Access to Maternal Healthcare in Virginia

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This study investigates access to maternal healthcare in Virginia, focusing on several methods to evaluate geographical barriers. Since 2012, Virginia has experienced a 25% reduction in birthing hospitals, which has led to increased travel distances for many residents, correlating with higher rates of severe maternal morbidity and preterm births. Medicaid expansion has improved healthcare coverage for eligible women during pregnancy and postpartum, though disparities remain, particularly in urban areas where access to care is complicated by provider availability. Data reveal that while urban areas have more healthcare professionals, this does not necessarily translate to better access to prenatal care. Efforts by the Virginia Neonatal Perinatal Collaborative (VNPC) through the CDC LOCATe[SM] program aim to assess and enhance hospital capacity and care coordination. Understanding and addressing barriers to maternal healthcare can provide guidance for fostering better health outcomes for the future.

Background

- As of August 2024, Virginia has 49 birthing hospitals recognized by the Virginia Neonatal Perinatal Collaborative (VNPC).
    - This is about a 25% decrease from 68 birthing hospitals in 2012.
    - From 2021-2023, approximately 96% of inpatient deliveries were from women that live within 25 miles of a birthing hospital.[8]
- In 2018, Virginia lawmakers passed a Medicaid expansion bill to include coverage throughout pregnancy to 12 months postpartum.[12]
- Data have identified about 2,500 providers and nurses specializing in maternal and infant healthcare in Virginia.[5]
    - Of these, 70% of providers and 63% of nurses are enrolled for Medicaid reimbursement.[7]

Introduction

Maternal health deserts can be defined as geographic areas that have limited access to maternal healthcare services. This limited access in large part is due to environmental barriers experienced in these regions. March of Dimes has previously reported that "30.8% of Virginia counties are maternity care deserts compared to 32.6% in the US".[4] They also reported that 14.8% of Virginians had no birthing hospital within a 30-minute drive compared to 9.7% in the US. Examining geographical barriers is essential in identifying maternal health deserts, though definitions of care deserts may vary between organizations.

Since 2012, 19 hospitals in Virginia have closed their doors for maternity care, so the number of births per hospital has increased. Data from the Virginia Pregnancy Risk Assessment Monitoring System (PRAMS) show that of respondents who had trouble accessing care 33.1% reported no transportation as a barrier to prenatal care, and 9.1% reported no transportation as a barrier to postpartum care.[11] 45.4% of PRAMS respondents who had trouble accessing care also reported not being able to get an appointment as a barrier to prenatal care, and 33.1% had an appointment too late. Prenatal and postpartum care are vital parts to maternal healthcare system, and it is important to better understand these barriers to mitigate risks.

Methods

The data for this report were compiled from several sources that capture information on Virginia deliveries, births, and nurse/provider license status. Since maternal care deserts are not clearly defined, this report highlights key methods to quantify and analyze access to maternal and infant care. The collected data were analyzed using Statistical Analysis Software (SAS) and Tableau, with interactive maps available online (see appendix).

Virginia Birthing Hospitals

The Virginia Neonatal Perinatal Collaborative (VNPC) maintains an updated list of all currently open birthing facilities in Virginia. As of September 2024, there are 49 active birthing facilities in the state. Data for these hospitals include address/geospatial information, hospital names, and annual birth volumes reported to the VNPC as part of quality improvement projects.

Virginia Nurses and Doctors

Data on Virginia nurses and doctors were obtained from the Virginia Department of Health Professions (DHP), which includes a publicly accessible database of active medical and nursing licenses.[5] The extracted licenses cover specialties such as OB/GYN, Maternal Fetal Medicine (MFM), Neonatal, Women's Health, Midwifery, and In-Vitro Fertilization—healthcare specialties likely to engage in maternal and infant care. This dataset, extracted in February 2024, includes professional license information, occupation, name, email, address, and specialty.

Additional data, also extracted February 2024, were sourced from the Virginia Medicaid – Department of Medical Assistance Services (DMAS) database, which lists "all active, enrolled Virginia Medicaid providers, their service locations, and revitalization dates."[7]

The DHP data were deterministically linked with DMAS data by matching Soundex codes for first and last names, with matches manually reviewed for accuracy. However, this approach has limitations, including potential inconsistencies due to name changes, misspellings, or common names, and the inability to determine whether a provider's address represents their home or practice location.

Virginia Hospital Deliveries

Data on inpatient hospital deliveries were extracted from the Maternal Health Dashboard for the years 2021 to 2023, the three most recent full years of available data.[8] The Maternal Health Dashboard, developed by the VNPC and the Virginia Hospital and Healthcare Association (VHHA), tracks clinical trends in hospitalization data. It includes all inpatient births in Virginia identified by a Diagnosis Resource Group (DRG) code for cesarean or vaginal deliveries, using UB-04 hospital discharge data submitted to the VHHA under the Patient Level Data System Act of 1993.[9] This dataset excludes out-of-hospital births and births by out-of-state residents have been excluded from analysis, with maternal residence approximated by the center points of ZIP codes.

Virginia Medicaid-Supported Births

The VNPC collaborated with DMAS to extract data on Medicaid-supported births in Virginia, identifying infants born to women who were enrolled in Virginia Medicaid during the 2022 calendar year.[6] This data aimed to capture births where Medicaid might not have been recorded as the primary payment source in vital records but where the birthing woman was covered by Medicaid in the year preceding the birth. These records represent the most recent data available from DMAS on Medicaid-supported births.

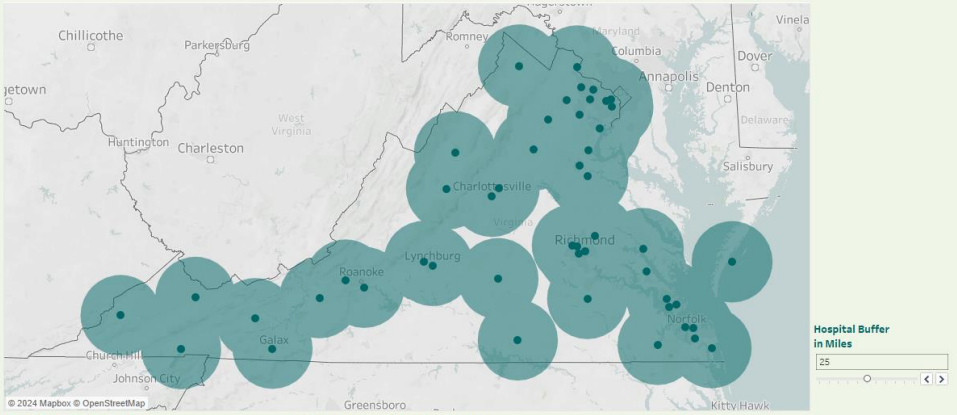
Objective

The overall objective of this report is to demonstrate how currently available data in Virginia can be utilized to analyze access to maternal and infant healthcare. Methods used in this analysis include examining geographical distance barriers, assessing the maternal and infant health workforce, and evaluating the capacity of Virginia hospitals. These approaches help to identify key areas where access to care may be limited and provide insights into potential improvements for maternal and infant health services across the state.

Virginia Birthing Hospitals

Virginia Birthing Hospitals and Inpatient Deliveries

Virginia inpatient deliveries 2021-2023.



Residence Inside Hospital Buffer	
Count	243,396
Percent of Deliveries	95.90%
Preterm (<37 Weeks)	9.95%
SMM Rate per 10k Deliveries	140.22

Residence Outside Hospital Buffer	
Count	10,411
Percent of Deliveries	4.10%
Preterm (<37 Weeks)	12.08%
SMM Rate per 10k Deliveries	167.13

Total for Virginia	
Count	253,807
Percent of Deliveries	100.00%
Preterm (<37 Weeks)	10.04%
SMM Rate per 10k Deliveries	141.33

Figure 1

Virginia has 49 birthing hospitals recognized by VNPC in September 2024. As previously stated, this number is down 19 from the 68 birthing facilities seen in 2012. That marks about a 25% decrease in facilities where women can give birth in Virginia. Figure 1 (highlighted above) is mapping each of these birthing facilities. The figure is also showing a "Hospital Buffer" of 25 miles around each hospital to highlight population differences that live closer vs farther away.

The data are showing in figure 1 that 95.90% of Virginia hospital deliveries are from women that live within 25 miles of a birthing hospital. Please note, distance is approximated based on the "center" of the maternal residential zip code to the hospital address, and distance is measured as a straight line between the two points. Deliveries from inside the 25-mile buffer zone also have slightly below average rates for preterm delivery (9.95%) and Severe Maternal Morbidity (140.22 per 10k deliveries). For more information on the used definition of SMM[2] see the appendix.

On the opposition, deliveries with a maternal residence that occurred outside this 25-mile hospital buffer are seeing higher rates for preterm delivery (12.08%) and SMM (167.13 per 10k deliveries). Deliveries further than 25 miles account for 4.10% of all inpatient Virginia deliveries.

The map in figure 1 has also been made available online (see appendix) where the hospital buffer zone can be changed to further assess this relationship. Only 1.09% of deliveries occurred from outside a 40-mile buffer, but they had an increased preterm rate (12.67%) and SMM rate(183.52). The inverse of this relationship is seen as we look at deliveries inside a smaller buffer zone. Inside a 10-mile buffer are 78.27% of deliveries with lower rates of preterm delivery (9.93%) and SMM (138.33 per 10k deliveries).

SMM increases with minimum distance to nearest birthing hospital.

Virginia SMM per 10k deliveries, 2021-2023.

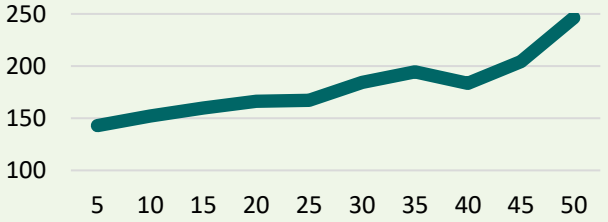


Figure 2 Minimum Distance to Hospital (Miles)

These data highlight the correlation between maternal and infant health outcomes with the geographical distance between home and hospital. Figure 2, above, is visualizing this correlation whereas the buffer zone increases, deliveries had a longer minimum distance to the nearest birthing hospital with higher SMM rates.

Virginia Maternal & Infant Health Professionals

Virginia Maternal & Infant Health Professionals by County/Locality

Medical and Nursing licenses active February 2024

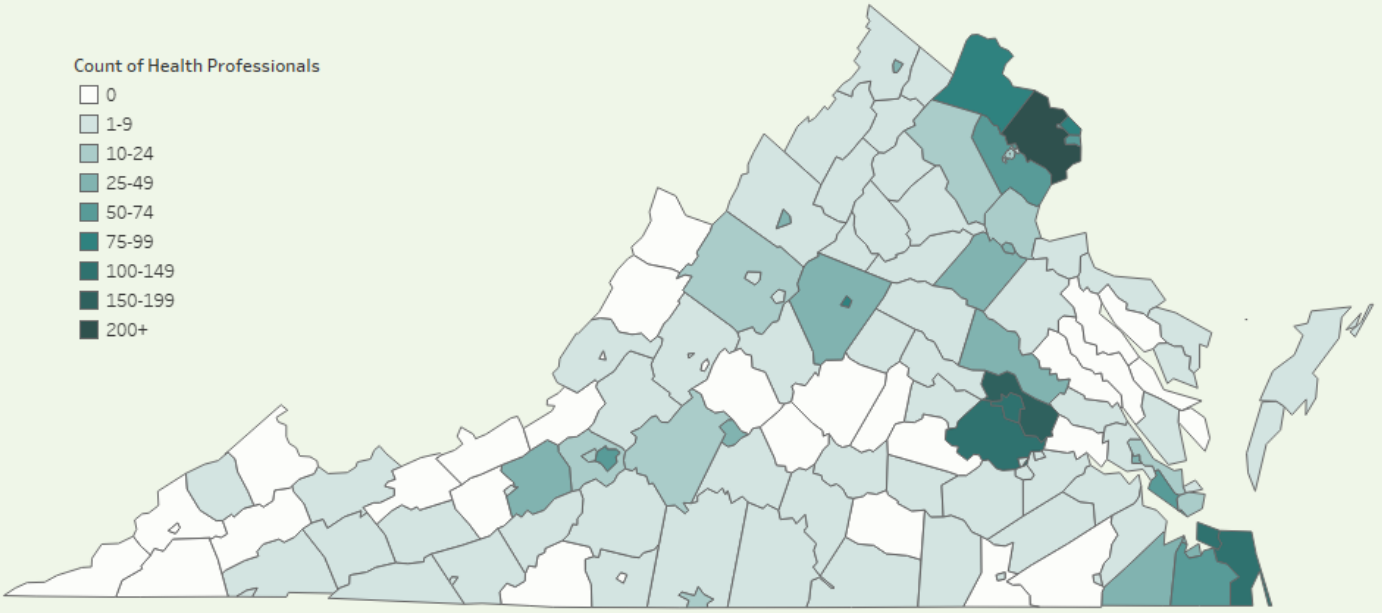


Figure 3

Data gathered from the Virginia Department of Health Professions (DHP)[5] identified 1,684 doctors with active licenses with a specialty focused on maternal and infant health (MIH). Of these 1,684 doctors, 1,177 were also identified to be enrolled with DMAS for Virginia Medicaid reimbursement.[7] Additionally, there are 824 nurses specializing in maternal and infant care with active licenses in Virginia. Of those 824 nurses, 523 were enrolled for Virginia Medicaid reimbursement. MIH specialties have been broken down into 6 main categories: OB/GYN, MFM, Neonatal, Women's Health, Midwife, and In-Vitro.

These data are highlighting about 69.89% of MIH doctors and 63.47% of MIH nurses are enrolled for Medicaid reimbursement. This is important for Medicaid patients since approximately 38% of Virginia hospital deliveries identified Medicaid as the primary payment source in 2023.[7] These results are consistent with national estimates showing 74.3% of physicians accepting payments for new Medicaid Patients in 2017.[3]

It is important to echo some of the limitations laid out in the methods section as well. This analysis is operating under that assumptions that license data are correctly representing professional specialties, and that all Virginia providers enrolled in Medicaid reimbursement are also represented appropriately. The license data from DHP were deterministically linked to DMAS reimbursement eligibility data by matching first and last names for each record by use of Soundex codes. Data inconsistencies are possible with this linkage due name misspellings or changes, but the nature of the matching and manual data review attempts to control for these. Without more identifiers in the data, inconsistencies are a possibility, meaning more MIH doctors and nurses may be enrolled for Medicaid reimbursement than are represented here.

Figure 3, seen above, is showing a map of all identified MIH doctors and nurses in Virginia show by county/locality. This map also has interactive functions that can be accessed online (see appendix). Users can evaluate the distribution of providers broken down into occupation, specialty, and Medicaid enrollment status, and different geographical boundaries can be selected. The distribution and locations of MIH professionals is important to the evaluation of maternal health deserts. Not all professionals are practicing in hospitals, and this reflects that idea as there are professionals in areas that are more than 25 miles from a hospital.

Virginia Deliveries vs Maternal Health Professionals

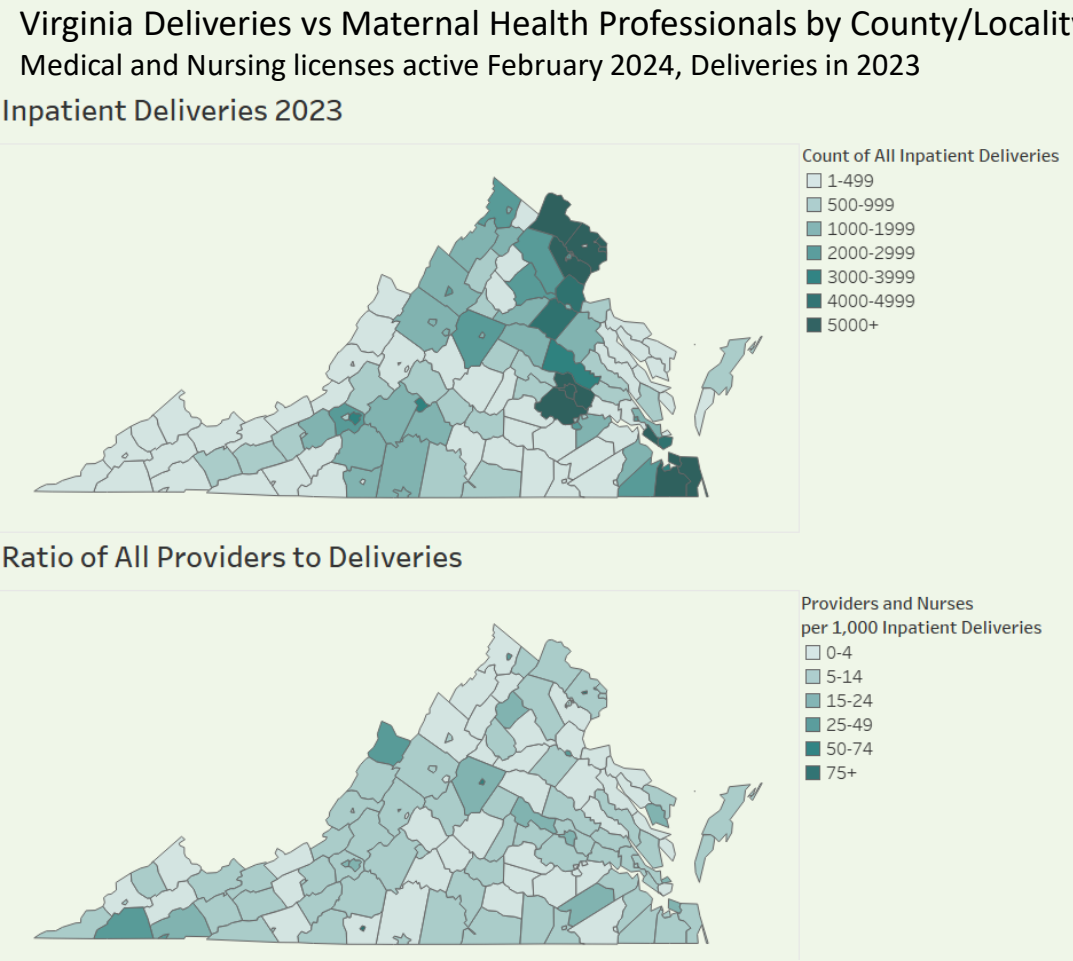


Figure 4

Another important way to consider access to maternal healthcare in Virginia is to analyze how many providers and nurses are available to patients. So far, the data have identified MIH providers in Virginia to the approximately 85,000 hospital deliveries in 2023.[8]

Figure 4, seen above, is depicting the quantitative relationship between professionals and deliveries. The data show Virginia inpatient deliveries are most dense around major cities: Washington DC, Richmond, and Norfolk which, similarly, showed a higher density for MIH professionals. This relationship has been quantified in the number of professionals per 1,000 deliveries.

This ratio of professionals shows a more inverse relationship to professional and delivery density as counties/localities with fewer deliveries/professionals generally have higher ratios. Some counties in southwest Virginia have fewer than 500 deliveries with a ratio of more than 75 professionals per 1,000 deliveries. Also, many metro areas have lower ratios despite their being more professionals and hospitals.

These results highlight that there can also be challenges getting access to care even for women that live near birthing hospitals. PRAMS data from 2018-2021 reflect that of respondents who had trouble accessing care 47% of Urban respondents reported not being able to get an appointment as a barrier to prenatal care compared to 27.7% of Rural respondents.[11] When considering postpartum care, 10.7% of Urban respondents reported no transportation as a barrier to care compared to 0.4% in Rural respondents.

This shows the importance of considering other factors affecting access to maternal healthcare beyond distance to a hospital or healthcare professional.

Virginia Medicaid Births vs Maternal Health Professionals

Virginia Medicaid Births vs Maternal Health Professionals by County/Locality

Medical and Nursing licenses active February 2024, Births in DMAS CY 2022

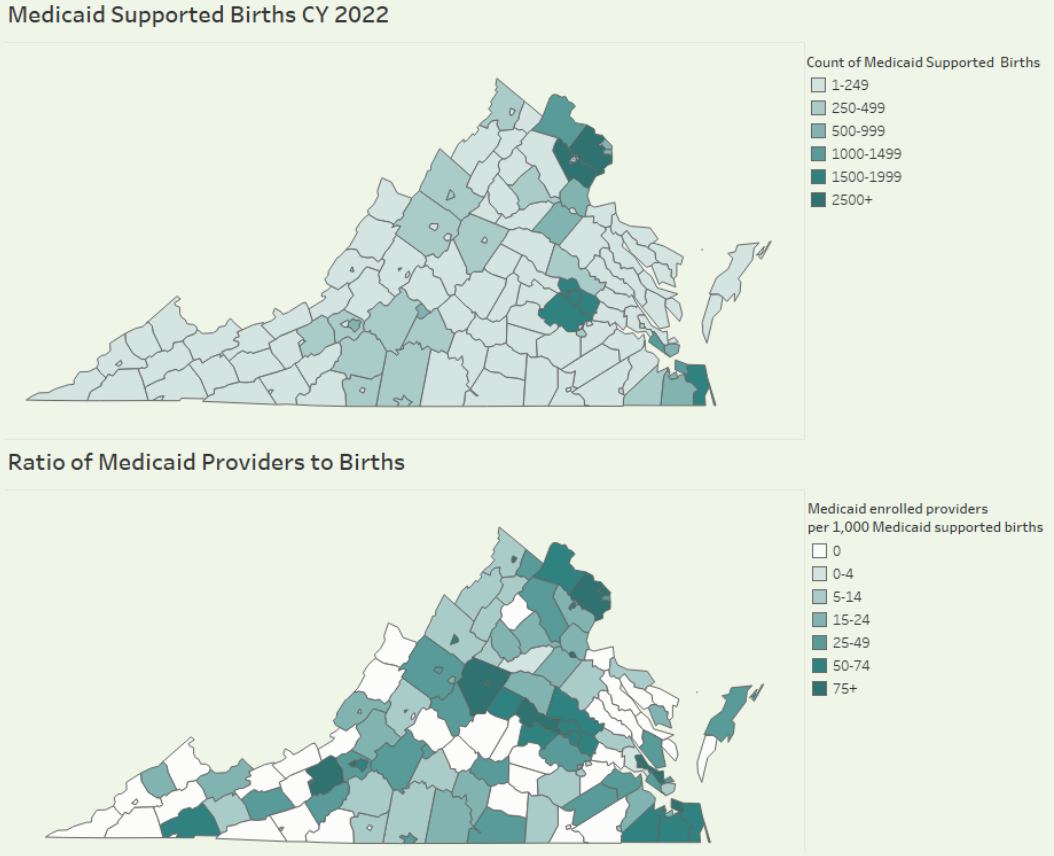


Figure 5

Building on the analysis from figure 4, Figure 5 shown above is depicting similar maps that are only focused on Medicaid supported births[6] and providers that are enrolled for Medicaid reimbursement. Looking at the map of Medicaid births, there is also a clear trend of a higher density of births around metros: Washington DC, Richmond, and Norfolk. Hospitalization data show that Medicaid supported deliveries represent roughly 37% of all deliveries in 2023.[8] This is over a 6% increase from 35% of deliveries in 2017.

In 2018, Virginia lawmakers passed a bill for Medicaid expansion. This expansion includes coverage throughout pregnancy up to 1 year postpartum for eligible women.[12] With expanded Medicaid coverage, and usage it is also important that the workforce taking care of these patients can keep pace with the increases.

The map of the ratio of Medicaid providers to births highlights that Medicaid births have more favorable ratios compared to all inpatient deliveries. Many counties have 75+ Medicaid providers per 1,000 births with better ratios around metro areas. Additionally, Northwest and Southwest Virginia have better ratios for Medicaid births than all deliveries in rural counties.

Based on more favorable ratios for Medicaid births, it should be expected that there are fewer barriers to care. PRAMS data for respondents that had trouble accessing care show 20.1% of Medicaid respondents reported not being able to get an appointment as a barrier to prenatal care compared to 47.8% of privately insured respondents.[11] 9.7% of Medicaid respondents reported no money/insurance as a barrier compared to 16.1% in private insured respondents. Medicaid respondents reported not having transportation or being too busy as the most common barriers to prenatal and postpartum care.

CDC Levels of Care Assessment Tool℠ (CDC LOCATe℠)

The Virginia Neonatal Perinatal Collaborative in partnership with the Virginia Hospital and Healthcare Association Foundation (VHHAF) have been conducting a survey project (LOCATe) for birthing hospitals to better to ensure that hospitals understand maternal and infant health care services available in Virginia.

The CDC defines LOCATe as: "a strategy to ensure that maternal and infant populations get the right care in the right place at the right time. To provide a consistent approach to assessing risk-appropriate care, CDC developed the CDC Levels of Care Assessment Tool."[1]

Hospital are asked to self assess their levels before surveys are used by the CDC to assess their level of Maternal and/or Neonatal care on a scale of 1 to 4. LOCATe was developed by the CDC using the most recent guidelines from the American Academy of Pediatrics (AAP), the American College of Obstetricians and Gynecologists (ACOG), and the Society for Maternal-Fetal Medicine (SMFM). Each hospital is given recommendations for how they can improve their quality of care.

In its most recent report, the Virginia Maternal Mortality Review Team (MMRT) has identified Coordination of Care as one of its recommendation themes for improvement in maternal and infant healthcare.[10] Care coordination is important to ensure that women in Virginia can get the appropriate care to fit their needs. Higher risk patients may need a higher-level hospital to accommodate their condition, and it is important that facilities know where to appropriately send patients.

The first wave launched in 2022 with 16 participating facilities, and 18 facilities in the second wave in 2023. The VNPC is currently working on the third wave of facilities with the hopes of 100% participation statewide. Current hospital level counts can be seen in table 1. The data highlight that many hospitals self-assessed at a level higher than was determined by the CDC showing the importance for hospitals to understand their own capabilities.

These data can kickstart collaboration among health agencies and policymakers to establish guidelines for care coordination and ensure hospitals understand their own capacity. This can also help identify regions lacking adequate resources or specialized staff for potentially high-risk patients. Gaining a deeper knowledge of the capabilities of Virginia's birthing hospitals will be crucial for assessing access to maternal and infant healthcare in the future.

Better understanding and collaboration between hospitals can aid in the provision of the best care for their patients. Understanding their limits can allow hospitals to know when and where to transfer patients to increase the likelihood of better health outcomes.

Maternal Level	Count Self Assessed	Count CDC Assessed	Neonatal Level	Count Self Assessed	Count CDC Assessed
4 – Regional Perinatal Health Care Center	4	3	4 – Regional NICU	4	2
3 – Subspecialty Care	11	1	3 – NICU	16	8
2 – Specialty Care	15	12	2 – Special Care Nursery	11	19
1 – Basic Care	6	17	1 – Well Newborn Nursery	3	8
N/A	2	5	N/A	4	1

Table 1

Discussion

This report highlights several key factors in evaluating access to maternal care, including the geographical distance to birthing hospitals, the capacity of the maternal and infant health workforce, the capacity of the Medicaid maternal health workforce, and the overall hospital capacity and level of maternal care. The data reveal that increased distances from birthing hospitals are associated with higher rates of Severe Maternal Morbidity and preterm births. Since 2012, Virginia has experienced a 25% reduction in the number of birthing hospitals, which has placed a greater burden on the remaining facilities and limited the options for Virginians to access maternal and infant health care.

2018 Medicaid expansion in Virginia supports eligible women by providing coverage for prenatal care to one year postpartum.[12] Since its implementation, the proportion of Medicaid-supported deliveries has increased by about 6%.[8] Moving forward, it is crucial that the maternal and infant health workforce is equipped to provide care to those with Medicaid. Figures 4 and 5 illustrate that the ratios of Medicaid-enrolled professionals to births are generally more favorable than the ratios of overall professionals to deliveries. This finding is supported by Virginia PRAMS data, which shows that respondents with private insurance were more likely to report challenges with provider availability for prenatal care compared to Medicaid patients.[11]

Professional ratios also indicate that urban areas with higher numbers of deliveries and healthcare professionals did not necessarily have better ratios of providers to patients. Virginia PRAMS data reflect that urban respondents reported more difficulty scheduling prenatal care appointments than their rural counterparts.[11] This suggests that reduced geographic distance to a birthing hospital does not always translate to better access to maternal and infant care. To accurately identify maternal health deserts, it is essential to consider a broader range of social and environmental factors beyond just distance.

Ongoing efforts by the VNPC focus on assessing hospital capacity and development through the CDC LOCATe[SM 1] program, which assigns an infant and maternal care level to each participating hospital. This initiative is critical for identifying hospitals and regions in Virginia that may lack the necessary resources to care for high-risk maternal and infant patients. The goals of the LOCATe[SM 1] program are to inform Virginia hospitals about their capabilities and the capabilities of nearby facilities, thereby enhancing care coordination across the state. This work supports the fundamental principle that all pregnant and postpartum women and infants deserve access to appropriate care at the right time, regardless of geographical or logistical barriers.

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Appendix

Key Definitions

Birthing Hospital: A hospital with a Labor & Delivery (L&D) unit and the necessary licensure (if available), staff, and training to provide obstetric care, regardless of the number of annual births. A L&D unit is a hospital unit dedicated to providing antepartum, intrapartum, and postpartum care. Please note that this does not include freestanding birth centers (a healthcare facility for low-risk childbirth that is not located within a hospital).

Inpatient Delivery: From an inpatient hospital record where a delivery was identified according to Diagnosis Resource Group (DRG) for vaginal and cesarean deliveries. Each inpatient delivery is representative of 1 birthing woman regardless of the number of infants born.

Live Birth: From vital records birth certificate data where each live birth is representative of a live born infant. This number will be higher than deliveries due to birth plurality where there may be several births to 1 delivery.

Severe Maternal Morbidity[2]: Unexpected outcomes of labor and delivery that can result in significant short- or long- term health consequences. Often time described as a "near miss" for maternal mortality. SMM is calculated from a standardized list of 21 clinical indicators with corresponding diagnosis and procedural ICD-10 codes. These data are extracted from in hospital delivery discharge data. Based on CDC recommendations, records citing only blood transfusions as the cause for SMM have been removed from analysis. In 2023, acute renal failure, acute respiratory distress syndrome, and disseminated intravascular coagulation marked the leading causes of SMM in Virginia.[8]

Further Explanation of Levels of Care

Level	Maternal (from ACOG)[1]	Neonatal (from AAP)[1]
4	Regional Centers: For the most critical cases, offering the highest level of care with extensive resources and expertise.	Regional NICU: Offers the highest level of care, including advanced surgical procedures and care for the most complex and critically ill newborns.
3	Subspecialty Care: For severe complications, with subspecialists and comprehensive medical and surgical care.	NICU: Provides comprehensive care for very ill or premature newborns, including advanced respiratory support and minor surgeries.
2	Specialty Care: For moderate- to high-risk pregnancies, with specialized staff and equipment for more complex conditions.	Specialty Care Nursery: Offers care for moderately ill newborns or those who need a brief period of intensive care.
1	Basic Care: For low- to moderate-risk pregnancies, handling routine care and minor complications.	Basic Care: Provides care for healthy newborns and can stabilize ill newborns until they can be transferred to a higher-level facility.

Virginia Birthing Hospitals & Deliveries, Figure 1

Virginia Maternal & Infant Professionals, Figure 3

All Providers – Deliveries, Figure 4

Medicaid Providers – Births, Figure 5