerbate challenges to receiving prenatal care.[80]



A recent survey of more than 14,000 pregnant women shows the effect this pandemic has had on the way women are receiving care. (Ovia Health, unpublished data, 2020). Although the majority of visits appear to be occurring as planned, with appropriate precautions, approximately 20 percent of visits were altered. Of those altered visits, 40 percent occurred online and 35 percent occurred by phone. Approximately 45 percent of women surveyed who received care either online or by phone were asked to take measurements at home (weight, belly measurements, blood pressure or other) and over 60 percent were able to take those measurements. In order to assure that during a continued health crisis telemedicine is a viable option for all women, additional studies are needed to examine barriers within certain communities. A worrisome result of the survey was that 40 percent of the women reported not having received information about the coronavirus from their provider or hospital.

One solution may be found in prenatal and postpartum care via telehealth. March of Dimes supports increasing access to telehealth services for pregnant and postpartum women. Telehealth is increasingly used across a range of health care specialties, including obstetrics, maternal-fetal medicine and mental health.[81] There's reason to focus specifically on telehealth in maternity care, as in recent years, telehealth has been incorporated into many aspects of women's health care, including: virtual patient consultation with specialists, remote observation of ultrasound recordings by maternal-fetal medicine experts, postpartum blood pressure monitoring using

Wi-Fi connected devices and fertility tracking with patient-generated data.[82] Additionally, a robust and growing body of evidence shows largely positive outcomes associated with the provision of telehealth services in maternity care.

Evidence on a range of services and telehealth domains suggests telehealth services provide comparable outcomes to traditional methods of health care delivery. A 2020 systematic review of telehealth interventions[82] found that that a number of telehealth interventions were associated with outcomes known to improve the health of moms and babies. In particular, telehealth interventions were associated with improvements in obstetric outcomes related to perinatal smoking cessation and breastfeeding.[82] For pregnant women, concern over COVID-19 may be even more heightened than the general public. Most women have frequent interactions with the health system during pregnancy for prenatal checkups. Current COVID-19 precautionary measures of social distancing, coupled with transportation and newly developed health care office procedures make routine prenatal care more difficult for pregnant women. The expanded use of telemedicine during pregnancy has enabled some pregnant women to stay home and participate in prenatal visits over videoconference or the phone without coming into the clinic where they risk COVID-19 exposure.[83] However, because some moms will face barriers to using telehealth, additional considerations on the part of the provider may help these women to utilize virtual care and minimize disruptions to care.[79] Coronavirus Preparedness and Response Supplemental Appropriations Act, which broadens coverage and reimbursement for telemedicine services for Medicare and Medicaid during this pandemic, is an opportunity to learn best practices for the future of telehealth services, cost sharing and reimbursement post-pandemic.[84]

TECHNICAL NOTES

In 2020, March of Dimes re-examined the 2018 Nowhere to Go Report on Maternity Care Deserts in the United States. The current descriptive analysis utilized county-level data from the Area Health Resource File 2017-18 (AHRF) which includes data from the 2017 American Hospital Association (AHA) Annual Survey, 2017 Small Area Health Insurance Estimates (SAHIE), and National Center for Health Statistics (NCHS) natality data (2018). All variables were from 2017-2018 except where noted. Key variables from the AHRF include hospitals (short term general hospitals with obstetric care), providers (obstetrician, general, providing patient care, certified nurse midwives, 2013), social determinants of health (median household income, proportion of the population in poverty, urban rural continuum, 2013) and health insurance (females 18-64 without health insurance). Urban was defined as a county within a metropolitan area (1, 2 or 3 on the urban rural continuum). Rural was defined as a county with an urban population of 2,500 to 19,999, 20,000 or more, not adjacent to a metro area, or completely rural (4 on the urban rural continuum).[85] Data on population of women ages 15-44 years was obtained directly from U.S. Census data.

A county was classified as a maternity care desert if there were no hospitals providing obstetric care, no birth centers, no obstetrician and no certified nurse midwives. Counties were further classified as having low access to maternity care services if there was one or less hospital offering obstetric service and fewer than 60 obstetric providers per 10,000 births, and the proportion of women without health insurance was 10 percent or greater. Counties were classified as having moderate access to maternity care services if there was 1 or less hospital offering obstetric service and fewer than 60 obstetric providers per 10,000 births, and the proportion of women without health insurance was less than 10 percent. Counties with full access had either 2 or more hospitals offering obstetric services or more than 60 obstetric providers per 10,000 births. Although level of health insurance was not part of the definition for access, a separate analysis was conducted to examine the variation in this important factor among those counties with full access. After excluding 11 counties from the analysis because data was missing from 1 or more components of the access to maternity care were missing (obstetric hospitals, obstetrician, CNM, health insurance or number of births equaled zero), there were 3,139 counties in the dataset.

Other data utilized for this report include data from the Pregnancy Risk Assessment Monitoring System (health insurance before pregnancy, 2017), NCHS 2018 final natality file (Medicaid-covered births, type of provider attending births). The proportion of women without insurance by county from SAHIE was obtained through the AHRF for use in the limited access to maternity care indicator.

Differences in methodology from the 2018 report include the inclusion of birth centers. In the 2018 report the proportion of women without health insurance was split into two categories greater than 10 percent and less than or equal to 10 percent. In order to remain consistent with the definition used in the 2018 and 2020 report the proportion of women without health insurance was recategorized to greater than or equal to 10 percent or less than 10 percent. In the 2020 report, urban and rural designations were matched to metro and non-metro designation used in the urban-rural continuum. Updated data indicates that the proportion of women lacking health insurance is 11 percent in the U.S.; however, to remain consistent with the 2018 analysis, 10 percent level was still utilized in designations.

Limitations: The AHRF is a primary data source for this report. Estimates in the AHRF come from a variety of other data sources and are all reported by county. Suppression criteria, other analytic decisions and data source limitations are not known for every data source represented in the AHRF and may skew estimates when data are aggregated across counties. This report does not use any geospatial analysis, so, actual distance to a hospital providing obstetrician services is not considered. Utilizing county as the level of analysis provides access to data that's not available at smaller geographic areas, but it does not capture access to services in adjacent counties. The use of OB hospitals and birth centers do not account for the provision of prenatal care in other clinical care settings (i.e., federally qualified health care centers, hospital satellite clinics). The three main components of the main indicator (hospitals, providers and insurance) do not account for the quality of the health care received, nor the appropriateness of the level of care a woman might receive given particular health conditions. Access by health insurance for women is based on population level proportions among women age 18-64 years and does not account for women who have insurance during and after her birth through Medicaid.

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HEALTHY MOMS. STRONG BABIES.

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Healthy Moms and Babies

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Healthy Moms and Babies

Overview

Maternal health refers to the health of women during pregnancy, childbirth, and the postnatal period (1). It is influential in determining the overall health outcomes of both mother and baby, making a woman's preconception health and ability to access maternal healthcare extremely important. Prenatal care is critical as it allows expecting mothers to be screened and monitored for potential complications that could occur during and after pregnancy. Access to prenatal care reduces the risk of many pregnancy complications that can be dangerous and even fatal for both the mother and baby, especially if left undiagnosed.

While genetics can play a role in maternal and infant health outcomes, the preconception health of a mother is critical. Research strongly supports that where people live, learn, work, and play (in addition to environmental and social factors and availability of resources to meet daily needs) influence maternal and infant health behaviors and health status (2).

A **maternity care desert,** as defined by the March of Dimes, is "a county in which maternity care services are limited or absent because of either a lack of services or barriers to a woman's ability to access those services" (4). Women living in these counties have limited access to appropriate preventive, prenatal, and postpartum care.

Nationally, more than 5 million women live in maternity care deserts that have no hospital offering obstetric care and no obstetric providers (4).

Almost 150,000 babies are born annually to women living in maternity care deserts in the United States (4).

Among women living in maternity care deserts, 4 of 5 live in a rural area (4).

Pregnant women living in rural communities face unprecedented barriers to accessing adequate maternity care, often leading to disparate birth outcomes (3). Rural women often face lengthy journeys to reach a hospital that offers obstetric care. The scarcity of obstetricians practicing in rural areas increases the number of births without obstetrician care and influences the number of early elective deliveries through the induction of labor and cesarean section procedures. The complications associated with these procedures present increased risks of maternal and infant mortality (4). The likelihood of facing these challenges is even greater for women of color in rural areas as they are disproportionately affected by a lack of access to maternal care and have a higher incidence of maternal mortality (5).

Prenatal Care Rated Adequate or Better

Rural
355.9 per 1,000

non-Rural
411.3 per 1,000

Virginia Department of Health PRAMS 2018

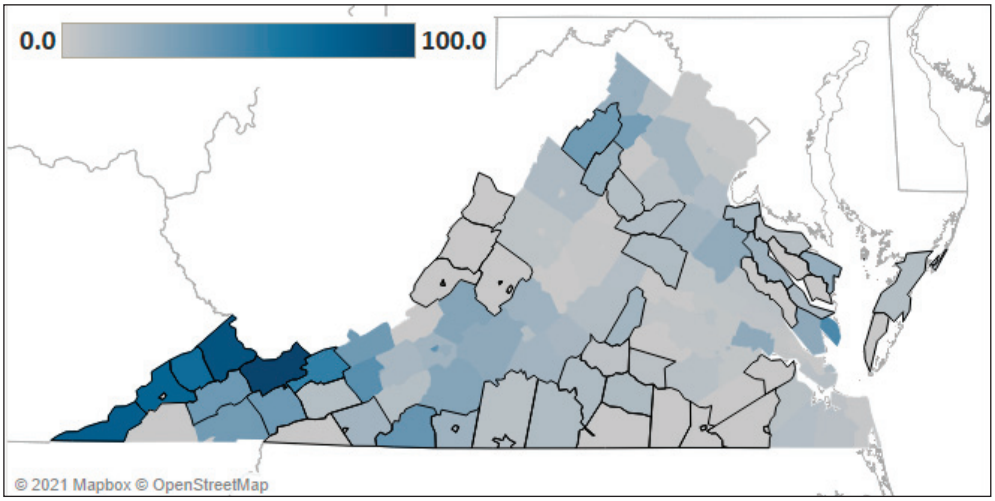
In Virginia, rural communities have a higher rate of infants born with low birth weight.

In rural areas, the rate of low birth weight is approximately 94 per 1,000 live births, compared to 82 per 1,000 in non-rural areas. However, there is much variation regionally. In Eastern Virginia, there are 123 babies born annually with low birth weight per 1,000 live births. In Northern Virginia, that number falls to 72. Additionally, low birth weight is often seen in babies with Neonatal Abstinence Syndrome (NAS), which occurs more frequently in rural areas.

Time between births is a concern for rural mothers and babies.

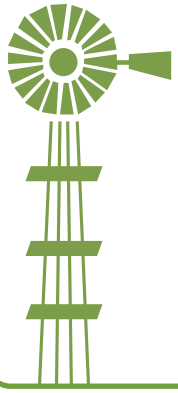
Children in rural areas are born with a birth interval of less than two years at over twice the rate of non-rural area; 190 per 1,000 live births in rural areas compared to just 89 per 1,000 live births in non-rural areas. Short birth rate intervals increase the risk of the mother not recovering fully from previous births, creating a sub-optimal environment for the next baby. These conditions can cause complications such as low birth weight and higher mortality rates in future births.

Neonatal Abstinence Syndrome Diagnoses per 1,000 Live Births



Source: Virginia Health Information, 2019

In order to begin to bridge the gaps between rural mothers, their babies, and adequate care, growing and retaining the maternity care workforce in rural communities should be made a top priority by health policy makers, health care systems, colleges and universities and public health programming.



In rural areas, the average cost of child care is higher.

According to a 2019 report by the National Women's Law Center, the average annual cost in Virginia for full-time center-based care was $13,728 for infants and $10,608 for 4-year-olds. That is significantly higher than the national average of $10,759 for infants and $8,678 for 4-year-olds. For a Virginia woman with an annual salary of $44,000, full-time child care for an infant would take up almost a third of her gross earnings (6).

Leading Practices and Approaches

Whenever possible, examples of leading practices and approaches were taken from rural Virginia communities. Otherwise, examples were gathered from localities with comparable demographic characteristics.

Middle Peninsula Northern Neck Community Services Board: Rural Infant Services Program

Need addressed: Most available information points to the fact that about one in six children in the United States is diagnosed with a developmental disability, ranging from autism, to ADHD, to other developmental delays. Some studies show that this number is increasing (7). Appropriate intervention and care must be available so that these individuals have the opportunity to reach their full potential.

Approach: The Middle Peninsula Northern Neck Community Service Board considers the delivery of "early intervention services for infants and toddlers" to be "a very worthy investment in the future, with considerable long-term benefits" (8). As a result, the Community Service Board created the Rural Infant Services Program (RISP) in order to provide early intervention for infants with developmental disabilities.

RISP offers many programs for babies with developmental disabilities, such as Go Baby Go in which high school science, technology, engineering, and mathematics (STEM) students partner with physical therapists to modify "battery-operated motor vehicles for children who need assistance exploring their environments (9). The Dream Horse Stables program allows small children to ride horses at a stable in Gloucester. Here, toddlers also gain access to physical, occupational, speech, and developmental therapists. RISP is funded by a variety of public and private sources including grants, donations, local tax dollars, private contributions, reimbursement from health insurance, and family fees (9).

Outcomes: When compared to similar programs across the Commonwealth, RISP is more successful in helping infants by fostering a higher percentage of positive social-emotional relationships, helping them better acquire and use new knowledge and skills, and more effectively promoting their ability to take actions to meet their needs (9).

Mount Rogers Health District: Baby Care Program

Need addressed: A 2013 study about the fourth trimester of the postpartum period reports that "rural women are…a dangerously underserved population due to the inadequate number of care providers who serve rural regions" (10). Additional health care options would benefit rural mothers and babies.

Approach: The Mount Rogers Health District created the Baby Care Program to coordinate Registered Nurses who are willing to educate mothers about the growth and development of their babies and to connect them with appropriate medical care. The Baby Care Program helps women learn how to have a healthy pregnancy, raise a healthy baby, and locate the appropriate health services for both herself and her baby. A mother enrolled in the program will learn how to monitor her baby's growth and development, keep her baby safe, maintain a healthy diet, and breastfeed. Beyond infant years, the Baby Care Program gives mothers advice on how to be a good parent, the importance of regular doctor visits, healthy lifestyle choices, and family immunizations (11).

Outcome(s): The Baby Care Program provides case management services, pregnancy and parenting information, emotional support, referrals to community services, home visits, and phone support to new moms and babies up to the age of two. The program has helped many growing families and even offers a plan of safe care for moms and families with substance abuse disorder (11).

Three Rivers Health District: Healthy Start Loving Steps

Need addressed: Maternal mortality rates have often been utilized as a broad indicator of a society's overall well-being, with lower mortality indicating better living conditions and increased access to high quality health care. Unfortunately, a 2019 study that examined the maternal outcomes of more than 33 million births between 2001 and 2015 found that in the United States, rural women were 9% more likely to suffer from severe morbidity and mortality"as compared to urban women (12).

Approach: The Three Rivers Health District encompasses the rural area of Virginia located between the Potomac, Rappahannock, and York Rivers and to the west of the Chesapeake Bay. Three Rivers Health District has three impressive home visiting programs that aid women in making sure their pregnancies are healthy and that they have the skills needed to effectively raise emotionally, physically, and socially healthy children (13).

The health district offers Community Health Workers' Home Visiting Case Management Services, a program called Three Rivers Resource Mothers, and the Healthy Start/Loving Steps program. The Three Rivers Resource Mothers Program works with teen moms to promote prenatal care, breastfeeding education, and developmental screenings of infants. It also makes sure young mothers immunize their babies. The Healthy Start/ Loving Steps program provides health education services exclusively to women in Westmoreland County until their child reaches two years of age. All three programs utilize community health workers to deliver services, education, and assistance to mothers (13).

Outcome(s): The Three Rivers Home Visiting Program has provided assistance to countless mothers and babies in rural Eastern Virginia. The Resource Mothers Program has especially improved health outcomes of mothers, as it assists teens with taking proper care of their babies, family planning, and developing a stable home (14).

University of Arkansas for Medical Sciences (UAMS) High Risk Pregnancy Program

Need addressed: In the early 2000's, Arkansas had high rates of low birthweight babies compared to the rest of the country, and women in rural areas had difficulty accessing specialty obstetric care (15).

Approach: The University of Arkansas for Medical Sciences (UAMS) created the Institute for Digital Health and Innovation (IDHI) High-Risk Pregnancy Program to increase access to care for pregnant women in an effort to improve outcomes for high-risk pregnancies. UAMS describes its program as an innovative consultative service for a wide range of obstetric providers in the state (9). Its goal is to ensure that pregnant women have access to high-risk obstetric services regardless of their residence in Arkansas. This program is the only one of its kind in the United States and offers access to maternal-fetal medicine physicians via telemedicine (15).

Outcome(s): The program has increased access to care and reduced infant mortality for rural Arkansas women through various programs and has been recognized as a model. Over the past fifteen years, the High Risk Pregnancy Program has resulted in a downward trend in neonatal death, post-neonatal death, and postpartum

Harrisonburg • Bill Crabtree Jr.

complications. Every participant in the High-Risk Pregnancy Program who completed a survey reported that they would either use the service again or thought the service was beneficial for the state of Arkansas (15).

Mothers and Infants Sober Together (Eastern Tennessee)

Need addressed: Tennessee and other states in the Central Appalachian region face higher rates of substance abuse disorder compared to the rest of the country. There is an opportunity to create programs for pregnant women using illicit substances and infants born into drug-positive families.

Approach: The Mothers and Infants Sober Together (MIST) program assists mothers who use substances to get treatment and provide a safe, drug-free home for themselves and their newborns. MIST provides mothers with integrated physical and mental health care and works with the mother to create a stable environment free of drugs. The average age of a MIST client is 24, with a range of 13 to 41 years (16).

Outcome(s): MIST has helped mothers find treatment and education and has helped children grow up in safe and healthy homes. The MIST Program reports that it has received 942 agency referrals. Because of MIST and with assistance of their physicians, many women have successfully detoxed before giving birth. Drug-free, healthy babies have been born to women who were previously addicted to drugs during pregnancy (16).

Opportunities for Growth

1. **Establish a Health Professional Shortage Area (HPSA) designation specific to maternity care**
   - Designations would allow for the National Health Service Corps, State Primary Care Office and State Office of Rural Health to offer student loan repayments to incentivize maternal health providers to practice in shortage areas.

2. **Integrate more certified nurse-midwives in prenatal care and birth plans**
   - Expanding access to midwifery is critical for improving maternal and neonatal health outcomes for rural women, especially those lacking access to traditional prenatal care.
   - Medicaid pays for slightly under half of all births in the United States, but in rural areas, the proportion is often higher. Since Medicaid pays approximately half as much as private insurance for childbirth, the financial aspect of keeping a labor and delivery unit open is more difficult in rural areas. Expanding the use of midwives and birthing centers could be a cost-effective alternative because they are generally less expensive than physicians and hospital obstetric units.

3. **Provide targeted training of providers practicing in maternity care deserts**
   - Traveling mobile units to offer training of general practitioners on common obstetric complications.

4. **Inform the strategic planning of Maternal Mortality Review Committees**
   - Compare maternal and infant birthing outcomes prior to and after Medicaid expansion.

5. **Utilize Telemedicine to provide long-distance maternal-fetal medicine consultations in rural hospitals and clinics**

6 **Share resources across systems and settings by regionalizing perinatal care**
   - By coordinating a system of care within a geographic area, pregnant women would receive risk-appropriate care in a facility equipped with the proper resources and health care providers (17). A study examining geographic gaps in access in the availability of obstetric and neonatal care found that while the majority of women of reproductive age in the U.S. do have access to critical care, there are significant differences (17). Nearly all obstetric and

newborn intensive care units were concentrated in urban areas with clusters of hospitals operating close to each other, which meant that the majority of the population did have access to perinatal critical care units. Access is defined as living within 50 miles of care. However, large geographic areas were not covered by either of the perinatal facility zones, indicating a significant gap in access for women in rural areas. In addition, the fastest access to both obstetric and neonatal critical care for almost 10% of women was in a neighboring state, underscoring the need for coordination between states (17).

7. **Train and implement more community health workers (CHWs)**
   - The addition of CHWs is critical to improving healthcare in rural settings, especially perinatal care.
   - A program that brings perinatal care and parenting education to parents in rural areas by CHWS is needed.
   - Holy Cross Medical Center in New Mexico's First Steps program provides home visits by CHWs to parents and children from the perinatal period to age three. This program assists parents with raising a child by helping reduce barriers. The CHW works with families to find resources and create plans for success.

8. **Expand awareness of and access to governmental assistance**
   - In 2012, Virginia spent over $16 million on Medicaid expenditures for pre- and postnatal care of mothers in rural areas. Over 5,000 births were paid through Medicaid.
   - In Virginia's Child Care Subsidy Program, a portion of the cost is made directly to high quality child care providers. This program is available to many women including those who are employed, participating in an education or training program, and/or receiving child protective services.
   - In 2019, there were 109,469 participants in the Women, Infants, and Children Program (WIC) in Virginia. However, in 2014, almost 50% of eligible pregnant women did not participate in the WIC program. Additionally, participation in the program has been decreasing as children become older even if they are still eligible. The overall coverage rate in Virginia is 47.7%.
   - While these programs are vital to many rural women and children, they do not have full participation. Support groups and classes can be created to help women and their children sign-up for these programs. Community members such as social workers should better explain these programs, the eligibility criteria, and how to receive coverage.

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ORIGINAL ARTICLE

BIRTH ISSUES IN PERINATAL CARE WILEY

Rural resilience: The role of birth centers in the United States

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Abstract

Purpose: To explore the role of the birth center model of care in rural health and maternity care delivery in the United States.

Methods: All childbearing families enrolled in care at an American Association of Birth Centers Perinatal Data Registry™ user sites between 2012 and 2020 are included in this descriptive analysis.

Findings: Between 2012 and 2020, 88 574 childbearing families enrolled in care with 82 American Association of Birth Centers Perinatal Data Registry™ user sites. Quality outcomes exceeded national benchmarks across all geographic regions in both rural and urban settings. A stable and predictable rate of transfer to a higher level of care was demonstrated across geographic regions, with over half of the population remaining appropriate for birth center level of care throughout the perinatal episode of care. Controlling for socio demographic and medical risk factors, outcomes were as favorable for clients in rural areas compared with urban and suburban communities.

Conclusions: Rural populations cared for within the birth center model of care experienced high-quality outcomes.

Health Policy Implications: A major focus of the United States maternity care reform should be the expansion of access to birth center models of care, especially in underserved areas such as rural communities.

KEYWORDS

birth centers, childbirth, rural

1 | INTRODUCTION

An estimated twenty-eight million women of reproductive age live in rural areas of the United States, amidst a crumbling health care infrastructure.[1] More than one in five women over the age of 18 in the United States lives in a rural county making the disparities in rural health outcomes a high priority issue.[2] Challenges facing maternity care in the United States, including overmedicalization, overuse, and unwarranted variations of care, are compounded in rural settings.[3-11] Root causes of poor outcomes in rural communities have been differentially attributed to population-level risk factors, lack of access to appropriate care, or poor-quality care associated with low-volume practice.[5-10] Increased closures of rural hospitals and maternity units have further strained the rural care infrastructure.[11-13] Maintaining high performance systems of care within low-volume practice environments has proven nearly impossible economically despite the fact that the need

for maternity services is universal, obstetric units are often centers for financial loss because of high costs and low reimbursement crossing.[13]

Interest in the birth center model of care in the United States (US) has grown steadily across stakeholder groups over the last decade, with an emphasis on expanded access for rural families.[13-15] In the United States, birth centers are health care facilities where prenatal, labor and birth, and postpartum care are provided using midwifery and wellness models of care. A birth center is freestanding, meaning that it is not within a hospital. Birth centers are integrated into the larger health care system, and midwives who provide services in this birth setting adhere to standards of consultation, collaboration, and transfer to higher levels of care when appropriate. The first rural birth center in the United States was started in 1971 in South Texas as a partnership between Catholic Charities and the Migrant Health Division of the US Department of Health, Education and Welfare.[16] According to data from the American Association of Birth Center member practices, there are 384 birth centers in the United States, a 97% increase in the past 10 years. Approximately 30% of birth centers are in rural areas and small towns.

Over the past 30 years, the safety and efficacy of midwifery-led community birth has been documented in the literature.[17-19] The birth center model has demonstrated appropriate use of evidence-based practices such as continuous labor support, nonintervention in the absence of complications, and support for initiation and maintenance of lactation, while limiting overuse of low-value medical procedures.[17-20] Limitations to effective spread and scale-up of midwifery-led birth center models of care are rooted in a lack of supportive state policies and significant barriers to reimbursement.[6,13,21] Unlike other high-resource nations, United States policies are not aligned with national standards for the support of midwives as autonomous, independent practitioners, nor with birth center facilities as the appropriate level of care for the majority of childbearing families, despite increasing service user demand.[6,13,21]

The current United States maternity care crisis is characterized by poor outcomes, systemic racism, and inequitable access to appropriate care.[6] Between 2012 and 2016, the Center for Medicare and Medicaid Innovation explored birth centers as an innovative solution to improve quality and decrease costs through an initiative called Strong Start for Mothers and Newborns (Strong Start). The final Strong Start evaluation report concluded that the birth center model of care is an appropriate level of care for most Medicaid beneficiaries.[19] Of the 47 birth centers included in this federal initiative, 21% were in rural locations. The purpose of this research was to explore the potential contribution of the birth center model of care in improving access to high-quality maternity care in rural communities.

2 | METHODS

Data were collected using the American Association of Birth Centers (AABC) Perinatal Data Registry™—a prospective clinical data registry that captures over 900 clinical variables throughout the perinatal course of care. The American Association of Birth Centers has served as the nonprofit, membership organization and the nation's leading resource on the birth center model of care for over 30 years. Approximately 30% of the member practices (n = 134) are in rural areas and small towns, and 34% of the sample in this study are rural or small-town birth center sites.

The primary purpose of the AABC PDR™ is to provide data for continuous quality improvement activities for members at the individual practice level and the aggregate level for the birth center industry. The secondary purpose of the registry is to serve as a research database to inform practice and policy development related to communities experiencing midwifery-led birth center, home, and hospital birth care. Eighty-two sites, representing 61% of member practices, participated in the AABC PDR and the 2016 AABC site survey and are included in this study. The clinical data from the registry are merged with the AABC 2016 site survey data, providing details about business model (eg, for-profit or not-for-profit), geographic location, licensure, and accreditation status. Users of the registry undergo formal data training, including use of a data dictionary, which aligns with the ACOG Revitalize Project and the National Quality Forum definitions of endorsed quality measures. In addition, the registry has systems to trigger incomplete and missing data reports, and mechanisms to track attrition. The registry has been demonstrated to be both reliable and valid, and is actively registered with the New England Institutional Review Board.[22]

2.1 | Data sources

All childbearing families enrolled in care at the American Association of Birth Centers Perinatal Data Registry™ user sites between 2012 and May of 2020, who completed the 2016 AABC Site Survey, are included in this analysis. There are 82 sites—28 (34.1%) coded as rural/small town and 54 (65.8%) coded as suburban/urban. A total of 88 574 courses of care are included and tracked from the first prenatal visit, through the antenatal, intrapartum, and postpartum periods. Attrition is tracked, including transfers to higher levels of care (eg, hospitals and practitioners: family practice physicians, obstetricians, and perinatologists). Births in all settings are included within the data set, including home, birth center, elective hospitalization (planned birth in a hospital in the absence of medical risk factors), and medically indicated hospitalization.

2.2 | Covariables

To explore the quality of rural health outcomes within the birth center model of care, the primary outcome measures include core maternal quality indicators: induction of labor, episiotomy, cesarean, and infant feeding. Infant outcome measures include birthweight in pounds, 1-minute and 5-minute Apgar score, low 5-minute Apgar score, and neonatal intensive care unit (NICU) admissions. To estimate the model's capability to serve as the appropriate level of care in rural settings, several variables were included. Antenatal transfer, intrapartum transfer, newborn transfer, and postpartum transfer variables quantify the percent of the population requiring transfer to a higher level of care (eg, level 2, 3, or 4 hospital). Planned birth site, site of labor admission, and actual place of birth are included in the analysis.

When comparing health outcomes between rural and urban birth center samples, we controlled for sociodemographic and clinical factors, including years of education, body mass index, maternal age, gravidity, parity, marital status, public or private payer, and minority status (Black or Hispanic/Latinx). We also controlled for medical risk status, using medical history, pregnancy history, and prenatal complication variables (Table 1).

TABLE 1 Low-risk sample—excluded characteristics

History	Prenatal complications
Medical History	Anemia
<16 y	Abruption/Previa
Cervical Abnormality	GDMA 2
Diabetes	Hypertension
Hypertension	Hyperemesis
HIV+	IUFD
Substance Abuse	IUGR
Seizures	Macrosomia
Smoker	Multiple Gestation
Uterine Abnormality	Malpresentation
Thyroid Disease	Maternal Death
Pregnancy History	Nonreassuring Fetal Status
Cesarean	Preeclampsia
Preeclampsia	Preterm Labor
IUGR/LBW	Preterm ROM
Sensitization	Vaginal Bleeding
Preterm Birth	Sensitization with Antibody

2.3 | Statistical analysis

Frequency means are reported for all variables and compared at the geographic level. For the purposes of this analysis, rural and small town are categorized together and suburban and urban areas are categorized together. Odds ratios are calculated using logistic regression, with controls for risk factors employed. Logistic regression was used to test low-frequency events within the sample (eg, low birthweight, neonatal intensive care admissions, and postpartum and neonatal transfers). Robust standard errors are clustered at the birth center level, using regional fixed effects instead of state fixed effects as certain characteristics do not vary within some states. Finally, a subsample of medically low-risk women is analyzed (excluding medical risk factors) to evaluate for the presence or absence of unwarranted geographic variation by rural or urban location. Missing outcome data occurs in the sample as a result of attrition from the birth center. Women may leave the sample by choice or medical attrition. Both are tracked within the data set. This missing outcome data may raise concern if there is selected attrition based on the geographic location of the birth center and this was not found in this sample (OR 0.85, CI 0.60-1.21). All data analysis is performed in Stata (version 16; StataCorp LP).

3 | RESULTS

Between 2012 and 2020, 88 574 pregnant clients enrolled in care within 82 American Association of Birth Center's Perinatal Data Registry™ user sites. Twenty-three percent of the episodes of care, or 20 371 pregnancies, were cared for within 28 sites coded as rural/small town. Rural sites accounted for 34.2% of the sites in the sample, whereas 54 (65.8%) sites were coded as suburban/urban. The average educational attainment of the clients served by the birth center model was 14.9 years with higher educational averages in urban birth centers (15.1 years) and lower in rural settings (13.9 years) (Table 2). The average maternal age was 25.1 years, similar for both urban and rural settings. Most childbearing people were married (78.0%), similar across urban and rural settings. Families in rural sites were more likely to be publicly insured (32.6%), compared with urban settings (28.4%). The majority of the clients receiving birth center model care in this sample are White-non-Hispanic (76.4%), with a higher portion of Black (10.0%) and Hispanic (8.5%) clients in urban birth centers.

Childbearing families cared for within this model of care achieved high-quality outcomes across all geographic settings (both rural and urban), meeting or exceeding national benchmarks (Table 2). For the entire sample, across all geographic locations, performance was notable with low rates of episiotomy (1.7%), cesarean (9.2%), induction of labor (11.0%), and

high rates of exclusive breastfeeding at discharge (94.6%). The birth center model of care demonstrated an average infant birthweight of 7.7 pounds, and 1-minute and 5-minute Apgar scores above 8.0 and 8.9, respectively. The incidence of low 5-minute Apgar scores across all geographic settings was less than 1.2%. Neonatal admission rates across all geographic locations were 1.1%. Of all clients who enrolled in pregnancy care within the birth center practices, 20.3% required transfer to a higher level of care during the prenatal period, and 10.6% during the intrapartum period. After birth, 1.2% of newborns required transfer to a higher level of care, and 1.1% of mothers required transfer to a higher level of care.

To explore variation by geographic location, cases were coded as rural (n = 20 371) or urban (n = 68 203) and frequencies of key maternal and neonatal outcomes compared (Table 2). For rural mothers receiving care within the birth center model, including those who transferred to a higher level of care, there are lower incidences of episiotomy (1.1%), cesarean birth (8.1%), and induction (10.6%), with higher incidences of exclusive breastfeeding (95.6%). Infants born within rural birth center systems, including those transferred to higher levels of care, had higher average birthweight in pounds (7.74), higher Apgar scores at five minutes (8.96), and similar rates of neonatal intensive care unit admissions (1.1%).

None of the above-mentioned performance advantages in rural settings achieved statistical significance, once controlling for geographic, sociodemographic, and medical risk factors (Table 3). Table 3 shows the results from the logistic regression comparing rural and urban settings and core quality indicators, while controlling for region of birth and sociodemographic and medical risk factors. Rural areas demonstrate similar performance in maternal and newborn birth outcomes to urban areas within this sample. Within the subsample of 44 379 clients coded as low medical risk at the time of admission in labor (Table 4), there are no statistically significant variations in perinatal quality outcomes by location of birth (rural or urban), with the exception of statistically significant performance advantage within rural sites demonstrating lower episiotomy among multiparas (OR 0.34, CI 0.12-1.00). There are no statistically significant variations in quality indicators between rural and urban births among low-risk nulliparas in this sample (Table 4).

Most birth centers (72.9%) were located less than 4 miles from the transfer hospital; 64.9% of rural birth centers and 78.9% of urban hospitals were within 4 miles of the closest transfer hospital. Similarly, 35% of birth centers in rural settings and 43% of birth centers in urban settings required more than 15 minutes of travel time to arrive to the nearest hospital of transfer. There are no performance advantages demonstrated within sites that are less than 15 minutes from the hospital of transfer within this sample. Cesarean rates (OR 0.96, CI 0.70-1.31), transfer rate (OR 0.79, CI 0.51-1.22), and Apgar score less than 7 at 5 minutes (OR 1.39, CI 0.92-2.09) were not statistically different based on proximity to a higher level of care. Similarly, being less than 5 miles from the nearest transfer facility did not demonstrate a performance advantage in this sample: cesarean rate (OR 0.85, CI 0.48-1.50), transfer rate (OR 1.34, CI 0.92-1.94), and Apgar score less than 7 at 5 minutes (OR 0.93, CI 0.55-1.57).

4 | DISCUSSION

This research supports the expansion of birth centers into rural communities in the United States. Midwifery care delivered in rural and small-town birth centers is associated with excellent outcomes across geographic locations, including within rural communities. As the infrastructures of standard, hospital-based maternity care in rural communities deteriorate, the birth center model of care has demonstrated its role as a durable model capable of stable and predictable capability to provide high-quality health care.[19] Exploration of the expanded role of the birth center model of care in rural settings is warranted.

Both populations of childbearing families in this study, rural/small town and urban/suburban, surpassed national benchmarks for selected quality measures. Although maternal and neonatal health inequities are well documented in rural America,[5-13] findings from this project tell a different story—one of population health, strength, and resilience associated with community midwifery care. Controlling for medical risk factors and when matched with the appropriate level of care, rural childbearing families have equal and in some cases better outcomes than those living in urban settings. Variations in quality by rural/urban location previously published within the literature are not demonstrated within this sample of birth center consumers.[5-13] The harmful variations that have been demonstrated to be amplified in populations of low-risk women, including overuse of cesarean birth and neonatal intensive care units, were not demonstrated in this sample.[3,20,23-25] More research exploring the variation in episiotomy rates within this sample of childbearing multiparous people of low medical risk is warranted. This variation is suggestive of unwarranted variation in care, hypothesized to be related to elective hospitalization within the sample.[20]

This research provides public health scientists and policymakers with estimates of the models' capacity to serve rural communities. Transfer rates during the antenatal, intrapartum, and postpartum period were stable, regardless of geographic location. This work provides population health estimates for anticipated referrals from rural sites to higher levels of care during the antenatal (19.9%), intrapartum (10.3%), postpartum (1.1%), and neonatal (1.3%) time periods. This supports previous research that demonstrates

TABLE 2 Average individual outcomes for means by urban and rural status

Core variables	Urban mean	Rural mean	Average mean for total
Sociodemographic variables			
Education	15.1	13.8	14.8
BMI	25.1	25.12	25.1
Maternal Age	29.7	29.0	29.5
Gravidity	2.5	2.8	2.6
Parity	1.0	1.3	1.1
Married	77.7	78.9	78.0
Public Insurance	28.4	3.26	29.4
Private Insurance	61.5	45.8	57.9
Race—White-Non-Hispanic	74.1	84.0	76.4
Black	10.0	4.5	8.8
Hispanic	8.5	6.4	8.0
Quality indicators			
Maternal outcomes			
Episiotomy	1.9	1.1	1.7
Cesarean	9.6	8.1	9.2
Induction	11.1	10.6	11.0
Exclusive Breast	94.3	95.6	94.6
Exclusive Formula	1.3	1.5	1.4
Infant Outcome			
Birthweight Pounds	7.71	7.74	7.72
One-Minute Apgar	8.0	7.9	8.0
Five-Minute Apgar	8.9	8.9	8.9
Low Five-Minute Apgar	1.2	1.3	1.2
NICU Admission	1.0	1.1	1.1
Transfers			
Transfer—Antepartum	20.4	19.9	20.3
Transfer—Intrapartum	10.8	10.3	10.6
Transfer—Neonatal	1.2	1.3	1.2
Transfer—Postpartum	1.1	1.1	1.1
Place			
Birth Place—Birth Center	60.3	60.9	60.4
Birth Place—Hospital	36.3	32.8	35.4
Birth Place—Home	2.2	4.9	2.8
Intended—Birth Center	83.2	82.1	82.9
Intended—Hospital	11.3	8.4	10.7
Intended—Home	2.2	4.7	2.8

Note: Urban mean, N = 68 203; rural mean, N = 20 371; mean for total, N = 88 574.

that most childbearing people in a population can be cared for using a midwifery-led, birth center model of care.[19] One of the most important initiatives for strengthening the maternal health infrastructure in the United States is the Obstetric Care Consensus: Levels of Maternal Care, led by the American College of Obstetricians and Gynecologists and the Society for Maternal Fetal Medicine.[26] This movement, partnered with an amplified understanding that the appropriate level of care for the majority of childbearing families is "basic," should lead to a systems approach, which matches the population health needs with the appropriate level of care.[27,28] The results of this analysis build on the growing body of literature, which supports the role of enhanced birth models and their ability to provide risk-appropriate care while protecting and promote resilience within populations, preventing the harmful effects of overmedicalization of pregnancy and birth and lack of access to wellness-based care.[5,6,14,17-21]

The distribution of births across the United States is disproportionately concentrated in regions with high population density.[9,10] As the maternity care system is redesigned to provide the appropriate level of care to the population, regardless of geography, it is unrealistic to expect there to be shifts in distribution of birth volume equally across settings. Research has shown that the majority of rural families will continue to give birth in rural areas, regardless of access to appropriate levels of care.[4] The system needs to be designed as an integrated, fluid system wherein communities have access to basic care, including the birth center model of care as a normative entry point. In this sample, the

TABLE 3 Birth outcomes by rural vs. urban settings

Core Variables	Cesarean Odds Ratio [Confidence Interval]	Episiotomy Odds Ratio [Confidence Interval]	Induction Odds Ratio [Confidence Interval]	Transfer Odds Ratio [Confidence Interval]	Breastfeeding Odds Ratio [Confidence Interval]	Apgar < 7 Odds Ratio [Confidence Interval]	Weight < 5.5lbs Odds Ratio [Confidence Interval]
Sociodemographic Variables							
Rural	0.93 [0.77,1.12]	0.58 [0.29,1.16]	1.04 [0.76,1.43]	1.02 [0.79,1.31]	1.37 [0.78,2.39]	1.05 [0.85,1.31]	0.85 [0.66,1.11]
Married	0.75 [0.68,0.82][a]	1.13 [0.87,1.46]	0.92 [0.85,1.00][b]	0.85 [0.77,0.95][a]	1.74 [1.47,2.08][a]	1.01 [0.80,1.28]	0.88 [0.72,1.08]
Education	0.95 [0.93,0.98][a]	0.98 [0.92,1.05]	0.99 [0.97,1.01]	1.01 [0.99,1.03]	1.11 [1.06,1.16][a]	1.02 [0.98,1.05]	0.92[0.89,0.96] [a]
Maternal Age	1.11 [1.05,1.17][a]	0.88 [0.77,0.99][b]	0.95 [0.90,1.00][b]	0.99 [0.94,1.04]	1.18 [1.09,1.27][a]	1.00 [0.88,1.14]	0.87 [0.81,0.95][a]
Age-Sq.	1.00 [1.00,1.00]	1.00 [1.00,1.00][b]	1.00 [1.00,1.00][b]	1.00 [1.00,1.00]	1.00 [1.00,1.00][a]	1.00 [1.00,1.00]	1.00 [1.00,1.00][a]
Underweight	0.69 [0.57,0.85][a]	1.11 [0.83,1.47]	0.84 [0.76,0.92][a]	0.96 [0.89,1.05]	1.04 [0.83,1.31]	1.07 [0.62,1.85]	1.94 [1.51,2.49][a]
Obese	1.94 [1.74,2.17][a]	1.12 [0.84,1.50]	1.45 [1.34,1.58][a]	1.36 [1.21,1.52][a]	0.59 [0.50,0.69][a]	1.49 [1.16,1.91][a]	1.06 [0.86,1.30]
Overweight	1.35 [1.22,1.50][a]	1.12 [0.93,1.34]	1.23 [1.09,1.39][a]	1.24 [1.14,1.34][a]	0.82 [0.70,0.97][b]	1.58 [1.23,2.03][a]	0.90 [0.71,1.14]
Black	1.29 [1.07,1.56][a]	0.76 [0.49,1.18]	0.79 [0.67,0.93][a]	1.17 [1.02,1.33][b]	0.63 [0.38,1.05][c]	1.21 [0.92,1.59]	2.15 [1.69,2.72][a]
Hispanic	1.45 [1.23,1.71][a]	1.09 [0.70,1.69]	0.96 [0.79,1.16]	1.00 [0.83,1.20]	0.63 [0.46,0.85][a]	1.09 [0.85,1.40]	1.39 [1.11,1.73][a]
Public Insurance	1.11 [0.97,1.27]	1.19 [0.80,1.75]	1.04 [0.93,1.17]	1.11 [1.02,1.22][b]	0.73 [0.58,0.92][a]	1.17 [0.94,1.45]	1.26 [1.04,1.54][b]
Self	0.82 [0.71,0.96][b]	0.83 [0.61,1.11]	0.79 [0.68,0.91][a]	0.86 [0.75,1.00][c]	1.34 [0.93,1.93]	1.29 [0.99,1.69][c]	1.01 [0.81,1.27]
Total (N) Births	64,102	58,196	87,205	87,588	47,374	47,648	53,911
Total (N) Sites	78	78	78	78	78	78	78
Pseudo–R-squared	0.08	0.07	0.05	0.05	0.09	0.03	0.05
Mean-Dependent	0.09	0.02	0.11	0.33	0.95	0.01	0.02
Controls for Risk	X	X	X	X	X	X	X

Note: [a] < 0.01; [b] < 0.05; [c] < 0.1; reported odds ratios from a logistic regression. Controls for risk factors include region of birth, parity, any diabetes history, hypertension history, preeclampsia, substance abuse, and smoking. Robust standard errors are clustered at the birth center level representing statistical levels at 1, 5, and 10 percent. Rural includes small towns. Urban includes suburban areas.

TABLE 4 Nulliparous Birth Outcomes by Rural v. Urban, Low-Risk Sample

Core Variables	Cesarean	Episiotomy	Induction	Transfer	Breastfeeding	Apgar < 7	Weight < 5.5lbs
Independent Variable							
Rural	1.04 [0.86,1.25]	0.62 [0.34,1.12]	0.93 [0.72,1.21]	1.14 [0.86,1.52]	1.41 [0.89,2.23]	0.82 [0.60,1.11]	0.87 [0.61,1.25]
N Births	18,773	16,712	18,776	18,776	14,025	13,859	15,667
N Sites	78	78	78	78	78	78	78
Pseudo–R-squared	0.03	0.02	0.02	0.02	0.04	0.01	0.04
Mean-Dependent	0.11	0.03	0.11	0.31	0.95	0.02	0.01
Parity	Nullipara	Nullipara	Nullipara	Nullipara	Nullipara	Nullipara	Nullipara

Note: Reported odds ratios from a logistic regression and confidence interval. Demographic controls include the controls reported in the full sample results in Table 1. Robust standard errors are clustered at the birth center level. Rural includes small towns. Urban includes suburban areas.

birth center sites were low-volume sites, capable of providing safe, high-quality care associated with improved outcomes. Increasing access to midwifery-led, birth center care will require improved regulatory infrastructure for licensure, accreditation, and regulation, and enhanced reimbursement frameworks.[6,13,21]

4.1 | Limitations

The prevalence of rural and small-town sites in this sample mirrors the national membership report of rural/small-town birth center locations, suggesting that the study is representative. Nonetheless, limitations to generalizability exist and include unquantifiable selection bias in two areas. First, users of the American Association of Birth Centers Perinatal Data Registry™ are members of the professional organization, implying that there is a level of adherence to the organization's standards. Participation in the registry requires commitment from member sites. Thus, these results may not be generalizable to nonmember sites. The second limitation to generalizability involves the unquantifiable level of selection bias introduced by clients who choose birth center care to begin with. As a prospective data registry, the data presented in these research findings have captured and tracked attrition throughout perinatal episodes of care for all clients who enrolled in care at participating birth centers. More research is needed on the differences between women who self-select birth centers versus a different care model because of existent medical risk factors. As more women choose birth centers, population estimates for antenatal transfer of care may rise.

4.2 | Conclusions

Between 2012 and 2020, 88 574 childbearing families enrolled in care with 82 American Association of Birth Centers Perinatal Data Registry™ user sites. Quality outcomes exceeded national benchmarks across all geographic regions with high performance on maternal and neonatal measures. When controlling for regional, sociodemographic, and medical risk factors, childbirth outcomes were the same across rural and urban settings, except for a performance advantage of lower episiotomies in rural settings among low-risk childbearing people. A stable and predictable rate of transfer to a higher level of care was demonstrated across geographic regions, with over half of the population remaining appropriate for birth center care. More research is needed to explore preconception risk, sampling bias, and the effect of elective hospitalization at the client and site level as birth center models are taken to scale across the United States. A major focus of United States maternity care reform should be the expansion of access to birth center models of care, especially in underserved areas such as rural communities.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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ORIGINAL ARTICLE

WILEY BIRTH ISSUES IN PERINATAL CARE

Rural community birth: Maternal and neonatal outcomes for planned community births among rural women in the United States, 2004-2009

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Abstract

Background: Approximately 22% of women in the United States live in rural areas with limited access to obstetric care. Despite declines in hospital-based obstetric services in many rural communities, midwifery care at home and in free standing birth centers is available in many rural communities. This study examines maternal and neonatal outcomes among planned home and birth center births attended by midwives, comparing outcomes for rural and nonrural women.

Methods: Using the Midwives Alliance of North America Statistics Project 2.0 dataset of 18 723 low-risk, planned home, and birth center births, rural women (n = 3737) were compared to nonrural women. Maternal outcomes included mode of delivery (cesarean and instrumental delivery), blood transfusions, severe events, perineal lacerations, or transfer to hospital and a composite (any of the above). The primary neonatal outcome was a composite of early neonatal intensive care unit or hospital admissions (longer than 1 day), and intrapartum or neonatal deaths. Analysis involved multivariable logistic regression, controlling for sociodemographics, antepartum, and intrapartum risk factors.

Results: Rural women had different risk profiles relative to nonrural women and reduced risk of adverse maternal and neonatal outcomes in bivariable analyses. However, after adjusting for risk factors and confounders, there were no significant differences for a composite of maternal (adjusted odds ratio [aOR] 1.05 [95% confidence interval {CI} 0.93-1.19]) or neonatal (aOR 1.13 [95% CI 0.87-1.46]) outcomes between rural and nonrural pregnancies.

Conclusion: Among this sample of low-risk women who planned midwife-led community births, no increased risk was detected by rural vs nonrural status.

KEYWORDS

access to care, birth center, health policy, home birth, midwifery, rural health

1 | INTRODUCTION

Pregnant women face many challenges in accessing maternity care services in rural and remote areas of the United States. These include: obstetric unit closures in rural hospitals,[1] shortages of qualified childbirth providers in rural areas,[2,3] and distances to travel to access care.[4] Currently, over 80% of rural counties have no hospital providing obstetric services[1,5] and 50% of rural counties have no actively practicing obstetric physicians.[2]

Difficulty accessing prenatal care[6] and long travel times to a hospital during labor have been linked to higher rates of adverse neonatal outcomes[7] and high psychosocial costs.[8,9] In contrast, receiving care and giving birth closer to home have demonstrated benefits;[10,11] however, with the declining availability of care in rural settings, this ideal is increasingly difficult to achieve. Although the majority of United States women deliver in hospitals with physicians, an increasing number of women are choosing a midwife as their care provider and planning to deliver at home or in a free standing birth center.[12] Independent midwives (not employed by a hospital) and who provide delivery services in the community setting (ie, home or a freestanding birth center) are referred to as "community midwives" and can include Certified Professional Midwives (CPMs), Certified Nurse Midwives (CNMs), Certified Midwives, state-licensed Licensed Midwives, or lay midwives.[13] A growing body of evidence suggests that for healthy women who meet criteria for a low-risk delivery, community birth is a safe option when assisted by well-trained and licensed/certified midwives.[14,15] However, definitions of "low risk" vary.[16] Noting the increased demand for midwifery care and community birth, the American College of Obstetricians and Gynecologists (ACOG) released a new position statement on home birth[17] which defines criteria, similar to those used by midwifery professional organizations in other countries, for promoting favorable birth outcomes among women planning a community birth.

ACOG, in their 2014 statement on rural health disparities, also notes that: "less than one half of rural [US] women live within a 30-minute drive to the nearest hospital offering perinatal services."[18] For some rural women, a midwife-attended home birth may align with core cultural or religious beliefs,[19,20] while allowing them to avoid having to travel to another community for birth.[21] Despite the challenges of rural maternity practice, 22% of CNMs,[22] at least 33% of CPMs,[13] and an unknown number of other midwives practice in rural areas. In 2006, the percentage of home births to women living in rural counties was 74% higher as compared to nonrural counties;[23] a similar trend has been observed in Canada.[24] Because rural community birth can be complicated by delays in accessing emergency backup services when intrapartum or postpartum complications arise, it is not immediately clear that midwife-led birth in community settings is a viable solution to address limited rural access to maternity care.

Only two United States studies have examined midwife-led care among rural women, both with good outcomes;[25,26] however, these studies were limited to small local areas. In Canada and New Zealand, midwife-led care for rural women has been shown to result in excellent outcomes[24,27,28] even in extremely remote[29] communities without local cesarean backup. However, the United States' health care system differs from these other countries in having a mixed public-private health care system and a high rate of uninsured or underinsured individuals; thus, findings reported elsewhere may not be generalizable to the United States. There is no existing national level research on perinatal outcomes for rural women who planned home or birth center births with community midwives in the United States. Thus, the purpose of this study was twofold. Using data collected through the Midwives Alliance of North America (MANA) Statistics Project,[30,31] we aimed to (1) describe rates for mode of delivery and other maternal and neonatal outcomes among rural women with low-risk pregnancies who planned a community birth with a midwife; and (2) to compare rates of modes of delivery and adverse outcomes among rural vs nonrural women.

2 | METHODS

The MANA Statistics Project (MANA Stats) was initiated in early 2000 to collect data on midwife-led courses of care and outcomes from planned home and birth center births. This study uses the MANA Stats 2.0 dataset (2004-2009), which includes data from medical records, logged prospectively by midwives, beginning at the initiation of care before the outcomes of the pregnancy are known. Over 200 variables were collected, including demographics; maternal residential zip code; reproductive, health, and social histories; antepartum, intrapartum, postpartum (maternal), and neonatal outcomes; as well as procedures or actions during these phases. Intended and actual place of birth was also recorded. Midwifery participation was voluntary and approximately 20-30% of active CPMs and a smaller proportion of active CNMs/CMs participated across the United States. Details of the outcomes from the main cohort (N = 24 848) have been published previously,[31] as have details of the data validation process.[30] The analysis plan for this study was reviewed and approved by the Institutional Research and Ethics Boards at Bastyr University and by the Institutional Review Board at Oregon State University; women provided written informed consent for their data to be included in the MANA Stats research dataset.

For this analysis, exclusions from the MANA Stats 2.0 dataset (N = 24 848)[16] are shown in Figure 1. After limiting to pregnancies with valid rural or nonrural zip codes, those with more complicated pregnancies—multifetal pregnancies (n = 66), breech singleton presentations (n = 236), known congenital anomalies (n = 30), preexisting maternal conditions (chronic anemia not resolved, chronic hypertension, eclampsia, preeclampsia, Rh sensitization, gestational diabetes) (n = 511), or prior cesarean delivery (n = 1124)—were also excluded. The final sample for these analyses consisted of 18 723 low-risk, mother-infant dyads planning community births at the onset of labor. All women who planned a midwife-attended birth at home or in a birth

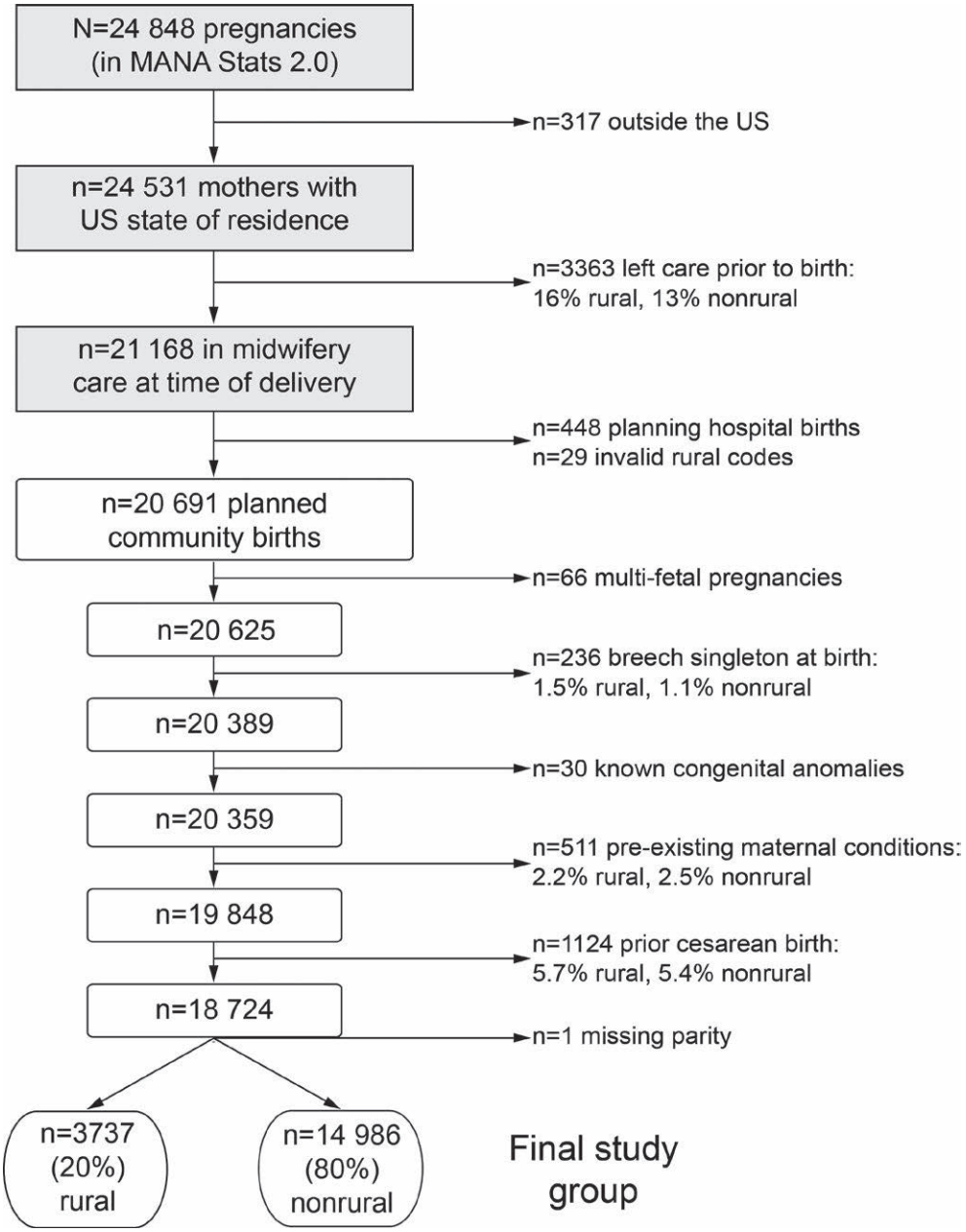

FIGURE 1 Derivation of low-risk cohort (N = 18 724) of rural and nonrural women who planned community births, MANA Stats 2.0, 2004-2009

center at the initiation of labor were included in the study even if transfer to a hospital and/or physician care occurred during labor or in the postpartum period. Based on a study population of 18 000 births and 3400 in the rural cohort, this analysis had 80% power to detect an odds ratio (OR) of 1.15 (or 0.87) at a 95% confidence level (CI) for most outcomes.[32] The detectable OR was 1.4 (0.71) if the outcome occurred less than 1% of the time in the rural group. The mother's home zip code was matched to the U.S. Census Bureau's Rural-Urban Commuting Area (RUCA) codes (version 2.0)[33]—a coding scheme that uses geographic area data and commuting patterns to characterize census tracts. RUCA codes have been used previously in birth outcomes research studies.[34,35] Rural residential zip codes were identified for this study, using RUCA codes following an approach used by the Federal Office of Rural Health Policy.[36] RUCA codes range from 1 to 10, corresponding with larger to smaller population areas, respectively. For this study, RUCA codes of 4 or greater and RUCA codes 2 or 3 with zip code areas at least 200 square miles in size or a population density of no more than 20 individuals per square mile were considered "rural."

Outcome measures that indicated a need for higher-level obstetric care, which might be adversely affected by distance

and/or travel time, were the focus of this analysis. Maternal outcomes included cesarean delivery, assisted delivery (forceps or vacuum), intrapartum transfer, postpartum (maternal indication) transfer, any severe events (seizure, eclampsia, uterine rupture, cord prolapse, embolism), maternal blood transfusion, and third or fourth degree perineal laceration or cervical trauma. A "maternal composite" was created which included any of the events listed above.

Neonatal outcomes included 5-minute Apgar scores <7 and <4, assisted ventilation for longer than 10 minutes, congenital anomalies, and any hospital or neonatal intensive care unit (NICU) admission (in the first 48 hours) lasting longer than 24 hours. A "neonatal composite" included hospital or NICU admission in the first 48 hours, 5-minute Apgar less than 4, or intrapartum or early neonatal death (in the first 7 days). Intrapartum or early neonatal deaths were not considered individually due to low numbers. Late neonatal deaths were not included as the intention was to focus on intrapartum-related morbidities, which might be affected by rural status. Deaths linked to severe congenital anomalies not compatible with life were excluded (n = 8). Hospital admissions were combined with early NICU admissions to minimize bias, since many rural hospitals do not have NICUs.

To maximize statistical power in this cohort with known low rates of adverse outcomes,[31] the maternal and neonatal composites were considered the primary outcomes for analysis, with secondary analyses focused on the individual measures (mode of delivery, adverse maternal and neonatal outcomes). Two alternate definitions were generated for the "maternal composite" variable: first, excluding all transfers and second, excluding transfers for nonurgent reasons (ex. slow progress or pain relief).

2.1 | Analysis

All outcomes were examined for association with rural residence first using univariate methods (chi-squared test or ANOVA), followed by multivariable logistic regression modeling to control for potential confounding. Univariate logistic regression models were created for the two primary outcomes first, with rural status alone as the predictor to estimate unadjusted ORs. Potential confounders considered in multivariable logistic models (in addition to rural residence) were as follows: maternal age (continuous); maternal prepregnancy body mass index (BMI) (continuous); maternal education (3 categories: up to high school, up to 4 years postsecondary or undergraduate degree, more than 4 years postsecondary); race/ethnicity (white vs all others); Amish, Mennonite, or Plain status; maternal insurance status (Medicaid vs private); parity (nulliparous vs multiparous vs >4 parity); reported prenatal medical conditions (pregnancy-induced hypertension or any infection); any prenatal testing (ultrasound, routine testing); and gestational age of infant (for neonatal outcomes only).

All potential predictors that were either significant in univariate models or those that are known risk factors (race/ethnicity, age, BMI, payer status)[16,21,37] were considered in multivariable models. All variables were offered to the multiple regression model in a manual backwards stepwise approach; final models were those with the lowest Akaike Information Criterion and significant predictors ($P < .01$). Two stable sets of predictors were identified for the maternal and neonatal composites, respectively. All primary and secondary outcomes were then adjusted, a priori, for the same set of predictors (listed in Tables 2 and 3) in addition to rural residence. Results are presented as an unadjusted and adjusted OR where nonrural (other) residence is the reference group. A complete case analysis approach was used: any records missing data were excluded from regression models; overall, n = 311 pregnancies and n = 44 neonates were excluded based on missing covariates. All analyses were conducted using SAS v9.3 (SAS Institute, Cary, NC, USA). Cases that resulted in an intrapartum transfer were removed from models for postpartum transfer, and cesarean deliveries were removed from models for severe perineal lacerations as these were no longer at risk.

Three additional sets of sensitivity analyses were also carried out. First, all models were rerun excluding women belonging to a Mennonite, Amish, or Plain church (4.1% of the total sample, 21% of the rural group), because these communities are known to have specific birth characteristics (low rates of interventions, high rates of home birth, high rates of congenital anomalies, and low rates of transfer for pain relief).[25] Second, all models were stratified by parity and, third, by planned birth location (home vs birth center).

3 | RESULTS

The rural group (Table 1) was primarily white (92%) and most ethnic groups were underrepresented compared to the general childbearing population, which reflects the United States demographics of predominantly white women choosing a midwife-led community birth.[38] Latina women were proportionally equivalent in both groups. Rural women had lower levels of educational attainment, were slightly younger, had higher initial BMIs, and higher rates of expected payment method listed as Medicaid insurance compared to nonrural women. A large proportion (20.8%) of the rural group belonged to the Amish, Mennonite, or Plain church. There were no differences in marital status, but all other demographics were significantly different ($P < .001$). Rural women were more likely to be multiparous, to have had a previous home or birth center birth, and to be "grand multiparas" (>4 previous pregnancies lasting

TABLE 1 Characteristics of rural and nonrural women who planned community births, MANA Stats 2.0, 2004-2009

Characteristic	Rural residence (n = 3737) Median [IQR] or No. (%)	Nonrural (n = 14 986) Median [IQR] or No. (%)
Race/ethnicity[a]		
African or Caribbean	18 (0.5)	140 (0.9)
Asian	9 (0.2)	133 (0.9)
Caucasian	3422 (91.6)	13 266 (88.5)
Hispanic or Latina	67 (1.8)	248 (1.7)
Native American	18 (0.5)	20 (0.1)
Other	25 (0.7)	124 (0.8)
More than one race indicated	167 (4.5)	914 (6.1)
Education[a]		
Any high school or completed	1832 (49.0)	3868 (25.8)
Any postsecondary up to 4 years	1429 (38.2)	7607 (50.8)
More than 4 years of postsecondary	417 (11.2)	3187 (21.3)
Belongs to Amish, Mennonite, or other Plain church[a]	777 (20.8)	258 (1.7)
Any Medicaid, primary or secondary[a]	499 (13.4)	1635 (10.9)
Any other insurance (non-Medicaid), primary or secondary[a]	745 (19.9)	6408 (42.8)
Marital status: married, partnered, or common-law	3643 (97.5)	14 558 (97.1)
Age[a]	29 [25-33]	30 [26-33]
BMI at beginning of pregnancy[a]	22.8 [21-26]	22.5 [21-25]
Nulliparous[a]	1182 (31.6)	5801 (38.7)
Grand multiparity (>4 prior vaginal deliveries)[a]	446 (11.9)	611 (4.1)
History of home or birth center birth[a]	1858 (49.7)	5596 (39.8)
Planned birth location at onset of labor[a]		
Freestanding birth center	620 (16.6)	2910 (19.4)
Home	3117 (83.4)	12 076 (80.6)
Number of prenatal care visits with this midwife[a]	10 [7-12]	11 [9-12]
Weeks (from last menstrual period) that any prenatal care began[a]	12 [9-16]	11 [8-13]

[a]$P \leq .001$. Categorical variables: Chi-squared or Fisher's exact tests; continuous variables: Kruskal-Wallis test.

20 weeks or more). While both groups initiated prenatal care early, on average, rural women initiated care 1 week later and had fewer prenatal visits (median 10 vs 11). Rural women had fewer ultrasounds and other prenatal testing.

Regarding intrapartum and maternal events (Table 2), the nonrural group had higher rates of intrapartum and postpartum transfer, and cesarean delivery. Unadjusted models for adverse maternal outcomes showed overall *decreased* risk of adverse outcomes for rural women. However, after adjusting for other risk factors and confounders, these associations were attenuated. For the primary maternal composite, rural status was not associated with an increased risk (adjusted OR [aOR] 1.05 [95% confidence interval {CI} 0.93-1.19]) relative to nonrural women. Results were generally unchanged (data not shown) for alternate maternal composites that excluded transfers.

However, stratifying by parity resulted in a modest, yet statistically significant increase in risk for the maternal composite only among the rural multiparous group (aOR 1.27 [95% CI 1.03-1.55] vs aOR 0.97 [95% CI 0.83-1.21] for rural nulliparous women) (Figure 2). Similar results were not observed for noncomposite indicators: mode of delivery, transfers, or other adverse outcomes.

Rates of adverse neonatal events are shown in Table 3. There were more postterm deliveries in the rural group, and rural infants had significantly higher rates of small for gestational age. We did not detect any increased risk by rural status relative to nonrural status, for any of the primary neonatal events in both unadjusted and adjusted models. All analyses were repeated excluding the Amish, Mennonite, and Plain women and stratified by planned home and birth center birth with no change in the main results (data not shown).

4 | DISCUSSION

This is the first study to describe birth outcomes from rural midwifery clients who met criteria for low-risk birth[17] and who planned to give birth at home or in freestanding birth centers in the United States. Overall, despite the challenges of rural practice and the differential risk profile of rural women, this analysis found no increased risk of adverse maternal outcomes among rural women when compared to nonrural women who also planned community births.

Absolute risks of cesarean delivery, or adverse maternal and neonatal outcomes among all women in this low-risk group, were extremely low and comparable to other studies of community birth,[15,39] despite the fact that the United States maternity care system is not generally considered well-integrated with respect to community midwifery practice.[40] For example, the rate of cesarean delivery in the present study (which excluded women with prior cesarean births, breeches, twins, preexisting medical conditions, or a gestational diabetes diagnosis) was 4.7% overall (<1% in multiparous women, 11% in nulliparous women) and not elevated by rural status. By comparison, a recent analysis found a 15.5% cesarean rate among low-risk women delivering at rural hospitals in the United States.[37] These differences in cesarean rates may reflect differences in criteria for low risk when comparing to hospital cohorts, differences in the midwifery model of care (ie, promoting physiologic birth), or inherent differences in women who seek out midwifery care with respect to motivation to achieve an unmedicated or vaginal delivery. Rates of adverse neonatal outcomes are difficult to compare across studies due to inconsistencies in metrics and whether or not severe congenital anomalies are included in the study group. Rates of adverse neonatal outcomes in this cohort were generally similar to other studies of planned home births.[14,39]

Similar to results reported elsewhere, rural women in this study were younger,[37] more likely to have Medicaid for payment,[37] less diverse,[37] and more likely to initiate care later in pregnancy.[35] They had lower rates of antenatal complications,[37] fewer years of formal education, fewer antenatal visits,[41,42] and were more likely to be planning a home birth versus a birth center birth.[24,43] Rural women in our study were also more likely to be multiparous and have higher parity relative to the rest of the cohort, even excluding the Plain subgroup. Before adjusting for risk factors, rural women demonstrated a *decreased* risk for

TABLE 2 Unadjusted and adjusted odds ratios for rural and nonrural women who planned community births, MANA Stats 2.0, 2004-2009

Intrapartum, delivery, and postpartum outcomes	Rural residence (n = 3737) No. (%)	Nonrural (n = 14 986) No. (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)[a]
Birth location (actual)[b]				
Freestanding birth center	520 (13.9)	2394 (16.0)		
Home	2881 (77.1)	10 819 (72.2)		
Hospital	327 (8.8)	1751 (11.7)		
Other	9 (0.2)	21 (0.1)		
Waterbirth[b]	1021 (27.3)	4926 (32.9)		
Mode of delivery				
Normal spontaneous vaginal delivery[b]	3564 (95.4)	14 080 (94.0)		
Instrumental delivery only (forceps or vacuum)	33 (0.9)	162 (1.1)	0.80 (0.54-1.15)	0.99 (0.65-1.46)
Cesarean delivery[b]	140 (3.7)	738 (4.9)	**0.76 (0.63-0.91)**[f]	1.06 (0.87-1.29)
Severe events (abruption, embolism, ruptured uterus, cord prolapse, seizure)	20 (0.5)	76 (0.5)	1.06 (0.63-1.71)	1.01 (0.58-1.69)
Blood transfusion (as reported by midwife)	15 (0.4)	51 (0.3)	1.17 (0.64-2.03)	1.38 (0.73-2.44)
Third or fourth degree perineal tear[c]	35 (1.0)	196 (1.4)	**0.70 (0.48-0.99)**	0.95 (0.65-1.36)
Intrapartum transfer to higher level of care[b]	333 (8.9)	1767 (11.8)	**0.74 (0.65-0.83)**	1.00 (0.87-1.15)
Postpartum transfer to higher level of care[d]	64 (1.9)	276 (2.1)	0.90 (0.68-1.17)	1.06 (0.79-1.40)
Maternal composite[b,e]	441 (11.8)	2188 (14.6)	**0.79 (0.71-0.88)**	1.05 (0.93-1.19)

[a]All models adjusted for: rural status, maternal age (continuous), BMI (continuous), parity (no prior births vs <5 births vs ≥5 births), belonging to Amish, Mennonite, or other Plain church (y/n).

[b]$P \leq .001$. Categorical variables: Chi-squared or Fisher's exact tests.

[c]Cesarean births excluded from the denominator as these cases are no longer at risk for severe perineal lacerations.

[d]Intrapartum transfers excluded from the denominator as these cases are no longer at risk for postpartum transfer.

[e]Maternal composite defined as: any of cesarean delivery, instrumental delivery, severe events, blood transfusions, third or fourth degree perineal laceration, intrapartum or postpartum transfer.

[f]Bolded ORs are statistically significant (greater or less than 1).

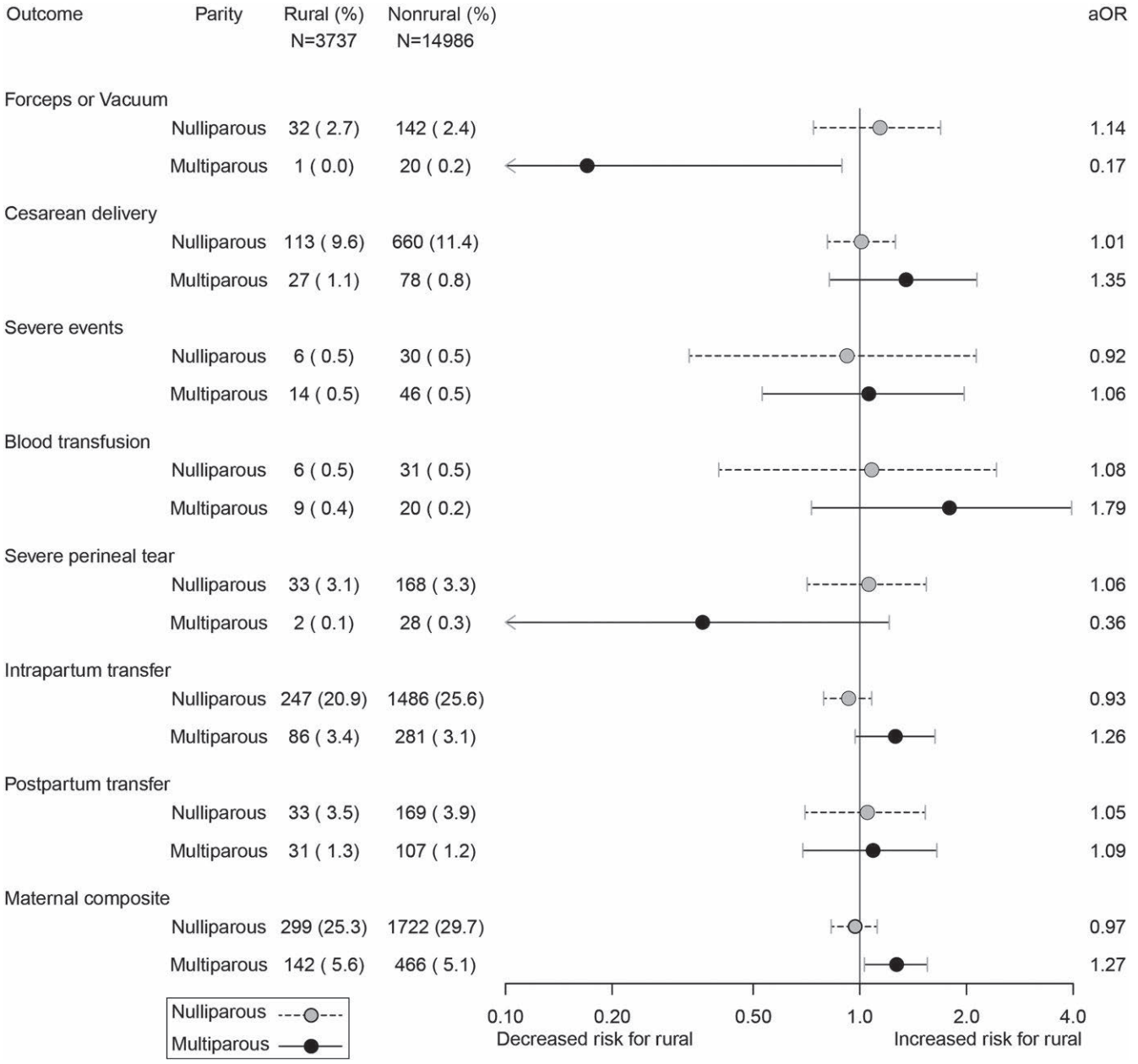

FIGURE 2 Adjusted odds ratios by parity, for rural and nonrural women who planned community births, MANA Stats 2.0, 2004-2009

most adverse outcomes; however, after adjusting for risk factors (listed in Tables 2 and 3), rural status was not associated with an increased risk for women or infants.

When stratifying by parity, there was a slightly increased risk for rural multiparous women when compared to nonrural multiparas with regard to the maternal composite variable only. This finding was unanticipated as multiparous women are usually considered a low-risk group. This finding has not been previously reported and because rates of complications among multiparas are generally low, the significance of these findings is unclear. Further, we cannot discount the possibility of a type 1 error (ie, that this is a chance finding).

An increased risk of adverse events in the rural group was expected in this study as we anticipated that longer transfer times to the hospital from home or birth center would result in a higher rate of poor outcomes in that group. Transfer times vary based on actual distance to the nearest hospital with obstetrics, mode of travel (air, car, ambulance, etc.), weather considerations, availability of ambulance or other transports, or delays because of low levels of interprofessional collaboration.[40,44] There are several possibilities as to why this was not the case in this analysis. First, midwifery care in both rural and nonrural settings involves risk screening and transferring clients as indicated in the antepartum, intrapartum, or postpartum periods. Midwives in this study may have been referring earlier and more conservatively with rural clients, as has been reported in other jurisdictions.[45] Second, the rural cohort may have a different

TABLE 3 Unadjusted and adjusted odds ratios for neonatal outcomes among rural and nonrural women who planned community births, MANA Stats 2.0, 2004-2009

Neonatal outcomes	Rural residence (n = 3737) Median [IQR] or No. (%)	Nonrural (n = 14 986) Median [IQR] or No. (%)	Unadjusted OR (95% CI)[a]	Adjusted OR (95% CI) [b]
Gestational age	281 [275-287]	281 [275-287]		
Preterm (<37 completed weeks)	72 (1.9)	242 (1.6)		
Postterm (>42 completed weeks)[c]	332 (8.9)	1039 (6.9)		
Small for gestational age (SGA)[c,d]	177 (4.7)	524 (3.5)		
Large for gestational age (LGA)[d]	653 (17.5)	2790 (18.6)		
Low birthweight (<2500 g)	35 (0.9)	101 (0.7)		
Macrosomic (>4000 g)	804 (21.5)	3266 (21.8)		
Macrosomic (>4500 g)	162 (4.3)	663 (4.4)		
Neonatal adverse outcomes				
5-min APGAR <7	54 (1.4)	193 (1.3)	1.16 (0.85-1.56)	1.33 (0.96-1.82)
5-min APGAR <4	20 (0.5)	67 (0.4)	1.23 (0.72-1.99)	1.43 (0.83-2.37)
Assisted ventilation >10 min	20 (0.5)	84 (0.6)	1.01 (0.60-1.62)	1.16 (0.67-1.90)
Congenital anomaly	64 (1.7)	236 (1.6)	1.07 (0.80-1.41)	1.02 (0.75-1.38)
Any NICU stay in the first 6 weeks[e]	77 (2.1)	450 (3.0)	**0.69 (0.53-0.87)[g]**	0.84 (0.65-1.08)
Hospital or NICU stay in the 1st 48 h for longer than 24 h	66 (1.8)	314 (2.1)	0.85 (0.64-1.10)	1.07 (0.80-1.40)
Neonatal composite[f]	78 (2.1)	353 (2.4)	0.89 (0.69-1.13)	1.13 (0.87-1.46)

[a]Logistic regression models use rural residence as the exposure of interest.
[b]Models are adjusted for: maternal age (continuous), BMI (continuous), parity (no prior births vs <5 births vs ≥5 births), belonging to Amish, Mennonite or other Plain church (y/n), gestational age at delivery (continuous) in addition to rural status.
[c]$P \leq .001$. Categorical variables: Chi-squared or Fisher's exact tests; continuous variables: Kruskal-Wallis test.
[d]Small for gestational age (SGA) defined as <10th percentile for gestational age and large for gestational age (LGA) as >90th percentile for gestational age using gender-specific birthweight data from the 1999-2000 U.S. Natality Datasets (by week of completed gestation).
[e]$P \leq .01$; same methods.
[f]Neonatal composite defined as: Any NICU admission or hospital (1st 48 h, >24 h), 5-minute Apgar <4 or intrapartum or neonatal deaths.
[g]Bolded ORs are statistically significant.

risk profile beyond the factors for which we controlled in this analysis (listed in Tables 2 and 3). Third, practitioners who serve rural clients may be different in terms of training, experience, or regulatory status. Others have reported high clinician variability in assessment of decision to transfer from home or birth centers.[46] Fourth, rates of adverse events were low overall; studies with a larger cohort may be necessary to detect any significant differences. However, our point estimates were not consistent with poorer outcomes for rural women and thus increasing the sample size would not necessarily alter our conclusions.

In a recent survey of hospital administrators, Kozhimannil and colleagues found that restrictive practice conditions for nurse-midwives were associated with a higher odds of cesarean delivery, preterm birth, and low birthweight infants,[47] suggesting that policies that facilitate access to midwifery care may help to improve outcomes. The findings reported here add further support to such a strategy. With the diminishing numbers of maternity care providers in rural settings, rural midwives may be well positioned to offer in-home antenatal, postpartum, and well baby care, as well as lactation support and community birth for low-risk women.

4.1 | Strengths and limitations

This analysis reports on a low-risk subset of pregnancies from the MANA Statistics Project from 2004 to 2009. The strengths of this dataset are a large sample size, a rigorously validated data collection tool, an extremely high participation rate among women (99.2% of eligible women gave consent for their data to be included in the research dataset),[48] a large number of covariates, and a prospective data collection strategy whereby clients are preregistered into the system early in care.[30] No prior analyses have examined rural status and birth outcomes within a cohort of women who planned midwife-attended births at home or in freestanding birth centers. Despite these strengths, contributing data to the MANA Statistics Project is voluntary for midwives and represents

outcomes of care for approximately 30% of United States community-based midwives practicing at that time; there is no way to predict how voluntary sampling may have affected our findings. Midwifery practice conditions and standards of care across the United States are highly variable due to state-specific regulation, legislative conditions, and licensure (or the absence thereof). More recent MANA stats data were not available for research when the study was initiated; however, future studies could incorporate newer data, as data through 2016 are now available. This study relied on maternal zip code to estimate rural status—an approach that is more precise than using county-level indicators, but that may not accurately reflect actual transfer times in case of emergency in all regions. Finally, this study was limited by inadequate power to study rare outcomes, despite using a neonatal composite to increase statistical power. While we did not detect any differences in neonatal outcomes by rural status, replication with a larger study sample could indicate significant clinical differences between midwife-attended rural and nonrural women in the United States which were too small to detect in our study.

4.2 | Conclusions

This is the first study to describe maternal and neonatal outcomes for midwife-led care among a cohort of low-risk rural and nonrural women who planned midwife-attended, community births in the United States. Healthy, low-risk, rural women planning home or birth center births attended by midwives experienced similar risks of cesarean delivery, operative vaginal delivery, transfers to hospital, severe adverse events, and other maternal morbidities when compared to nonrural women after controlling for risk factors. Our findings support continued discussion in rural communities towards incorporating community midwives as allied health care providers who can help alleviate some of the stresses on the rural maternity care system. While rural home or birth center birth may not be of interest to all rural women, rural midwives could be well positioned to provide antenatal and postpartum care to low-risk women who plan hospital deliveries in larger centers.

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