

Maine Policy Review

Volume 34
Issue 2 *Rural Maine*

2025

Maine's Rural Maternity Crisis: A Policy Agenda

Dora Anne Mills
MaineHealth, doraamills@gmail.com

Follow this and additional works at: <https://digitalcommons.library.umaine.edu/mpr>

Recommended Citation

Mills, Dora Anne. "Maine's Rural Maternity Crisis: A Policy Agenda." *Maine Policy Review* 34.2 (2025) : 59-73, <https://digitalcommons.library.umaine.edu/mpr/vol34/iss2/7>.

This Article is brought to you for free and open access by DigitalCommons@UMaine.

Maine’s Rural Maternity Crisis: A Policy Agenda

by Dora Anne Mills

ABSTRACT

Maine faces a worsening rural maternity crisis driven by the closure of hospital maternity units and deteriorating maternal health. Fifty-two percent of Maine’s rural hospitals have closed their maternity units, creating vast maternity care deserts where pregnant women face the longest average drive times in New England for prenatal care and delivery. This crisis is compounded by workforce shortages, hospital financial pressures, declining birth rates, and Maine’s status as the nation’s oldest and most rural state. Rural pregnant women experience disproportionately high rates of chronic disease, substance use disorders, and mental health conditions, contributing to worse maternal and infant outcomes. Evidence-informed policy solutions require concurrent action: ensuring rural hospital financial stability through alternative reimbursement models, implementing regional care coordination, expanding telehealth services, diversifying the maternity workforce, addressing public health challenges and social determinants, ensuring safety across all birth settings, and supporting rural immigration to sustain communities and healthcare systems.

the state and how these access gaps both result from and contribute to worsening rural maternal health. The article evaluates a range of evidence-informed policy strategies, such as assuring rural hospital financial stability, implementing regional planning, expanding telehealth, addressing workforce shortages, tackling major public health problems and social drivers of health, ensuring each birth setting is as safe as possible, addressing the needs of closed maternity units, and supporting rural immigration. Findings show that combined approaches are essential to improving outcomes as well as preserving the health and viability of Maine’s rural communities.

INTRODUCTION

Maine is facing a growing rural maternity crisis driven by two interconnected challenges: the closure of rural hospital maternity units and worsening maternal health. Public health crises emerge in different ways—some with sudden impacts such as a flu pandemic, and others through slow and steady erosion like the myth of the frog in increasingly heated water. Maine’s rural maternity crisis reflects the latter: a long-developing emergency shaped by numerous factors and resulting in two interconnected public health issues. The first challenge is the widespread closure of rural hospital maternity units in Maine, which has created large geographic regions with limited or no access to labor and delivery services. The second is the worsening burden of maternal chronic disease, behavioral health conditions, and social drivers of health that disproportionately affect rural pregnant women, often to the detriment of infant health.

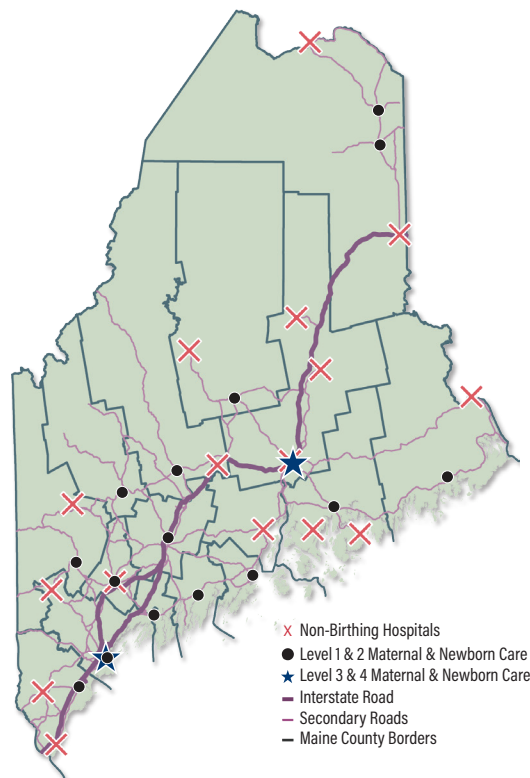
This article examines how hospital maternity unit closures have expanded maternity care deserts across

Note: The term “woman” is used in this article, though there is recognition that someone who identifies as a man or as binary, but was assigned female at birth, is sometimes able to become pregnant and deliver a baby.

RURAL MATERNITY UNITS

The most visible rural maternity issue is the closure of hospital maternity (labor and delivery) services across rural America over the last 15 years, with 52 percent of rural hospitals without such units in 2022 (Kozhimannil et al. 2025: 166). This has created what is commonly known as maternity deserts, or regions without full maternity care. In Maine, 52 percent (13 out of 25) of currently operating hospitals in rural communities have had to close their maternity units. Overall, 17 Maine hospitals have had to close their maternity units, 11 of them in the last decade (see Table 1). Figure 1 presents a map of Maine showing hospitals both with and without maternity units and several regions without maternity care. A striking area is the 160 miles (150–180

FIGURE 1: **Maine Hospitals with and without Maternity Units**



minutes of driving time) between Presque Isle and Bangor, which covers an area with three hospitals, all with closed maternity units.

I believe there are three overarching reasons that explain why Maine's rural hospitals are losing their maternity units: workforce shortages, economic difficulties, and demographic challenges.

Obstetric Workforce Shortages

Obstetric workforce shortages are much more severe in rural areas as compared with urban areas because in part rural populations have a proportionally older population, so there is also a proportionally smaller available workforce (Hung et al. 2016). Additionally, although midwives, doulas, nurse midwives, and others can fill gaps, only certain types of physicians can perform cesarean sections (that occur in about one-third of deliveries) or manage some other pregnancy-related complications (e.g., ectopic pregnancies). Finding sufficient numbers of these physicians to work in rural areas is challenging (Busse et al. 2025). Maintaining adequate

numbers of maternity nurses has also been difficult. When a hospital's birth numbers are low, these nurses often have to be reassigned to other units. Maintaining their skills and a community of practice becomes difficult, as does recruiting and retaining them.

Economic Difficulties

Rural hospitals are much more challenged economically than their urban counterparts, especially since they serve communities with higher proportions of people without insurance or with Medicaid (also known as MaineCare in Maine). They also have high fixed costs to maintain round-the-clock standby services with a full complement of trained health professionals necessary in case a patient presents in labor, even when there are no deliveries.

Demographic Challenges

Birth rates are declining in rural areas nationally. When a hospital has fewer than 200 births per year, it can be challenging for obstetric providers to obtain malpractice coverage and for hospitals to hire enough personnel and justify the costs associated with keeping the unit appropriately staffed (Kozhimannil et al. 2022).

In Maine, we face three additional demographic challenges contributing to maternity unit closures. First, we are the first or second most rural state in the country (next to Vermont, depending on the calculation and year), with 61 percent of Mainers living in rural areas, vs 19 percent nationally. In other words, the proportion of Mainers living in rural areas is three times the national average. Additionally, Maine's population density is about half that of the United States.¹

Second, Maine's birth rates are among the lowest in the country, often the lowest or second lowest (next to Vermont). This low rate makes it difficult for rural hospitals, where birth rates are even lower, to maintain enough deliveries to keep their maternity units open. Maine has seen a 25 percent decline in births over the last 25 years and a 50 percent drop since 1960. In 1960, there were almost 24,000 births per year in Maine; now, there are fewer than 12,000. This decrease in births is worse in rural Maine (Figure 2) (Terry Bryant, personal communication, May 2025). Maine is also one of the few states in the country with higher numbers of deaths than births, something we have seen since 2011 (Rector and Bailey 2025).

Third, Maine is considered demographically the oldest state in the country, with 23 percent of its population age 65 and older, and a median age of 45 years

TABLE 1: **Maine Hospital-Based Maternity Unit Closures**

Hospital	Town/city	County	Urban (U) or rural (R)*	Year of closure
St. Joseph's	Bangor	Penobscot	U	1970s
Northern Light Sebec	Pittsfield	Kennebec	R	1970s
Northern Light CA Dean	Greenville	Piscataquis	R	1995
Millinocket	Millinocket	Penobscot	R	1998
Northern Light Blue Hill	Blue Hill	Hancock	R	2011
Goodall (MaineHealth Maine Medical Center Sanford)	Sanford	York	R	2014
Penobscot Valley	Lincoln	Penobscot	R	2015
Calais	Calais	Washington	R	2017
Bridgton	Bridgton	Cumberland	R	2021
St. Mary's	Lewiston	Androscoggin	U	2022
Rumford	Rumford	Oxford	R	2023
Northern Maine Medical Center	Fort Kent	Aroostook	R	2023
York	York	York	U	2023
MaineHealth Waldo	Belfast	Waldo	R	2025
Northern Light Inland**	Waterville	Kennebec	R	2025
Mt Desert Island**	Bar Harbor	Hancock	R	2025
Houlton	Houlton	Aroostook	R	2025

*Using federal Health Resources and Services Administration (HRSA) definition of rural and urban; ** Hospital maternity unit closed March 2025, hospital closed June 2025.

(compared to the national averages of 18 percent and 39 years, respectively). Maine’s rural areas are even older by these measures (Rector and Bailey 2025), and Maine’s aging population affects both the number of people who can give birth as well as the number of people in the workforce.²

These demographics—high rurality, low birth rates (especially compared with deaths), and low proportion of working age and reproductive age adults—foretell continued stressors on Maine’s rural hospitals.

Impacts of Hospital Maternity Unit Closures

Maternity unit closures can have several impacts. First, there are impacts on health. Studies show that maternal and infant health significantly worsen after a rural hospital maternity unit closes. Issues include the doubling of infant mortality rates (Waldman et al. 2024); significant increases in out-of-hospital births and preterm births (Kozhimannil et al. 2018); significant decreases in prenatal and postpartum visits (McMorrow et al. 2021);

and negative impacts on perinatal mental health (Woodward et al. 2023).

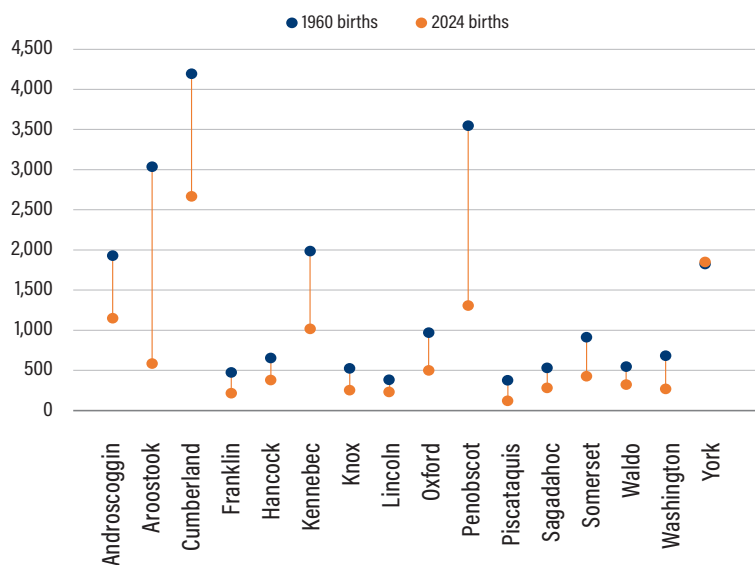
As a result of these hospital maternity unit closures, the average one-way drive time for a pregnant woman in rural Maine for prenatal care and delivery is 45 minutes, the longest in New England, and one of the longest in the country (CHQPR 2025). With most rural pregnant women living with low incomes (at least half with MaineCare insurance) and with little public transportation available in rural areas, driving 90 minutes or more round trip for regular prenatal visits, delivery, and postpartum care is most often a tremendous burden. Studies show that when driving distance for prenatal care and delivery is increased, health outcomes for women receiving maternity care worsens, and there are elevated risks of adverse neonatal as well as maternal outcomes (Minion et al. 2022; Sugg et al. 2025).

Second, closure of rural hospital maternity units results in negative economic impacts. Employers report difficulty recruiting employees when families have few options for full maternity or hospital care, and research indicates counties with maternity unit closures experience a decline in economic activity after the closure, including a loss in their workforce and population of reproductive age. The closures make it harder to maintain schools and a robust economy when rural maternity care is threatened and birth numbers continue to decline (Owen et al. 2022). As some hospital administrators anecdotally report, the ability of a rural area to offer safe labor and delivery (including cesarean sections or other interventions if there are complications) is a pipeline to the future.

WORSENING MATERNAL HEALTH

Compounding the challenges caused by rural hospital maternity unit closures is worsening maternal health and its ripple effects on infant outcomes. Rural

FIGURE 2: **Live births for Maine Resident Mothers by Mother's County of Residence**



Sources: Maine Center for Disease Control, Office of Data, Research, and Vital Statistics. Data on Maine birth settings and Maine births 1960, 2024. Communication with Terry Bryant, May 2025.

Note: Maine births overall were 50% lower in 2024 than 1960 (lower by 11,692 births). Largest relative decline: Aroostook (-81%); Piscataquis (-68%); Penobscot (-63%)

maternal health is a significant challenge in Maine and across the country.

Some national data will provide context. The United States has the highest maternal death rate among high-income countries, including a nearly three-fold higher rate than France, the country with the second-highest rate (Taylor et al. 2022). Maternal deaths in the United States have been rising, with a 28 percent increase from 2018 to 2022 (Chen et al. 2025). Rural US maternal mortality rates are about twice as high as urban rates (Harrington et al. 2023), and the maternal mortality rates for Black and Native women are more than twice the overall US maternal mortality rate (Hoyert 2021). Furthermore, rural mortality and morbidity disparities persist, even when racial and other sociodemographic factors and clinical conditions are controlled for (Kozhimannil et al. 2019). The United States also has the highest infant mortality rate among high-income countries (Woolf and Chapman 2024), and the country's rural infant mortality and morbidity rates are higher than urban rates (e.g., reported 36 percent higher in one study [Ehrenthal et al. 2020]).

So, how does Maine fare compared to these national statistics? I will begin with two caveats. First, because rural populations in many states, including Maine, are

statistically small, and because maternal and infant mortality are statistically rare events, mortality metrics are often analyzed across rural areas nationally. Second, increases in maternal and infant mortality rates are considered a late finding, occurring after the breakdown of systems and increases in contributing factors.

There are, however, several reports that provide insights on how Maine fares with regard to maternal and infant outcomes. The March of Dimes gives Maine a C in its report on preterm births, compared to a B+ for Vermont and an A- for New Hampshire.³ Maine's Maternal, Fetal, and Infant Mortality Review Panel (MFIMRP) provides in-depth reviews on a few patient cases every year to identify contributory factors to mortality and to identify strengths and weaknesses in the maternal/infant delivery system. Their 2023 and 2024 reports show Maine's infant mortality rates are generally higher than the national average (MFIMRP 2025, 2024). Like for most rural or low population states, a reliable maternal mortality rate is not feasible to calculate for Maine.⁴ However, out of 29

pregnancy-associated deaths in Maine from 2018 to 2021, 80 percent occurred among people living in rural areas (rural populations account for 61 percent of the state's overall population); more than half occurred among people with a high school diploma or less education; and 80 percent were insured by MaineCare (vs 39 percent of pregnant women statewide and 50 percent of pregnant women in rural Maine, 2023 data). Obstetric complications, motor vehicle crashes, drug overdoses, and deaths related to mental illness were the leading causes (MFIMRP 2025, 2024).

Additionally, several major public health problems with important implications for pregnancy are noted to have higher rates in Maine than in the United States overall, and are higher in Maine's rural than urban populations. These health issues affect overall maternal and infant outcomes and include nicotine addiction; obesity and diabetes; substance use disorders including neonatal abstinence syndrome (mostly due to opioid addiction); mental health issues (especially from pre-existing depression and anxiety); and social drivers of health, e.g., poverty, food insecurity, housing instability, and transportation challenges. Specific examples include that one

What makes the rural maternity crisis different from other rural health care concerns?

First, it represents a major public health issue. For instance, public health commonly uses some nonmedical metrics to determine the impacts of interventions or the loss of services. One of them is the years of lives lost (YLL). When applied to rural health care services, if closure of a rural maternity unit results in the death of a newborn, this equates to an estimated 80 YLL. If a pregnant or postpartum woman dies, that is an estimated 55 YLL. By contrast, when a person experiencing a heart attack dies because they present to a rural hospital that cannot provide the full spectrum of care of a tertiary care hospital, this represents about 5 to 10 YLL. These notable differences in YLL are reason why maternity services have more of an impact in a public health context. Second, unlike other rural medical or surgical services, when inpatient maternity services are closed, often no clinical staff at the hospital are fully capable of handling an obstetric emergency, e.g., a patient needing an urgent cesarean section.

in five rural pregnant women use nicotine during pregnancy, three times the urban rate; neonatal abstinence syndrome affects one in fourteen newborns in Maine, and one in seven in most of our rural counties; and rates of depression among pregnant women in Maine with Medicaid (MaineCare) are twice as high (37%) than among those without Medicaid (16%), which translates to higher rates in rural Maine because of higher coverage with Medicaid (March of Dimes, 2022).⁵ A 2023 assessment conducted by the federally funded Maine RMOMS grant (Rural Maternity and Obstetrics Management Strategies) indicated that mental health issues faced by pregnant women were the top concerns among rural obstetric clinicians.

As discussed earlier, rural hospital maternity unit closures are a contributing factor to worsening health outcomes. However, rural maternal health issues work synergistically to create a rural maternal population whose health is worse than that of its urban counterparts, which leads to higher-risk pregnancies. As a result, in addition to workforce shortages, low birth volumes, and financial losses, rural hospital leaders frequently cite clinical safety concerns and liability risks in caring for increasingly high-risk pregnancies in low-volume settings as reasons for discontinuing obstetric services (Busse et

al. 2025). Therefore, it is imperative to address rural maternity unit closures and rural maternal health issues concurrently and not as completely separate issues.

ADDRESSING MAINE'S RURAL MATERNITY CRISIS

What are effective policy strategies to address a rural maternity crisis comprised of hospital maternity unit closures and maternal health issues? Studies indicate there is not one solution for solving the rural maternity crisis. Rather, many strategies are needed, such as assuring rural hospital financial stability, implementing regional planning, expanding telehealth, addressing workforce shortages, tackling major public health problems and social drivers of health, ensuring each birth setting is as safe as possible, addressing the needs of closed maternity units, and supporting rural immigration.

Assuring Rural Hospital Financial Stability

Alternative reimbursement models

To maintain a maternity unit, a hospital must maintain an appropriately qualified team at all times for managing both mothers and babies, which includes staff to handle cesarean sections that account for almost one-third of all deliveries. Whether a woman is in labor or not, the facility must have on hand (or sometimes very close by) 24 hours per day, at a minimum the following:

- a nurse midwife or physician who can deliver babies;
- a physician who can perform cesarean sections as needed (this can be the same person delivering babies if they are a physician with obstetric training who is also trained in performing cesarean sections);
- a surgical assistant (another surgeon or a specialized nurse);
- an anesthesiology provider (a physician anesthesiologist or a certified registered nurse anesthetist);
- two surgical technicians or operating room nurses; and
- a clinician dedicated to the newborn (a pediatrician or a pediatric nurse practitioner) (Sung et al. 2025).

Higher-volume hospitals (e.g., >200 births per year) are more likely to be able to financially maintain this level of staffing 24 hours per day (Kozhimannil et al. 2022).

TABLE 2: **Live Maine Births by Facility**

Facility	CY 2024	CY 2023	CY 2022	CY 2021	CY 2020	CY 2019
Delivered At Home	330	321	324	307	274	227
Northern Sun (Topsham) - R		4	9	6	9	6
The Birth House (Bridgton) - R		7	12	5	9	12
Holly #7 (Bangor)		40	39	9	15	11
Soft Corner Midwifery (Bath) - R		2				
Women First (Machias) - R		1				
Free-Standing Birth Center	75					
Bridgton Hospital (2021) - R		1	1	27	58	60
Northern Maine Medical Center (2023) - R		14	46	45	53	43
St Mary's Regional (2022)		1	246	482	504	542
Rumford Community(2023) - R		8	55	84	80	95
York Hospital (2023)		187	291	265	271	324
Millinocket Regional (1998) - R	1	0	1	2	2	
Calais Regional (2018) - R	1	0	1	1	1	2
MH Waldo - R	125	109	97	123	119	137
Houlton Regional - R	82	90	88	107	103	119
Mt Desert Island - R	33	59	67	42	62	64
Northern Light -Inland Hospital - R	208	268	270	270	296	307
MH Franklin - R	256	281	240	222	237	229
MH Lincoln - R	132	132	101	111	111	92
MH Stephens - R	233	204	225	151	147	163
MH Mid Coast - R	475	528	506	532	464	569
MH Pen Bay - R	201	202	234	211	225	248
MH Maine Medical Center Biddeford/Sanford	437	436	476	441	417	505
MH Maine Medical Center Portland	3330	3236	3313	3157	3055	2942
Central Maine Medical	735	855	746	525	559	568
Cary Medical Center - R	214	201	194	195	196	204
Mayo Regional - R	113	104	112	108	108	85
Redington-Fairview - R	112	118	103	119	125	125
Down East Community - R	83	112	141	183	153	177
MaineGeneral Alfond Center for Health - R	1003	1050	1033	1058	980	1015
Northern Light-A.R. Gould - R	190	177	155	212	166	175
Northern Light-Mercy Hospital	725	670	682	632	669	638
Northern Light -Eastern Maine Medical Center	1591	1587	1721	1669	1607	1625
Northern Light-Maine Coast Hospital - R	259	186	170	184	211	193
Total deliveries	11,587	11,737	12198	11,962	11,296	11,511

Source: Maine Center for Disease Control, Office of Data, Research, and Vital Statistics, Communication with Terry Bryant, May 2025.

Note: R following the hospital name indicates a rural hospital using federal HRSA definition of rural. Gray-shaded area indicates facilities that have closed maternity units as of Dec. 2025.

Five rural Maine maternity hospitals have fewer than 200 annual births (MH Lincoln, Mayo Regional, Redington-Fairview, Down East Community, and NLH A.R. Gould), and five more hover just above that (MH Franklin, MH Stephens, MH Pen Bay, Cary Medical Center, and NLH Maine Coast) (Table 2).

Alternative reimbursement models (such as add-on payments, standby reimbursement, or local government ownership of the hospital) could help ensure rural hospitals maintain their maternity units.

Add-on payments. State and federal policies related to Medicaid reimbursements are critical to the survival of

rural hospital maternity units. Fifty percent of pregnant women in rural Maine have MaineCare. Some counties such as Washington, this rate is 60 percent. By comparison, statewide, 39 percent of pregnant women have MaineCare, and urban counties such as Cumberland and York, the rate is 26 percent to 27 percent (2023 data). To ensure reimbursement is sufficient for rural hospitals with lower-volume deliveries, some states, including Texas, have a special Medicaid add-on payment per delivery (of \$1,500) for rural birthing hospitals to help cover the costs of providing round-the-clock access.⁶

Standby reimbursement model. Some have proposed a payment system for rural hospital maternity care that combines reimbursement for each delivery as well as a monthly payment for standby capacity to assure a sufficient workforce. Under this model, insurers (private insurers and Medicaid) reimburse rural maternity hospitals a rate that reflects the number of women of childbearing age in the hospital's service area who are insured by that health plan, in addition to payments for each delivery (CHQPR 2025). There are some analogies to this approach with how Maine and some other states require health insurers to provide payments to the state at a rate based on their covered beneficiaries in order for all children to have access to free vaccines.⁷

Local government ownership of hospitals. Some hospitals in other parts of the country have changed ownership to a local government (e.g., a municipality or county), with the governance conducted by an elected board or government officials, with the ability to use property taxes to help fund the services. While this model has not been used in Maine and seems an unlikely strategy at this point in time, it should be noted that Cary Medical Center in Caribou is municipally owned.

Bundling or de-bundling of payments. Additionally, insurance companies sometimes bundle payments, meaning that they pay a single predetermined payment for the entire pregnancy and delivery. While sometimes this bundling is desirable and creates incentives for preventive care over traditional fee-for-service payments, bundling can create hurdles when two hospitals want to collaborate so that one provides most of the prenatal care and the other the deliveries. Policies that include both bundled and unbundled reimbursement options can provide hospitals with more flexibility.

Reducing malpractice insurance costs

The cost of medical professional malpractice coverage for obstetrics is among the highest of all specialties

across the country. There are some policies, however, that can address this issue.

FQHC collaborative. Some hospitals (mostly in other states) have grown a collaborative relationship with a federally qualified health center (FQHC) or other federally funded clinics, so that physicians and other providers are employees of the federal clinic and are then contracted to provide services for the hospital, including in labor and delivery. This assists with malpractice insurance costs, since the providers are covered through the FQHC by the Federal Tort Claims Act. According to one report, such a partnership saved a hospital \$200,000 per year per obstetric provider (Gilburg et al. 2024). Currently, Cary Medical Center in Caribou has a collaborative relationship with the Pines Health Services, a local FQHC that employs physicians for the hospital. Cary is the only Maine maternity hospital with such a relationship.

Discussions with Medical Mutual. Maine has one dominant medical malpractice insurer, Medical Mutual, that was founded in 1978 by a group of Maine physicians.⁸ As regional planning for maternity care evolves, conversations with Medical Mutual and regional clinical leaders could help determine any needed changes to the criteria for medical malpractice insurance coverage. Examples include revisions to the criteria for hospitals that participate in a regional collaborative to perform trials of labor after cesarean and to provide cesareans performed by family medicine physicians with specialized obstetrical training. The purpose should be to ensure the right balance of access to care with sufficient quality and safety of care while reducing malpractice costs.

Implementing Regional Planning

Regional planning has been shown to improve coordination, leverage resources, and generate creative solutions. Such planning in Maine during the 1980s and 1990s led to a coordinated system of hospital-based trauma centers. In other parts of the country, effective maternal-systems-of-care planning have included a diverse healthcare team (obstetricians, family medicine physicians, nurses, midwives, pediatric and anesthesia providers, doulas, public health nurses), other healthcare providers and administrators, and community-based organizations (e.g., WIC, home visiting).

Some promising results of such planning efforts elsewhere have included the development of hub-and-spoke models, e.g., where a larger hospital (hub) and smaller hospitals (spokes) partner to share resources and

improve communication, including developing telehealth networks (GAO 2022). Other promising results include improved coordination of care, e.g., making sure that women who receive perinatal care at home by a midwife or in a rural hospital can have their care transferred promptly to the appropriate setting, and developing clinical teams from across a region who meet regularly to discuss and coordinate patient care plans. Regional planning can also leverage resources to ensure there is situational awareness among maternity care providers on how to access regional and state assets such as specialized community health workers, perinatal mental health, and dietitian resources. Finally, regional planning can work to develop creative solutions, e.g., establishing a community of practice among rural maternity nurses who share common interests and goals, including a desire to collaborate to learn and grow (Gilburg et al. 2024).

The good news is that regional planning in Maine is being initiated by a new federally funded Maine DHHS Transforming Maternal Health (TMaH) grant process. More information on its goals and format is expected in 2026. One common question in regional planning is what criteria should planners use to determine if a hospital's maternity units should close or stay closed? There is no consensus on the answer. On one hand, patients who give birth at low-volume rural hospitals (<460 births/year) are more likely to face severe maternal morbidity (though these are statistically rare events) than those who give birth at rural higher-volume hospitals (>460 births/year) (Kozhimannil et al. 2023). On the other hand, rural hospital maternity unit closures are associated with significant declines in maternal and infant health. There is currently no clinical or policy consensus on the number of births and associated financial, staff, and training resources needed to safely provide obstetric services as well as the distance for women to travel for perinatal services that assures sufficient access to that care. Even given all these factors, with the current workforce shortages and declining birth numbers in rural Maine, it is likely more hospitals will face a decision about closing their maternity units. However, if strategies to address the contributing factors can be successfully implemented in the next several years, including critical regional planning, then it is possible some of Maine's rural maternity units can remain open and some closed ones may be able to reopen. Ultimately, it is about finding the right balance of assuring sufficient quality of care and adequate access to care.

Expanding Telehealth

There are several possible telehealth strategies that can assist rural maternity hospital units to remain open, to address access-to-care issues in regions without an open maternity unit, or to improve maternal health issues. For instance, virtual obstetric or neonatal physician support for rural providers caring for obstetric patients or newborns, including emergencies and deliveries, can provide support for rural hospitals with limited or no maternity services. Currently, MaineHealth and Dartmouth Health each provide specialized teleNICU (neonatal intensive care unit) services for newborns to some hospitals in Maine and New Hampshire. Telehealth access to obstetric physician support for rural obstetric providers is not widely available, but other states have used this approach successfully (Meighan et al. 2023; Theiler et al. 2024). Nonurgent provider-to-provider consultation is also a useful telehealth tool. A common version of this involves rural family physicians and nurse midwives meeting via telehealth with obstetricians or maternal-fetal medicine specialists (obstetricians with additional training to manage high-risk pregnancies) to review patient care plans and coordinate care (Gilburg et al. 2024). There is no statewide availability of this option in Maine.

Telehealth can also be used to support patients directly. Currently, Maine RMOMS has funded the launch of a perinatal telepsychiatry program, perinatal remote patient monitoring for maternal hypertension, and perinatal tele dietitian services. However, especially in regions without maternity care, there are other direct to patient telehealth possibilities that should be considered. For instance, if patients, doulas, or community health workers are equipped with video internet capabilities (e.g., a smart phone with cell service), simple home monitoring devices for blood pressure and weight assessment, and a handheld Doppler for fetal heart rate, some of the recommended 13 prenatal visits can be performed successfully at the patient's home or a mobile health unit, communicating with an obstetric provider via video (Kern-Goldberger and Srinivas 2022).

Identified policy and system-related barriers to expanding telehealth include startup costs (especially since federal RMOMS grant used for some startup costs is coming to a close); insufficient insurance reimbursement (e.g., for consultative telehealth visits and for home monitoring equipment); federal restrictions that limit where patients must be located to receive telemedicine services; and standardized provider licensure policies across

state lines such as via interstate medical licensure compacts to allow out of state providers to more easily care for patients in remote areas via telehealth.

Addressing Workforce Shortages

Many of the recommendations in this section can also be found in two recent reports conducted by the Roux Institute of Northeastern University in Portland, Maine (Roux). A team from Roux was contracted by the Maine RMOMS grant (awarded to MaineHealth) to conduct in-person visits and interviews with a wide variety of health professionals and administrators in rural hospitals to develop recommendations to address rural maternity workforce needs. The report was published in 2024, followed by a second report in 2025 that added insights based on interviews with referral maternity hospitals and several hospitals with closed maternity units (Keefe-Oates et al. 2024, 2025).

Alternative care models

Maternity workforce challenges have been a major factor leading to poorer maternal and infant health outcomes in the United States as well as rural maternity unit closures. Several studies have explored the major factors in peer high-income countries (e.g., the European Union, the United Kingdom, New Zealand, Australia, and Canada) that account for their better, yet lower-cost, maternal and infant health outcomes (Gunja et al. 2024; Niles and Zephyrin 2023; Tikkanen, 2020). The reports show these countries use care models that rely on a professionally diversified workforce, where women with healthy pregnancies are mostly cared for and their deliveries are attended by nurse midwives and doulas (or community health workers), who build a trusting relationship with the woman and her family, provide home and office visits, deliver the baby, and provide postpartum care (see [appendix](#) for more information on midwives practicing in Maine).⁹ In many cases, the first visit after a pregnancy is detected is a home visit by a midwife and doula, who build the foundation of an ongoing relationship to comprehensively address health and social needs.

In these models, women with more medically complicated pregnancies are seen by a family physician, and

BARRIERS TO DIVERSIFYING THE WORKFORCE

A number of barriers exist to diversifying the workforce in Maine, including that there are limited or no education and training programs as well as state certification, licensure, or reimbursement for a number of professionals, and few rural training programs. Some examples:

- **Obstetricians.** There is only one obstetric residency program in Maine, at MaineHealth Maine Medical Center. While the focus is on care for patients from across the state, including rural areas, currently there is not a substantial specific focus on rural training such as a rural track, though the MERGE Collaborative has recently established rural electives.
- **Family medicine obstetric physicians.** There are no obstetric fellowship programs in northern New England for family medicine physicians that provide training in cesarean sections and some advanced obstetric care. Of the two in New England, both are in urban areas (Providence, Rhode Island, and Lawrence, Massachusetts).¹⁵
- **Nurse midwives.** There are no nurse midwife education programs in northern New England and only three in New England (Baystate Medical Center in Massachusetts, Yale and Fairfield Universities in Connecticut).
- **Certified professional midwives.** There are limited education programs available in New England for certified professional midwives and no regular MaineCare reimbursement.¹⁶
- **Doulas.** Doulas in Maine are not yet required to be certified, and there is currently no mechanism for licensure or reimbursement by MaineCare, though planning for this is underway. There are some Doula Organization of North America (DONA)-certified doulas practicing and training others in Maine.¹⁷
- **Community health workers.** Certification and reimbursement for Community Health Workers are emerging in Maine.¹⁸

those needing even higher levels of care are seen by an obstetrician. In most of these countries, nurse midwives greatly outnumber obstetricians and are the backbone of the reproductive health system. By contrast, in the United States, obstetricians outnumber nurse midwives. Additionally, in these countries, family physicians or advanced nurse practitioners often provide the routine ongoing care for the baby. A literature review by Sandall et al. (2016) provides evidence that diversified maternity workforce models can result in better outcomes when the workforce is well trained, and referrals are made seamlessly and appropriately with planning and coordination among facilities and team members.

There is increasing support for a diversified maternal workforce model in the United States. For instance, the Milbank Memorial Fund endorses this strategy in its report (Gilburg et al. 2024). It is clear from several sources that the federal government is supporting a transition to these types of models. Examples include the 2022 White House Blueprint for Addressing the Maternal Health Crisis (White House 2022) as well as the CMS (Centers for Medicare and Medicaid) Issue Brief Improving Access to Maternal Health Care in Rural Communities (CMS 2019). In 2025, based on the findings in these reports, CMS issued a competitive request for proposals for the Transforming Maternal Health Model (TMaH).¹⁰ Maine DHHS applied for this funding and obtained it.

Maine's patient volume lends itself to a diversified workforce. With birth and overall population declines in rural Maine, there are often insufficient numbers of patients to maintain three or four obstetricians (considered the minimum number for adequate call coverage). Additionally, family physicians with specialty training in obstetrics (often called family medicine obstetric physicians or FM OBs) can provide obstetric care, including cesarean sections. These professionals offer the advantage of being able to provide primary care for people of all ages and genders. In general, they provide low-risk maternity care and refer higher-risk patients to obstetricians and maternal-fetal medicine providers. Certified nurse midwives commonly provide delivery services in hospital settings, as well as ambulatory prenatal and postpartum care. Because they are unable to perform surgery such as cesarean sections, they cannot be solely relied on for maternity services and must have surgical backup for deliveries, but they can close some gaps in rural hospitals. Maternity nurses working in rural hospitals are also a critical workforce. The Roux Institute assessment showed the need for the development of communities of practice, with ongoing connections between those in the field and mentors; immersion experiences in higher-volume hospitals to maintain their delivery skills; and maternity residency programs for nurses interested in the field.

Outside hospital settings, doulas and community health workers are increasingly recognized as important members of maternity care teams, especially as women face complex health-related social needs and as they express the desire for an ongoing relationship with professionals who can assist them. Certified professional midwives provide home births across much of Maine and offer women alternatives to a hospital delivery. Home

deliveries have doubled over the last 15 years from an average of 153 (1.1 percent of all births) per year (2004–2008) to 317 (2.7 percent of all births) per year (2021–2023). While home births with adequately trained certified professional midwives caring for women with a low-risk pregnancy are considered safe, it is important that planned and coordinated back-up care with an obstetric team is available within a short drive. Unfortunately, as hospital maternity units are closing, this is increasingly not the case.

Maine can adopt several policies to address these workforce shortages. The state could offer specific student loans or loan repayment for professionals who will work in the rural maternity field or consider routine reimbursements for professionals who are appropriately certified or licensed, e.g. doulas, community health workers, certified professional midwives. Additionally, the state could fund the establishment of Maine-based education and training programs such as a rural obstetric residency track, family medicine obstetrics residency, certified nurse midwife programs, and ongoing training and supports for maternity nurses; and encourage or require regional planning that includes all members of the maternity care system with the goals of assuring sufficient access and quality of perinatal care.

Tackling Major Public Health Problems and Social Drivers of Health

Public health problems

As mentioned, women of reproductive age in rural Maine carry heavier burdens of a number of health issues than their urban counterparts, including nicotine addiction, obesity, diabetes, substance use disorders, neonatal abstinence syndrome (mostly due to opioid addiction), and mental health issues (especially depression and anxiety). These conditions lead to worse maternal and infant health outcomes as well as the need for higher levels of prenatal care largely available only in urban areas. Additionally, when rural maternity units close, prevention and treatment for these health issues among women of reproductive age becomes scarcer, with the closures contributing to a worsening of these health issues. Therefore, public health programs need to focus on preventing and mitigating these conditions, starting with youth and young adults. Addressing these health issues should also be integrated into the maternal health care system, since pregnancy is often a strong individual motivator for behavior change.

Social drivers of health

People with low incomes tend to have high levels of health-related social needs, such as transportation barriers, lack of control over their time (e.g., jobs that allow little autonomy over their schedule), housing instability, and food insecurity. Given that poverty rates are higher in rural areas, these social drivers are accentuated among rural perinatal women. Screening pregnant women for health-related social needs (e.g., difficulties with housing, transportation, food, utilities) and successfully referring them to services is an essential first step for reversing these trends. The good news is many of these referrals can now be done electronically.

Data

Public health begins with defining a problem with data. With current funding threats at the federal level, it is critical to maintain the foundational datasets for maternal and infant health including Vital Records; Pregnancy Risk Assessment Monitoring System (PRAMS); Behavioral Risk Factor Surveillance System (BRFSS); and the Maine Maternal, Fetal, and Infant Mortality Review process.

Ensuring Each Birth Setting Is as Safe as Possible

A critical aspect of addressing rural maternity issues is assuring each birth setting is as safe as possible. In 2020, the National Academy of Sciences (NAS) and the National Institutes of Health (NIH) published an extensive study, *Birth Settings in America: Outcomes, Quality, Access, and Choice* (NASEM 2020). The report notes that no birth setting is risk-free, but that a woman should have the right to choose where and with whom she gives birth, and therefore, it is important each setting improves outcomes and makes births as safe as possible. Additionally, according to the report, US maternity care patterns of “too little, too late” and “too much, too soon” contribute to poor outcomes and yet each can be modified.

Home births and birth center births

The NASEM report notes that international studies indicate home and birth center births can be as safe as hospital births for low-risk women and infants. However, several factors are essential, although not widespread in many areas of the United States:

- birth centers and midwives providing home births should be an integral part of the maternal health system including a regional one that provides planning, coordination, and training;

- birth attendants, e.g., midwives, should be well-qualified and be able to manage first-line complications;
- the ability to transfer to a nearby hospital with a maternity unit within 30 minutes is available and seamless; and
- appropriate risk assessment should occur throughout pregnancy to ensure there is an ongoing appropriate level of care.

State policies related to licensure; standards of care; reimbursement of birth centers, certified professional midwives, and hospitals; and regional and statewide planning can ensure these factors are in place.

Hospital setting

The NASEM report includes recommendations to improve hospital care, such as

- implementing quality improvement initiatives developed by national associations (in Maine, led by Perinatal Quality Collaborative for Maine);
- offering nonsurgical maternity care such as trial of labor after cesarean and planned vaginal twin birth;
- developing in-hospital low-risk midwifery-led units where hospital volumes can support such units;
- providing medical students and residents (obstetric and family medicine) training alongside midwives; and
- developing value-based maternity care payment models.

Numerous state and federal policies and funding can ensure these are in place.

Addressing the Needs of Closed Maternity Units

Prenatal and postpartum services

Some hospitals with closed maternity units have continued to provide prenatal and postpartum services using staff from the closest maternity unit hospital. Although such uses are viable options for some hospitals, there are potential downsides that can often be prevented or addressed. Commonly, the services are offered part-time and not frequently enough to accommodate patients' schedules (especially for low-income patients who have less control over their schedules). It also can become increasingly difficult to recruit and retain health professionals to provide care in a rural setting away from the delivery hospital. Finally, because of community perceptions that a part-time clinic is not fully staffed and

equipped, it may become known as less desirable, and people with resources may choose to travel to other sites, which further contributes to a downward spiral of pressures on the clinic (Radke et al. 2023).

Ongoing training and telehealth

When inpatient maternity services are closed, often there is no one left at the hospital who can fully handle obstetric emergencies. Therefore, ongoing training in those hospitals as well as telehealth support for staff in emergency departments and emergency medical services for obstetrical and neonatal emergencies are necessary. There should be efforts to ensure that generalist surgeons affiliated with the hospitals have training on emergency pregnancy-related surgeries such as cesarean sections and ectopic pregnancy surgeries. State or federal policies that can address these needs include those that set licensure and reimbursement standards for hospitals as well as funding for planning and training.

Supporting Rural Immigration

Reviewing the data about birth declines in rural Maine, knowing that Maine is the oldest state in the country, and recognizing we already have high workforce participation rates among those of peak working age,¹¹ one obvious long-term strategy for addressing the rural maternity workforce crisis is to recruit and support the immigration of young families to rural Maine, as part of an overall state economic and health strategic plan. Such recruitment could support sustainability of rural hospitals by providing more maternity patients as well as a much-needed workforce. The latter is also greatly needed across other economic sectors, and lack of a young workforce is impeding economic development in rural Maine (Myall 2023). Given the current prohibitions on international immigration, these strategies must be focused on domestic labor sources. Housing, schools, and non-healthcare-related jobs also need to be considered, along with the relative lack of racial and ethnic diversity in rural communities. But rural Maine also offers a lifestyle desired by many—outdoor activities in beautiful bucolic settings, strong social networks, good access to broadband, low crime rates, and few issues with traffic congestion or air pollution.

WHAT IS WORKING IN MAINE?

Many efforts in Maine are working to address rural maternal health issues. Here I present some

government-related examples; more information is available in the online [appendix](#). In 2022, MaineCare was expanded to include postpartum women earning up to 214 percent of federal poverty level (FPL) for 12 months after birth from the previous 60-day period. Newborns are now qualified with family earnings of up to 305 percent of FPL. Additionally, Maine Family Planning, as Maine's federal Title X recipient, has successfully maintained rural reproductive health clinics that provide a wide range of care, including preconception and early pregnancy care, sexually transmitted infection services, and contraceptives. However, current federal policies are severely threatening their ability to provide these services.¹²

Another program that addresses rural maternal health is the state's home visiting program. Funded by state and federal dollars and administered by Maine Families, this program offers home visits by certified professionals to assist families who are pregnant or with newborns and young children on topics such as health, nutrition, safety, development, and the family's overall well-being. Wabanaki Public Health and Wellness also administers home visits for some Tribal members. Maine also has public health nurses, a program started in 1920 to address maternal and infant mortality. The state's public health nursing program is administrated by the Maine CDC/DHHS. Although nurse numbers dwindled in the 2010s to fewer than 10, there are now 40–50 statewide. Public health nurses provide in-home or virtual nursing services to all prenatal and postpartum individuals and infants at no cost through the CradleME Program.¹³

At the community level, several Maine communities are hosting Community Baby Showers as a way to not only provide needed clothing and supplies, but also to provide a community of support for those expecting a baby. Many are partially funded by the Maine Children's Trust check off on state income tax forms and local prevention councils.¹⁴ Beyond this sample of efforts, there are numerous organizations (e.g., faith organizations, businesses, and nonprofits) that are stepping up to provide support for pregnant women and their families. These efforts can help knit a much-needed tightly woven caring community blanket. Indeed, everyone can play a role.

CONCLUSION

The rural maternity crisis has been simmering for years and is now nearing a boiling point, with more rural hospitals closing their maternity units, and

maternal as well as infant health outcomes worsening. Yet, unlike the frog in the fable, we are not trapped in the cauldron. We can act—and we must. The stakes extend far beyond obstetric services; rural maternal health is a bellwether for Maine’s future.

Maternal and infant health indicators have long served as the clearest measure of a society’s well-being. Infancy is the only time in life when we are guaranteed to be entirely dependent on others, and maternal health is the greatest determinant of infant health. The profound improvements in maternal and infant mortality (99 percent and 90 percent declines, respectively) during the last century transformed life expectancy across the United States, illustrating how powerful investments in maternal health can be.²⁷ The ripple effects of healthy pregnancies, healthy births, and healthy infants extend across the lifespan and across generations.

Addressing rural maternity also requires holding two truths at once. Pregnancy is not a disease and is most safely supported through holistic, relationship-centered models of care that meet families’ social and behavioral health needs. At the same time, pregnancy carries real risks, and rural hospitals must be equipped to respond to emergencies. Meeting both needs will require creativity: rethinking reimbursement and care-delivery models, strengthening the perinatal workforce, partnering across sectors, and aligning rural maternal health strategies with broader community social and economic development efforts. The work will also need to be continuously monitored to assure the efforts are finding the sweet spot of sufficient quality of perinatal care balanced with sufficient access to that care.

I remain optimistic. Maine has a long tradition of coming together to solve complex problems, and a growing coalition of communities, clinicians, policy-makers, and advocates are already working to strengthen rural maternity care. But lasting progress will require sustained commitment. Ultimately, Maine’s rural maternity crisis is shaped by two interdependent forces - the closure of rural maternity units and the worsening health challenges facing rural families. They will need to be tackled simultaneously, since neither can be solved in isolation.

With more than 60 percent of Mainers living in rural areas, this crisis touches the entire state. Rural maternal health is inseparable from Maine’s overall well-being, its workforce, its economy, and the health of future generations. In many ways, rural maternity care is a reflection of who we are and a predictor of who we will become.

Ensuring healthier pregnancies and births today is fundamental to ensuring a healthier Maine tomorrow.

NOTES

- 1 “Rural Populations in the United States,” America’s Health Rankings, https://www.americashealthrankings.org/explore/measures/pct_rural_b; “Population density in the U.S. by federal states including the District of Columbia in 2023,” Statista, <https://www.statista.com/statistics/183588/population-density-in-the-federal-states-of-the-us/>
- 2 “Maine,” US Census Bureau, <https://data.census.gov/profile/Maine?g=040XX00US23>
- 3 “2025 March of Dimes Report Card for Maine,” <https://www.marchofdimes.org/peristats/reports/maine/report-card>; “2025 March of Dimes Report Card for New Hampshire,” <https://www.marchofdimes.org/peristats/reports/new-hampshire/report-card>; “2025 March of Dimes Report Card for Vermont,” <https://www.marchofdimes.org/peristats/reports/vermont/report-card>
- 4 “Frequently Asked Questions,” National Center for Health Statistics, CDC, <https://www.cdc.gov/nchs/maternal-mortality/faq.htm>
- 5 “Pregnancy Risk Assessment Monitoring System (PRAMS),” Centers for Disease Control and Prevention, <https://www.cdc.gov/prams/index.html> (data from PRAMS were accessed July 17, 2025; data are not currently available from the website); “Neonatal Abstinence Syndrome in Maine,” America’s Health Rankings, <https://www.americashealthrankings.org/explore/measures/nas/ME>; “Data for Maine: Pre-pregnancy Depression by Medicaid Status: Maine, 2022,” March of Dimes, <https://www.marchofdimes.org/peristats/data?top=24&lev=1&stop=605&ftop=609®=99&sreg=23&obj=36&slev=4>
- 6 “Rural Health Care,” Texas Hospital Association, <https://www.tha.org/issues/rural-health-care/>
- 7 “About Us,” Maine Vaccine Board, <https://www.mevaccine.org/ui>
- 8 Medical Mutual Insurance Company of Maine, <https://www.medicalmutual.com/>
- 9 Appendix for this article: <https://doi.org/10.53558/tqnj1835>
- 10 “Transforming Maternal Health Model (TMAH),” Centers for Medicare and Medicaid Services, <https://www.cms.gov/priorities/innovation/innovation-models/transforming-maternal-health-tmah-model>
- 11 “Labor Force Participation,” Maine Development Foundation, <https://www.mdf.org/measures-of-growth/labor-force-participation/>
- 12 “Family Planning Association of Maine, Inc.,” US Department of Health & Human Services, <https://opa.hhs.gov/grant-programs/title-x-service-grants/current-title-x-service-grantees/maine-family-planning>; “About Us,” Maine Family Planning, <https://mainefamilyplanning.org/>; appendix for this article: <https://doi.org/10.53558/tqnj1835>
- 13 “Welcome to Maine Families,” Maine Families, <https://mainefamilies.org/index.asp>; “Tribal Home Visiting,” Wabanaki Public Health & Wellness, <https://wabanakiphw.org/departments/wabanaki-public-health/our-next-generation/maternal-child-health/tribalhomevisiting/>; “CradleMe,” <https://cradleme.org/>
- 14 “Community Baby Showers,” Maine Children’s Trust, <https://www.mechildrenstrust.org/babyshowers.asp>; Maine Prevention Council, <https://mainepreventioncouncils.org>
- 15 “Family Medicine Obstetrics Fellowship Programs,” American Board of Physician Specialties, <https://www.abpsus.org/family-medicine-obstetrics-fellowship-programs/>
- 16 “Midwife Medicaid Reimbursement Policies by State,” National Academy for State Health Policy, <https://nashp.org/state-tracker/midwife-medicare-reimbursement-policies-by-state/>

- 17 "Find a Doula," Dona International, <https://www.dona.org/what-is-a-doula-2/find-a-doula/>; "State Medicaid Approaches to Doula Service Benefits," National Academy for State Health Policy, <https://nashp.org/state-tracker/state-medicaid-approaches-to-doula-service-benefits/>
- 18 <https://nashp.org/state-tracker/state-community-health-worker-policies/maine/>

REFERENCES

- Busse, C.E., K. O'Hanlon, K.B. Kozhimannil, and J.D. Interrante. 2025. "Financial Challenges of Providing Obstetric Services at Rural US Hospitals." *Journal of Rural Health* 41(4): e70082. <https://doi.org/10.1111/jrh.70082>.
- CHQPR (Center for Healthcare Quality and Payment Reform). 2025. *Stopping the Loss of Rural Maternity Care*. https://chqpr.org/downloads/Rural_Maternity_Care_Crisis.pdf.
- CMS (Centers for Medicare and Medicaid). 2019. *Improving Access to Maternal Health Care in Rural Communities*. Issue Brief. <https://www.cms.gov/About-CMS/Agency-Information/OMH/equity-initiatives/rural-health/09032019-Maternal-Health-Care-in-Rural-Communities.pdf>.
- Chen, Yingxi, Meredith S. Shiels, Tarsicio Uribe-Leitz, Rose L. Molina, Wayne R. Lawrence, Neal D. Freedman, and Christian C. Abnet. 2025. "Pregnancy-Related Deaths in the US, 2018–2022." *JAMA Network Open* 8(4): e254325. <https://doi.org/10.1001/jamanetworkopen.2025.4325>
- Ehrenthal, Deborah B., Hsiang-Hui Daphne Kuo, and Russell S. Kirby. 2020. "Infant Mortality in Rural and Nonrural Counties in the United States." *Pediatrics* 146(5): e20200464. <https://doi.org/10.1542/peds.2020-0464>
- Gilburg, Mary Louise, Morgan McDonald, and Erin E. Sullivan. 2024. "Innovations in Rural Obstetrics to Maintain Access to Care." *Milbank Memorial Fund*, September 17, blog. <https://www.milbank.org/2024/09/innovations-in-rural-obstetrics-to-maintain-access-to-care/>.
- Gunja, Munira Z., Evan D. Gumas, Relebohile Masitha, and Laurie C. Zephyrin. 2024. *Insights into the U.S. Maternal Mortality Crisis: An International Comparison*. Commonwealth Fund, Issue Brief. <https://doi.org/10.26099/cthn-st75>.
- Harrington, Katharine A., Natalie A. Cameron, Kasen Culler, William A. Grobman, and Sadiya S. Khan. 2023. "Rural-Urban Disparities in Adverse Maternal Outcomes in the United States, 2016–2019." *American Journal of Public Health* 113(2): 224–227. <https://doi.org/10.2105/AJPH.2022.307134>
- Hoyert, Donna L. 2023. Maternal Mortality Rates in the United States, 2021. NCHS Health E-Stats. 2023. <https://doi.org/10.15620/cdc:124678>
- Hung, Peiyin, Katy B. Kozhimannil, Michelle M. Casey, and Ira S. Moscovice. 2016. "Why Are Obstetric Units in Rural Hospitals Closing Their Doors?" *Health Services Research* 51(4): 1546–1560. <https://doi.org/10.1111/1475-6773.12441>. Erratum in *Health Serv Res.* 53(3): 2005. <https://doi.org/10.1111/1475-6773.12865>.
- Keefe-Oates, Briana, Katherine Simmonds, Louisa H. Smith and Jeni Stollow. 2024. *Needs Assessment of the Obstetric Workforce in Maine's Rural Hospitals*. Maine Rural Maternity and Obstetrics Strategies (RMOMS) Network. <https://roux.northeastern.edu/story/needs-assessment-of-the-obstetric-workforce-in-maines-rural-hospitals/>.
- Keefe-Oates, Briana, Katherine Simmonds, Louisa H. Smith and Jeni Stollow. 2025. *Rural to Referral: Assessing the Obstetric Workforce Landscape in the State of Maine*. Maine Rural Maternity and Obstetrics Strategies (RMOMS) Network. <https://roux.northeastern.edu/story/rural-to-referral-assessing-the-obstetric-workforce-landscape-in-the-state-of-maine/>.
- Kern-Goldberger, Adina R. and Sindhu K. Srinivas. 2022. "Obstetrical Telehealth and Virtual Care Practices During the COVID-19 Pandemic." *Clinical Obstetrics and Gynecology* 65(1): 148–160. <https://doi.org/10.1097/GRF.0000000000000671>.
- Kozhimannil, Katy B., Peiyin Hung, Carrie Henning-Smith, Michelle M. Casey, and Shailendra Prasad. 2018. "Association Between Loss of Hospital-Based Obstetric Services and Birth Outcomes in Rural Counties in the United States." *JAMA* 319(12): 1239–1247. <https://doi.org/10.1001/jama.2018.1830>.
- Kozhimannil, Katy B., Julia D. Interrante, Lindsay K. Admon, and Bridget L. Basile Ibrahim. 2022. "Rural Hospital Administrators' Beliefs About Safety, Financial Viability, and Community Need for Offering Obstetric Care." *JAMA Health Forum* 3(3): e220204. <https://doi.org/10.1001/jamahealthforum.2022.0204>.
- Kozhimannil, Katy B., Julia D. Interrante, Caitlin Carroll, Emily C. Sheffield, Alyssa H. Fritz, Alecia J. McGregor, and Sara C. Handley. 2025. "Obstetric Care Access at Rural and Urban Hospitals in the United States." *JAMA* 333(2): 166–169. <https://doi.org/10.1001/jama.2024.23010>.
- Kozhimannil, Katy Backes, Julia D. Interrante, Carrie Henning-Smith, and Lindsay K. Admon. 2019. "Rural-Urban Differences in Severe Maternal Morbidity and Mortality in the US, 2007–15." *Health Affairs* 38(12): 2077–2085. <https://doi.org/10.1377/hlthaff.2019.00805>.
- Kozhimannil, Katy Backes, Stephanie A. Leonard, Sara C. Handley, Molly Passarella, Elliott K. Main, Scott A. Lorch, and Ciaran S. Phibbs. 2023. "Obstetric Volume and Severe Maternal Morbidity Among Low-Risk and Higher-Risk Patients Giving Birth at Rural and Urban US Hospitals." *JAMA Health Forum* 4(6): e232110. <https://doi.org/10.1001/jamahealthforum.2023.2110>.
- MFIMRP (Maternal, Fetal, and Infant Mortality Review Panel). 2024. *Maine's Maternal, Fetal, and Infant Mortality Review Panel 2023 Annual Report*. <https://www.maine.gov/dhhs/mecdc/about-us/commissions-review-panels/maternal-fetal-and-infant-mortality-review-panel>.
- MFIMRP (Maternal, Fetal, and Infant Mortality Review Panel). 2025. *Maine's Maternal, Fetal, and Infant Mortality Review Panel 2024 Annual Report*. <https://www.maine.gov/dhhs/mecdc/about-us/commissions-review-panels/maternal-fetal-and-infant-mortality-review-panel>.
- March of Dimes. 2025. *2025 March of Dimes Report Card for Maine*. <https://www.marchofdimes.org/peristats/reports/maine/report-card>.
- McMorrow, Stacey, Sarah Benatar, and Timothy J. Fisher. 2021. *Following Labor and Delivery Unit Closures in Rural New Hampshire, Driving Time to the Nearest Unit Doubled*. Urban Institute. https://www.urban.org/sites/default/files/publication/104985/following-labor-and-delivery-unit-closures-in-rural-new-hampshire-driving-time-to-the-nearest-unit-doubled_0.pdf.
- Meighan, Mary, Priyanka Das, and Andrea A. Creanga. 2023. "Perinatal Telemedicine at Lower-Level Birthing Hospitals in Maryland: Lessons Learned from a Landscape Analysis." *Minerva Obstetrics and Gynecology* 75(2): 93–102. <https://doi.org/10.23736/s2724-606x.21.04933-2>.

- Minion, Sarah C., Elizabeth E. Krans, Maria M. Brooks, Dara D. Mendez, and Catherine L. Haggerty. 2022. "Association of Driving Distance to Maternity Hospitals and Maternal and Perinatal Outcomes." *Obstetrics & Gynecology* 140(5): 812–819. <https://doi.org/10.1097/AOG.0000000000004960>.
- Myall, James. 2023. *State of Working Maine 2023: Boosting Maine's Workforce*. Maine Center for Economic Policy. <https://www.mecep.org/wp-content/uploads/2023/11/State-of-Working-Maine-2023-Report.pdf>.
- NASEM (National Academies of Sciences, Engineering, and Medicine). 2020. *Birth Settings in America: Improving Outcomes, Quality, Access, and Choice*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25636>.
- Niles, P. Mimi, and Laurie Zephyrin. 2023. "How Expanding the Role of Midwives in U.S. Health Care Could Help Address the Maternal Health Crisis." *Commonwealth Fund, Issue Briefs*, May 5. <https://doi.org/10.26099/3qm1-3914>.
- Owen, Andrew L., Alison Davis, and Simona Balazs. 2022. *County-Level Availability of Obstetric Care and Economic Implications of Hospital Closures on Obstetric Care*. Center for Economic Analysis of Rural Health, University of Kentucky. https://cearh.ca.uky.edu/sites/cearh.ca.uky.edu/files/final_obcare_cearh_policy_brief_july2022.pdf.
- Radke, Stephanie M., Laurel Smeins, Kelli K. Ryckman, and Thomas S. Gruca. 2023. "Closure of Labor & Delivery Units in Rural Counties Is Associated with Reduced Adequacy of Prenatal Care, Even When Prenatal Care Remains Available." *Journal of Rural Health* 39(4): 746–755. <https://doi.org/10.1111/jrh.12758>.
- Rector, Amanda, and Megan Bailey. 2025. "Are We There Yet? Changing Migration Patterns in Rural Maine and Implications for Long-Term Population Growth." *Maine Policy Review* 34(2): 33–43. <https://doi.org/10.53558/thpo2940>.
- Sandall, J., H. Soltani, S. Gates, A. Shennan, and D. Devane. 2016. "Midwife-Led Continuity Models Versus Other Models of Care for Childbearing Women." *Cochrane Database of Systematic Reviews* 4:CD004667. <https://doi.org/10.1002/14651858.CD004667.pub5>.
- Sugg, Margaret, Shishir Shakya, Sarah Ulrich, Jennifer Schroeder Tyson, and Jennifer Runkle. 2025. "Mapping Maternity Care Deserts: Driving Distance and Health Outcomes in North Carolina." *Journal of Rural Health* 41(2): e70020. <https://doi.org/10.1111/jrh.70020>.
- Sung, Sharon, Beverly A. Mikes, Daniel J. Martingano, and Heb Mahdy. 2025. "Personnel Chapter, Cesarean Delivery." In *StatPearls* [Internet]. Treasure Island, FL: StatPearls Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK546707/>.
- Taylor, Jamila, Anna Bernstein, Thomas Waldrop, and Vina Smith-Ramakrishnan. 2022. "The Worsening U.S. Maternal Health Crisis in Three Graphs." *The Century Foundation*, March 2. <https://tcf.org/content/commentary/worsening-u-s-maternal-health-crisis-three-graphs/>.
- Theiler, Regan N., Vanessa Torbenson, Jessica C. Schoen, Hollie Stegemann, Heather A. Heaton, Katy B. Kozhimannil, Jennifer L. Fang, and Annie Sadosty. 2024. "Virtual Obstetric Hospitalist Support for Obstetric Emergencies and Deliveries: The Mayo Clinic Experience." *Telemedicine and e-Health* 30(6): 1600–1605. <https://doi.org/10.1089/tmj.2023.0358>.
- Tikkanen, Roosa, Munira Z Gunja, Molly FitzGerald, and Laurie C. Zephyrin. 2020. "Maternal Mortality and Maternity Care in the United States Compared to 10 Other Developed Countries." *Commonwealth Fund, Issue Briefs*, November 18. <https://doi.org/10.26099/411v-9255>.
- Transforming Maternal Health Model (TMaH), Centers for Medicare and Medicaid Services (CMS). <https://www.cms.gov/priorities/innovation/innovation-models/transforming-maternal-health-tmah-model>.
- Waldman, Hailey, and Alexandra Zimmerman. 2024. *Maternal health in Rural America*. National Rural Health Association White Paper. <https://www.ruralhealth.us/nationalruralhealth/media/documents/advocacy/white%20paper/maternal-health-in-rural-america-white-paper-final.pdf>.
- US GAO (Government Accountability Office). 2022. *Maternal Health: Availability of Hospital-Based Obstetric Care in Rural Areas*. GAO-23-105515. <https://www.gao.gov/assets/gao-23-105515.pdf>.
- White House. 2022. White House Blueprint for Addressing Maternal Health Crisis. <https://bidenwhitehouse.archives.gov/wp-content/uploads/2022/06/Maternal-Health-Blueprint.pdf>.
- Woodward Rivers, Emily S. Mazure, Charles M. Belden, Sheri Denslow, Jill Fromewick, Suzanne Dixon, William Gist, and Margaret H. Sullivan. 2023. "Association of Prenatal Stress with Distance to Delivery for Pregnant Women in Western North Carolina." *Midwifery* 118:103573. <https://doi.org/10.1016/j.midw.2022.103573>.
- Woolf Steven H., and Derek A. Chapman. 2024. "Excess US Deaths Attributable to High All-Cause Mortality Rates Among Youths Aged 0 to 19 Years." *JAMA Pediatrics* 178(9): 942–944. <https://doi.org/10.1001/jamapediatrics.2024.1869>.

Dora Anne Mills is a public health physician and pediatrician who was raised in Farmington, Maine, and practiced medicine in Tanzania, Los Angeles, and Farmington, before leading the Maine Center for Disease Control from 1996 to 2011, then serving as a vice president at the University of New England. Since 2018 she has worked at MaineHealth as the Chief Health Improvement Officer, overseeing their public health efforts. She currently serves as the principal investigator on a federally funded grant (RMOMS) that addresses some rural maternity challenges. This paper represents her personal views.