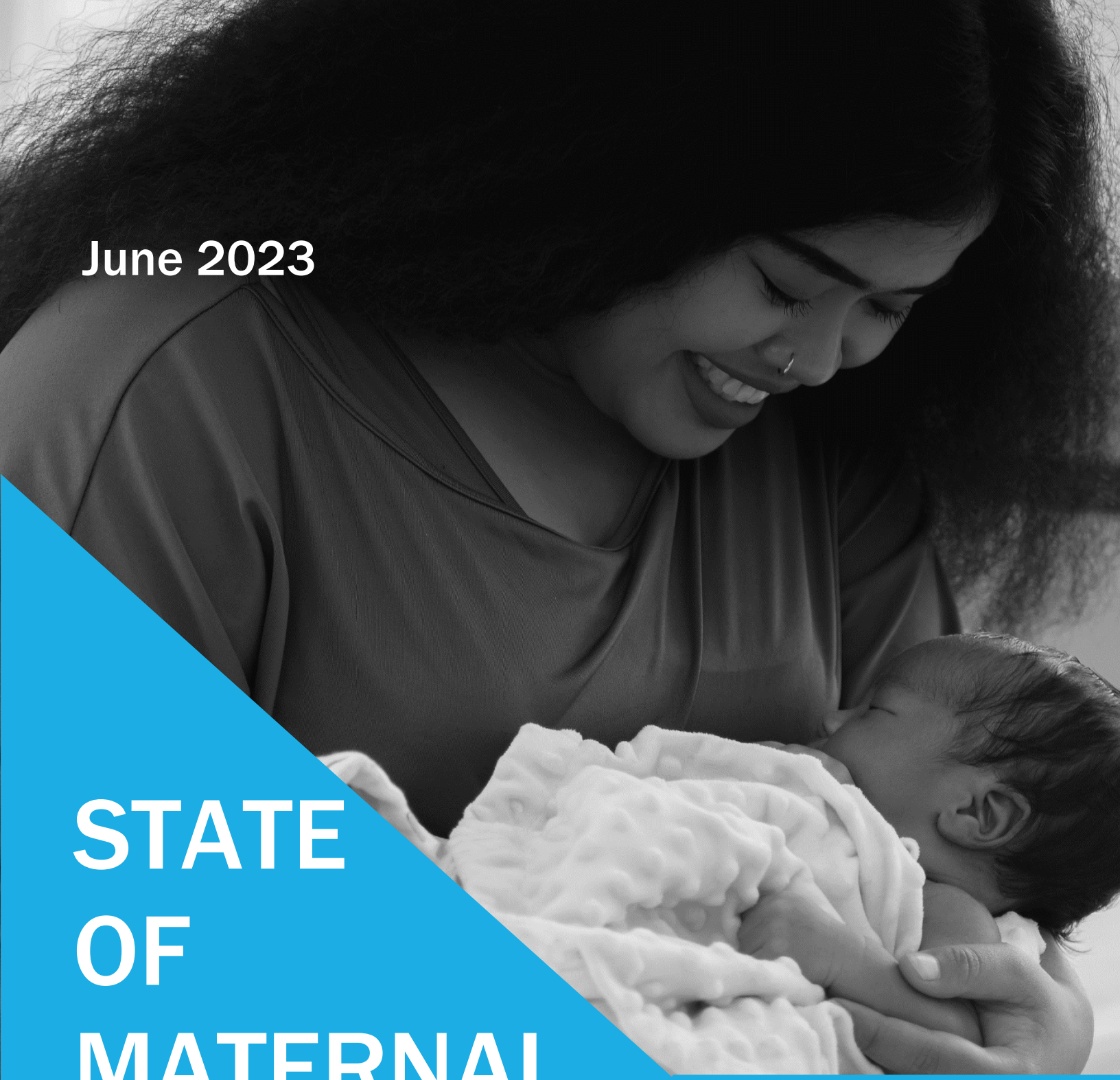


June 2023

STATE OF MATERNAL HEALTH

New Hampshire

NNEPQIN
Northern New England Perinatal Quality Improvement Network

NHPQC
New Hampshire Perinatal Quality Collaborative

Housed at Dartmouth Health

NH DIVISION OF
Public Health Services
Department of Health and Human Services

Table of Contents

Executive Summary

In June of 2022, the executive branch of the federal government released the *White House Blueprint for Addressing the Maternal Health Crisis* (hereinafter the Blueprint).[1] The Blueprint acknowledges nationwide disparities most prevalent among women who identify as Black/African American or American Indian and Alaskan Native (AIAN) as well as those residing in rural areas.[1] The COVID-19 pandemic adversely contributed to maternal health outcomes especially related to perinatal mood and anxiety disorders (PMAD).[1] The federal executive team developed five actionable goals which encompass the maternal health experience in the United States. They include: 1) Increasing access to and coverage of comprehensive maternal health services; 2) Ensuring birthing people are heard and improving accountability in systems of care; 3) Advancing data collection, standardization, transparency, research, and analysis; 4) Expanding and diversifying the perinatal workforce and; 5) Strengthening economic and social support during the perinatal period.[1]

New Hampshire (NH) hosted 12,159 live births to in-state and out-of-state residents (i.e., occurrent births[i]) of the 3.6 million live births occurring nationally in 2022.[2] The total resident births was 12,072 while out of state births born in NH were 1,383. Clinical care indicators of maternal health status include women receiving adequate prenatal care (86.8%, 2019-2022) and low risk cesarean deliveries[ii] (28.4%, 2022).[3] Mental health was the leading contributing factor to pregnancy associated overdose related deaths which occurred between 2017-2021 in New Hampshire; substance overdose was the leading cause of death among pregnancy associated deaths.[4] These findings reflect a growing need for comprehensive maternal substance use/mental health screening and treatment services in the state.[4] Between 2017-2021, 32 maternal deaths occurred among New Hampshire residents, 17 of which were categorized as pregnancy-related (see **Glossary**).[4] The rates of Severe Maternal Morbidity (SMM), among NH occurrent births,

[i] Occurrent births: live births that occurred in NH to both in-state and out-of-state residents

[ii] Cesarean deliveries (aka C-sections) can prevent injury and death in women and infants at higher risk of complicated deliveries however C-sections are linked to increased risk of infections and poor outcomes for women who are low risk. Scheduled C-Sections for low-risk women can be an indicator of long travel time to birthing facility. The 28.4% statewide rate is limited to occurrent (all births in NH) hospital births.

increased significantly from 2020-2021. Adult respiratory distress syndrome was the third leading cause of SMM in 2021..[5] The other leading causes of SMM were Blood Transfusions, Disseminated Intravascular Coagulation (DIC), Hysterectomy and Acute Renal Failure (ARF).

In recent years, the New Hampshire Pregnancy Risk Assessment Monitoring System (PRAMS), funded by the CDC, has made great strides in increasing data collection and representation of state level interests in maternal health via survey for the purpose of improving public health practice and outcomes. Recent PRAMS selected survey topics include preconception health, maternal mental health, and tobacco use. In addition to the PRAMS surveys, vital records data provided by the NH Division of Vital Records Administration (NHDVRA), hospital discharge data (HDD), and publicly accessible sources such as County Health Rankings are presented in this report to best describe existing knowledge of maternal health outcomes and experiences in NH.

The pregnancy experience in New Hampshire is influenced by circumstances including rural obstetric service closures and shortages as well as social determinants impacting access to care and quality of care for birthing people. The nationwide goals for improving maternal health represent similar areas of need in New Hampshire. Understanding how New Hampshire's maternal health resources must evolve to meet the changing needs of its community is an important step in the path forward to reducing disparity and adverse health outcomes during pregnancy. In this report, the latest projects and data on NH maternal health will be presented as it relates to the five goals outlined by the Blueprint to describe the unique needs and characteristics of birthing people, identify gaps in knowledge and maternal health disparities, and produce actionable recommendations. This report is intended to describe New Hampshire's Department of Health and Human Service's (NH DHHS), Maternal and Child Health section and collaborating partners' commitment to decreasing rates of maternal mortality and morbidity, reducing disparities in maternal health outcomes, and improving the overall pregnancy, birth, and postpartum experience for birthing people across the state.

Introduction

Between 2018-2022, NH hosted an average of 10,800 births to in-state residents (**Table 1**).[3] In maternal health statistics, birth data are typically grouped as resident or occurrent births. Occurrent births, births that occur in NH regardless of mother's state of residence, are typically used to describe the systems perspective, that is, the components that contribute to health outcomes for this group can be impacted by changes to health systems within the state. Resident births, births to NH residents, regardless of where they occurred, alternatively, more closely indicate the public health perspective through the lifespan model which focuses on stability and changes in behaviors/exposures that occur throughout the lifetime. During 2022, there were 12,159 occurrent births in NH and 12,073 resident births, (**Table 1**).[3]

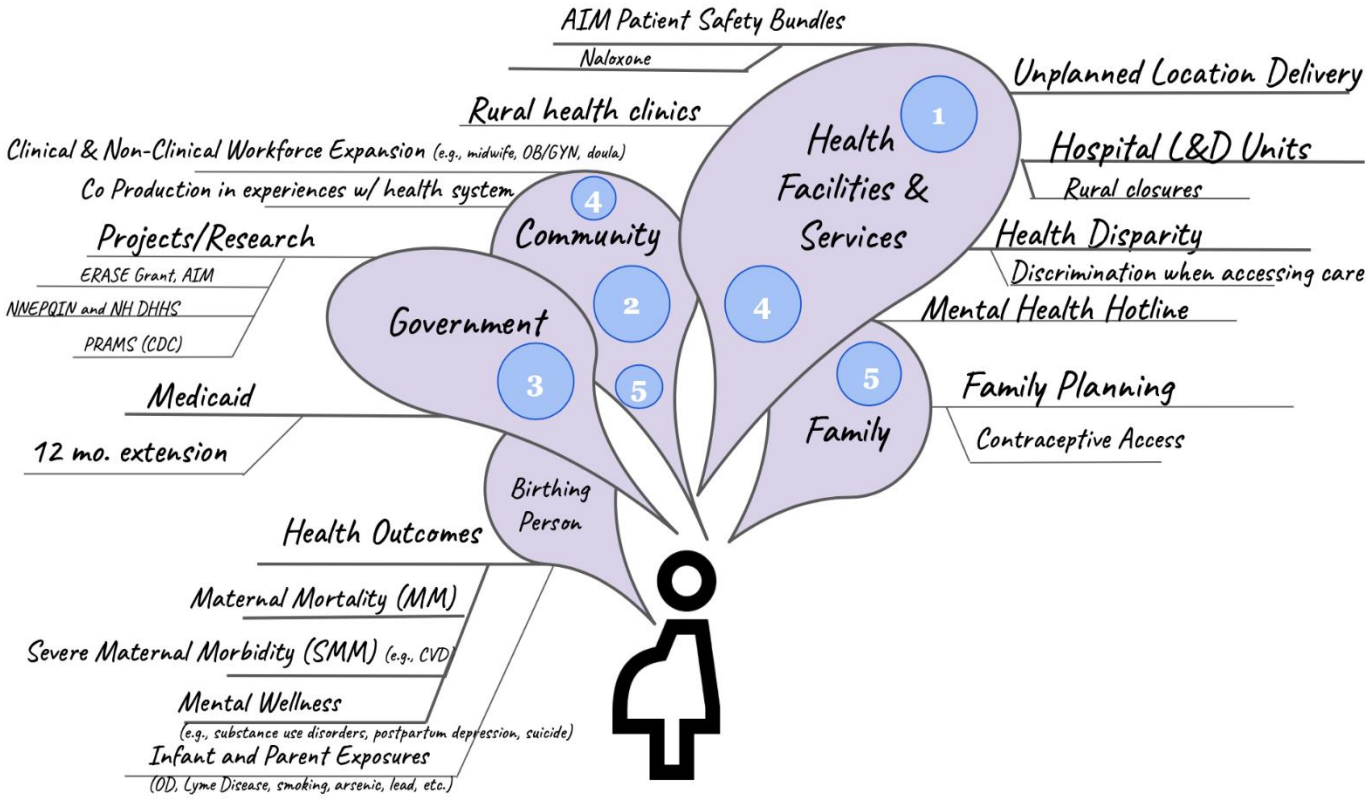
Table 1. NH Birthing Population, Occurrent, and Out-of-State Resident Births (2018-2022)

Year	2018		2019		2020		2021		2022	
	Count	%	Count	%	Count	%	Count	%	Count	%
NH residents born in NH	10,736	89.8	10,637	89.9	10,598	89.9	11,257	89.3	10,776	89.2
NH residents born out of state	1,223	10.2	1,183	10.1	1,182	10.1	1,354	10.7	1,296	10.8
Grand total	**11,959**	100	**11,820**	100	**11,780**	100	**12,611**	100	**12,072**	100
Non-NH residents born in NH	1,241		1,189		1,244		1,413		1,383	
VT residents	599	48.3%	633	53.2%	617	49.6%	723	51.2%	697	50.4%
ME residents	380	30.6%	344	28.9%	354	28.5%	408	28.9%	404	29.2%
MA residents	218	17.6%	181	15.2%	227	18.2%	250	17.7%	247	17.9%
Other state/ country residents	44	3.5%	31	2.6%	46	3.7%	32	2.3%	35	2.5%

According to 2022 data, the majority of NH resident births (71.6%) were paid by private insurances followed by Medicaid (21.5%).[3] The remaining births (6.9%) were financed either through self-pay (2.4%), other payers (2.0%), an unknown source (1%), other government (0.9%), or the NH Children's Health Insurance Program (CHIP) (0.5%).[3] Non-NH residents who gave birth in NH accounted for about 11.4% (n=1,383) of occurrent births in 2022, and most of this group resided in Vermont (**Table 1**).[3]

An adaptation of the social ecological model (SEM) depicts the categories pertaining to the maternal health experience in New Hampshire below (See **Figure 1**). The birthing person is depicted as the focal point of the graphic to emphasize the importance of patient involvement via shared decision making in accessing and receiving health services. Determinants, including payor and socioeconomic-status, are associated with adverse health outcomes including SMM in NH. Other listed elements include Maternal Health (MH) programs and MH resources such as the Alliance for Innovation on Maternal Health (AIM) patient safety bundles and ongoing research/projects to improve data collection and transparency across the state on maternal health indicators.

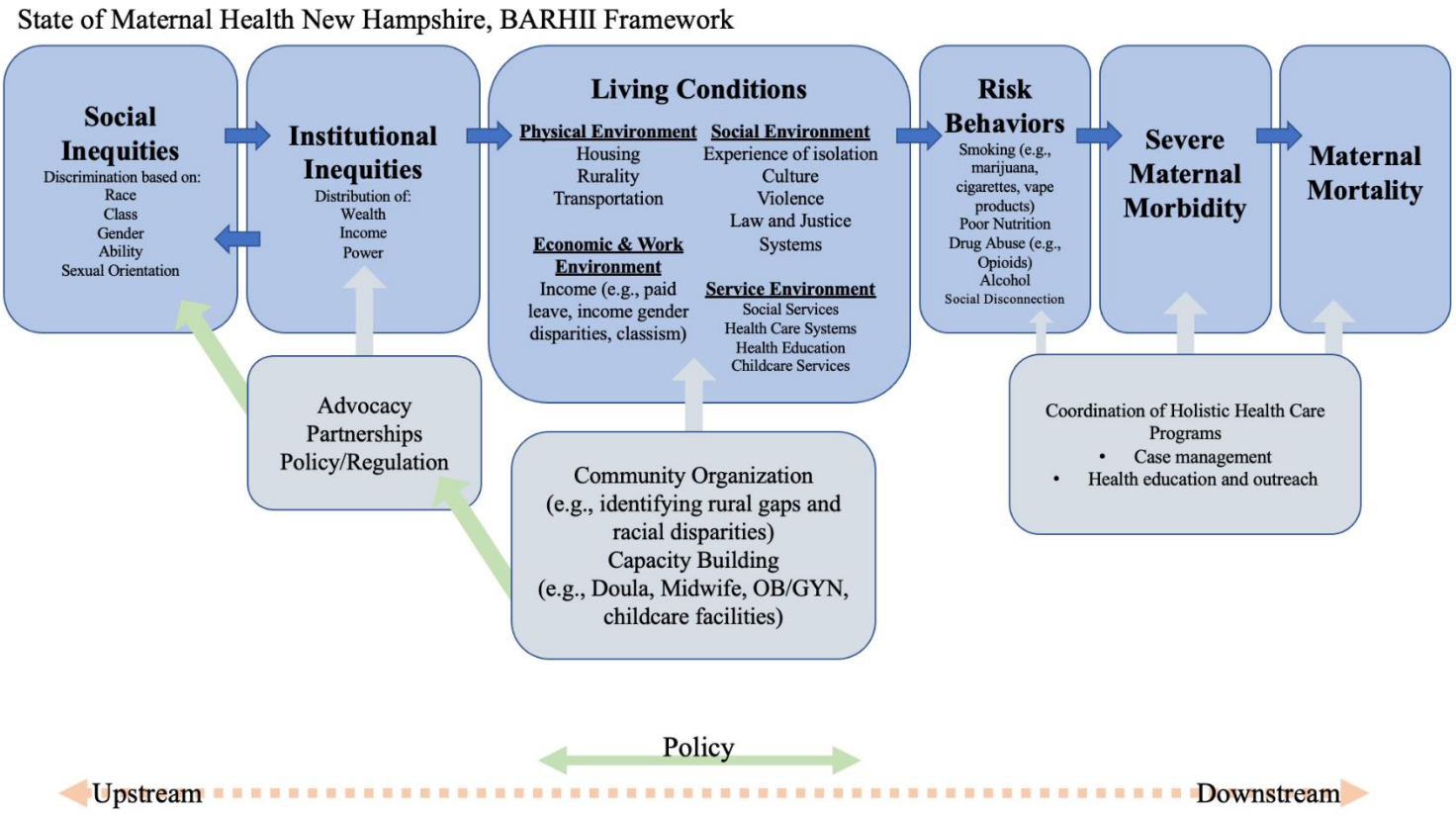
Figure 1. Framework: Social Ecological Model of Maternal Health in New Hampshire (2023)



Above, the birthing person is depicted as having five primary spheres of influence on maternal health related outcomes (i.e., individual birthing person, government, community, family, and health facilities and services). Each blue numbered circle within the five primary purple thought bubbles indicates where the White House Blueprint Goals for maternal health interact with and support the social ecological model of health. In New Hampshire, as across the US, both rural closures of labor and delivery units and mental wellness are top concerns.*CVD-Cardiovascular Disease e.g. eclampsia. *Medicaid will be adding compensation for doulas and donor milk.

The conceptual map in (**Figure 2**) depict the complex interrelationship of health determinants and health systems on birthing people in New Hampshire. The Bay Area Regional Health Inequities Initiative (BARHII)[iii] public health model was adapted for this report on NH maternal health The BARHII model illustrates the secondary and tertiary contribution of influence from policy, social and institutional inequities, and living conditions on maternal health outcomes including maternal mortality (MM) and severe maternal morbidity (SMM).

Figure 2. Framework: Bay Area Regional Health Inequities Initiative

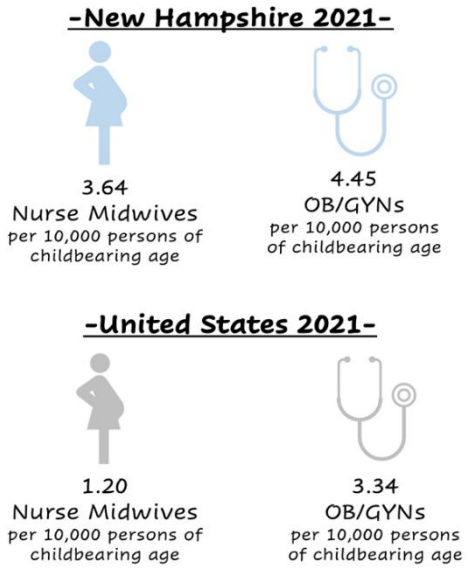


The above diagram has been adapted from the BARHII public health model. Arrows demonstrate the interaction and influence of social determinants on downstream individual and group level health outcomes. Source: Bay Area Regional Health Inequities Initiative. Copyright 2020. Accessed January 04, 2022. https://www.barhii.org/barhii-framework

[iii] https://barhii.org/framework/

Goal 1: Increase Access to and Coverage of Comprehensive High-Quality Maternal Health and Maternal Behavioral Health Services

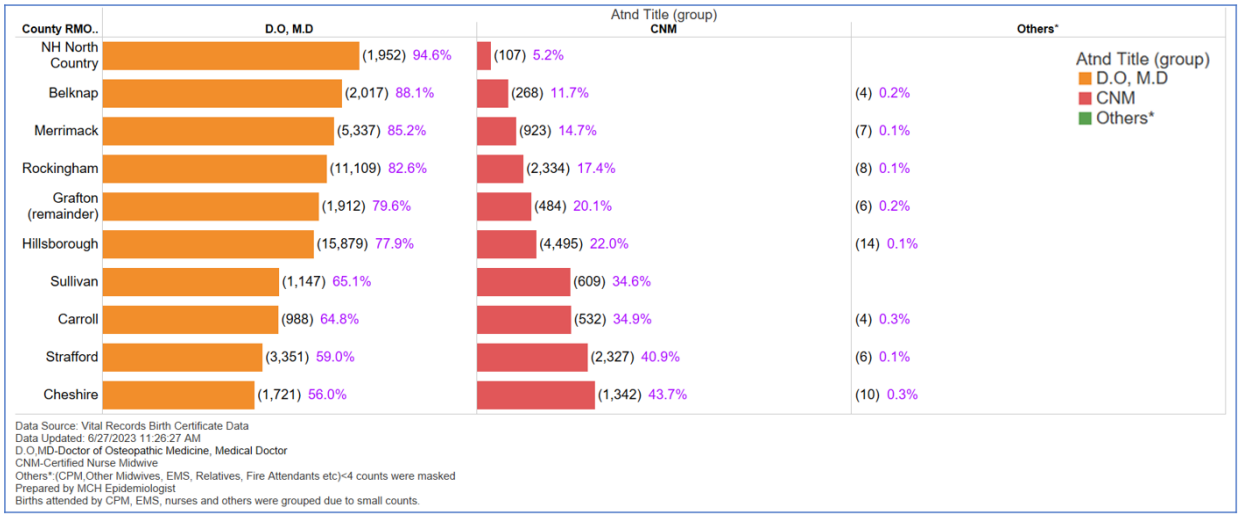
Figure 3. OB/GYN and CNM Coverage NH 2021



Data: USBLS, March of Dimes, & WHO
Data graphic & analysis: MCH Intern

To meet the needs of birthing people in New Hampshire, maternal health resources extend beyond the hospital and OB/GYN sphere to comprehensive family planning, adequate prenatal care, pregnancy, and post-partum services including behavioral health services. NH has a more resourced nurse midwife and OB/GYN workforce per 10,000 persons of childbearing age than the national average (see **Figure 3**).[6-8] In 2021, 26.7% of occurrent births were attended by certified nurse midwife (CNM) across NH and 71.0% of occurrent births were attended by either an MD or DO **(Figure 4).**[9] In 2021 within three NH hospitals, the proportion of CNM attended births exceeded 50% in 2021.[9] A recent publication by King suggest that CNM attendance at birth can increase maternal experiences of comprehensive high-quality birthing care and reduce adverse health outcomes for mothers.[10] Continued expansion of both clinical and nonclinical workforce capacity is further described in **Goal 4**. Similarly, doula care is also associated with lower rates of cesarean delivery.[11] However, data on births and pregnancies attended by doulas in NH is not available.

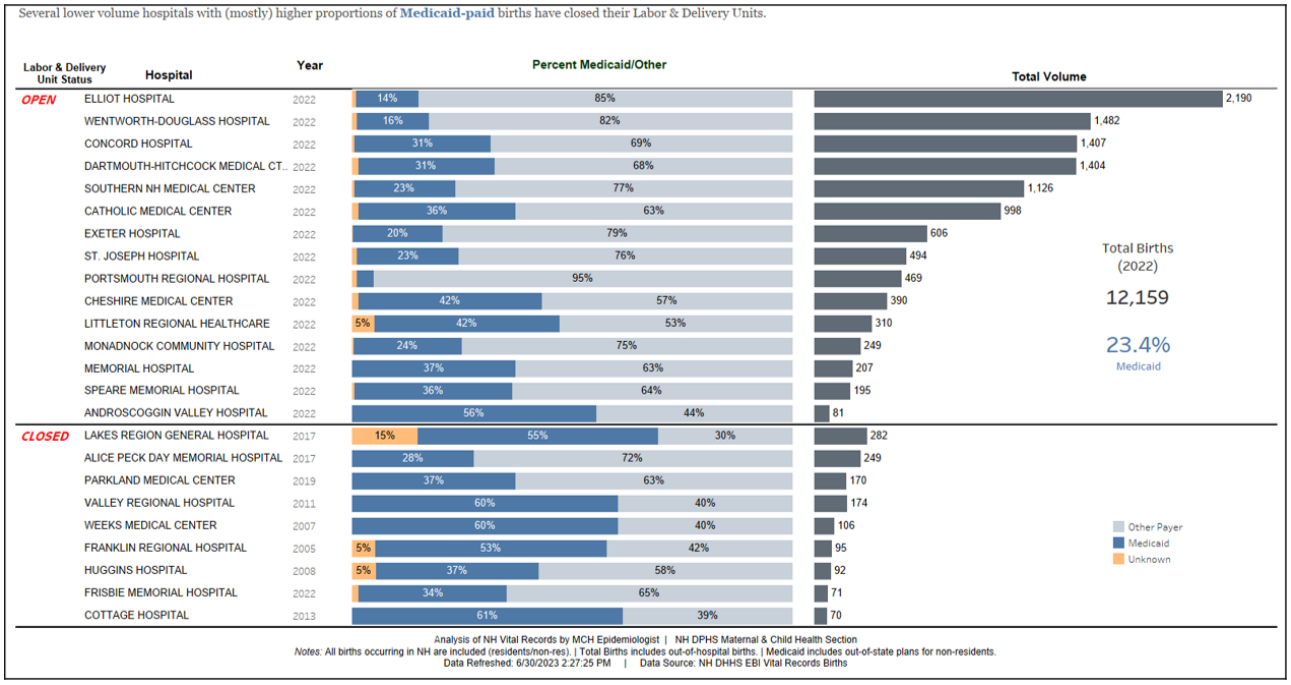
Figure 4. Birth Attendant by Mother's County of Residence, 2019-2022 NH Resident Births



Labor and Delivery Closure and Unplanned Birth Locations

Across the state, just 15 of the 25 labor and delivery units serving the area since 2000 remain open (see **Figures 5**). In rural NH, nine hospitals have closed their labor and delivery units since 2000 leaving five birthing hospitals operational and creating maternity deserts. The closures were largely because of financial pressures and quality concerns associated with declining birth rates in rural regions.[12,13] In birthing hospitals which have closed their L&D units, the majority of births occurring in NH were paid by Medicaid **Figure 5**.[3]

Figure 5. NH Occurrent Births by Open and closed Hospitals, Payer and Birth Volume.

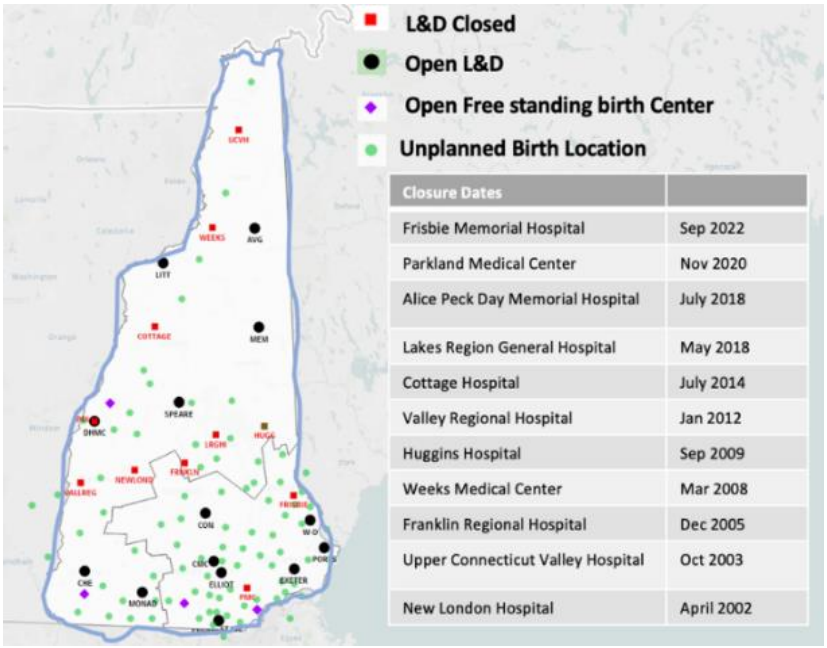


Additionally, most births which occurred in unplanned locations happened either at home (unplanned) or enroute to the nearest open L&D, (**Figure 6 and 7**).[3] The rate of unplanned location births for 2020-2022 was 4.8 per 1,000 live births in rural NH[iv],[v] as compared to 2.9 per 1,000 live births in urban NH.[3] Those covered by private insurance had a smaller rate (2.3 per 1,000 live births) of unplanned birth location as compared to those who paid for their deliveries using Medicaid (5.1 per 1,00 live births) or other payment methods (9.8 per 1,000 live births).[3]

A recent study reported the median driving time to the nearest labor and delivery (L&D) unit increased from 18 to 39 minutes after closures across eight hospitals.[12] The share of pregnant people who lived more than 30 minutes from an open L&D unit increased from 20.2 percent in 2000 to 27.3 percent in 2018. [12] Reduced proximity to an open unit was associated with an increased probability of attending fewer prenatal care visits than is recommended and giving birth enroute to the hospital or having an unplanned home birth.[12]

[iv] https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html
[v] Rural vs Urban NH designation is mapped using NH rural geo-spatial data.

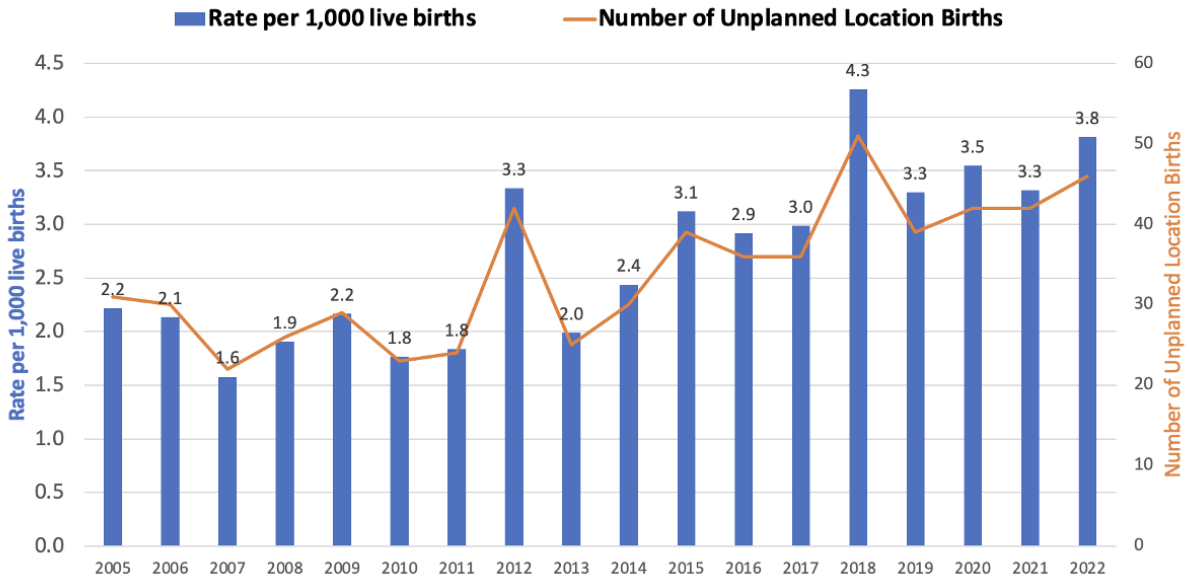
Figure 6. Unplanned Birth Location and L&D Unit Closures (2018-2022)



Closure Dates	
Frisbie Memorial Hospital	Sep 2022
Parkland Medical Center	Nov 2020
Alice Peck Day Memorial Hospital	July 2018
Lakes Region General Hospital	May 2018
Cottage Hospital	July 2014
Valley Regional Hospital	Jan 2012
Huggins Hospital	Sep 2009
Weeks Medical Center	Mar 2008
Franklin Regional Hospital	Dec 2005
Upper Connecticut Valley Hospital	Oct 2003
New London Hospital	April 2002

. The mapped unplanned birth locations include home-unplanned, enroute, clinic/doctor's office and non-L&D hospitals by residential zip code.
Data Source: NH Birth Certificate Vital Records Data Analysis: NH DHHS DPHS MCH Section

Figure 7. Unplanned Location Births Occurring in New Hampshire Over Time

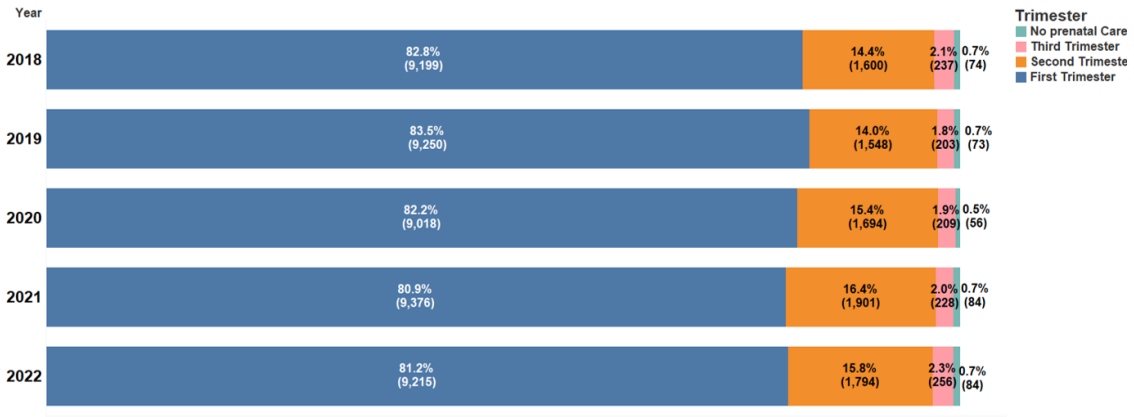


Since 2005, the rate and number of unplanned location births has increased on average overtime.
Data Source: NH Birth Certificate Vital Records Data. Data Analysis: NH DHHS DPHS MCH Section

Prenatal Care Utilization

Prenatal care is an important indicator of access which provides an understanding of resource utilization, enabling the perinatal health system to identify areas potentially managing resource strain or areas where health systems are resourced but underutilized. Between 2018-2020 83.9% of NH residents who gave birth began prenatal care (i.e., any medical care received during pregnancy) in the first trimester on average (**Figure 8**), however disparities exist by race, especially for Black/ African American, Native American/Alaskan Native birthing people who were more likely to begin prenatal care in the second trimester than the state average overall. **(**See **Figure 9).** During 2020 and 2021, the proportion of birthing people initiating prenatal care during the second trimester of pregnancy (i.e., weeks' 13-26 gestation) increased to 15.4% and 16.4% respectively after residing within 14.4% between 2018-2019 (**Figure 8**). COVID19 may have resulted in the observed late entry to prenatal care as previous studies have reported similar findings[vi].

Figure 8. Trimester of Prenatal Care Initiation (NH Resident Births)



Data Source: NH Vital Records || Data Analysis: MCH Epidemiologist

Among full term births in NH between 2020-2022, significantly more birthing people who received less than 10 prenatal care visits resided in rural areas (31.8%) as compared to those in urban NH (16.5%). Attending less than 10 prenatal care visits was more common among both rural and urban substance use exposed birthing people than their non-substance exposed rural

[vi] Goyal, M., Singh, P., Singh, K., Shekhar, S., Agrawal, N., & Misra, S. (2021). The effect of the COVID-19 pandemic on maternal health due to delay in seeking health care: Experience from a tertiary center. International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics, 152(2), 231–235.

and urban counter parts. The disparity in prenatal care visit count between rural and non-rural residents was more pronounced among non-substance exposed people. **Figure 10** shows that significantly more rural birthing residents entered prenatal care at the second trimester as compared to those residing in urban NH.

Figure 9. Trimester of Prenatal Care Initiation by Maternal Race, NH Residents 2018-2022

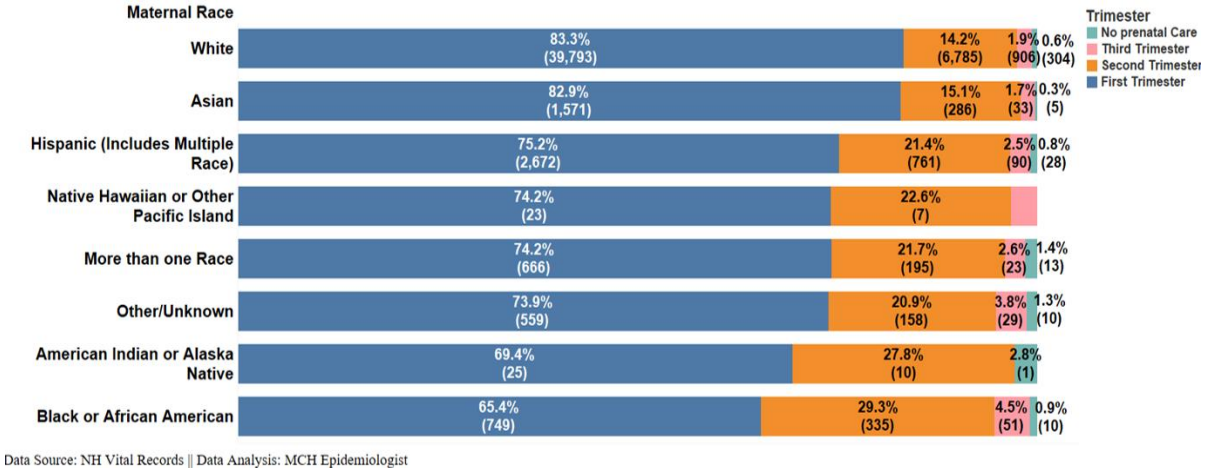
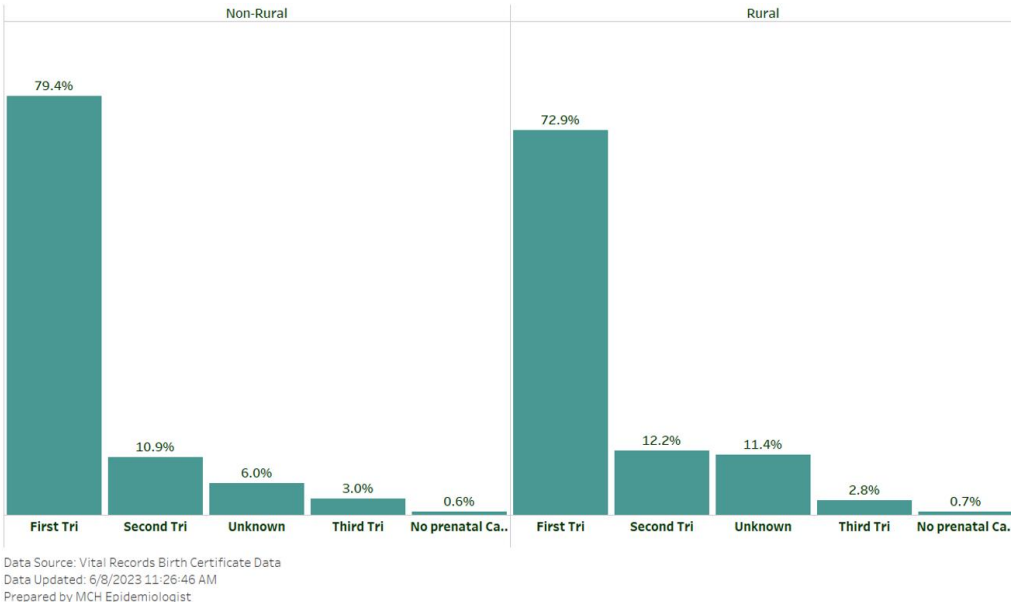


Figure 10. Timing of First Prenatal Care Visits by Mother's Residence (2020-2022)



Prenatal care utilization was also assessed using Kotelchuck Index (Adequacy of Prenatal Care Utilization Index (APNCU). Between 2019-2022 86.8% of birthing people in NH received adequate or adequate plus prenatal care, compared to 74.7% nationally in 2020 while 13.1% received intermediate or inadequate prenatal care (**Table 2**).

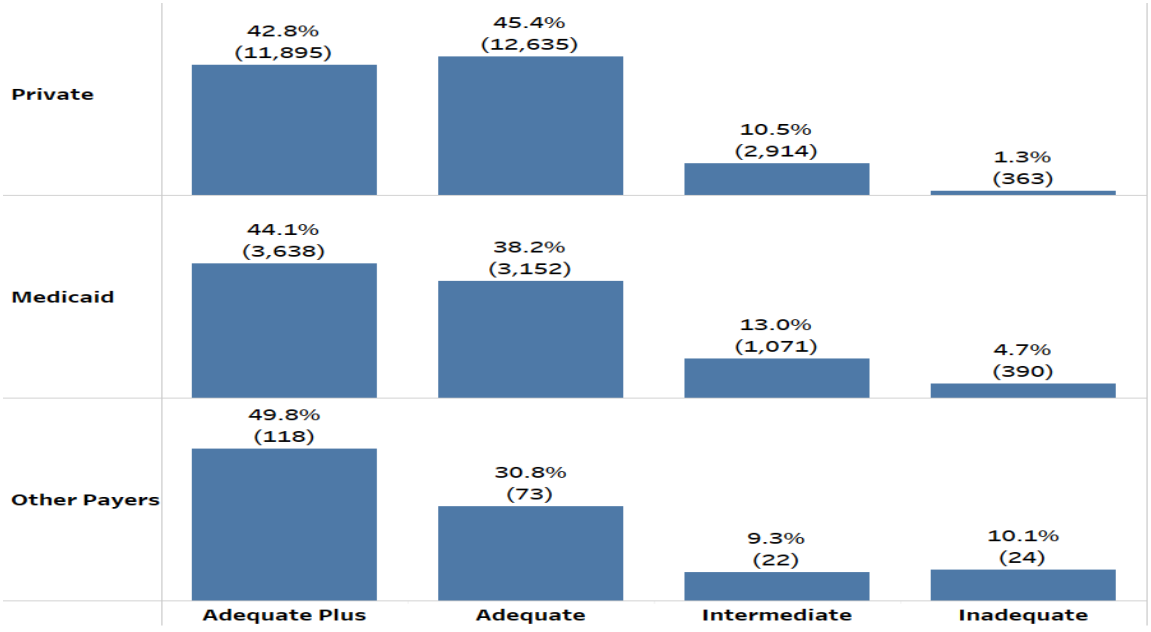
Table 2. Adequacy of Prenatal Care

Adequacy of Prenatal Care, NH Resident Births (2019-2022)		
	Count	%
Adequate Plus	15,651	43.1
Adequate	15,860	43.7
Intermediate	4,007	11.0
Inadequate	777	2.1

Data Source: NH Birth Certificate Vital Records Data

Inadequate and intermediate levels of prenatal care were lowest on average between 2019 and 2022 for other payer and Medicaid groups, 19.4% and 17.7% respectively, compared to privately insured birthing people of whom 11.8% received inadequate or intermediate prenatal (**Figure 11**).

Figure 11. Adequacy of Prenatal Care by Payer, NH Resident Births (2019-2022)

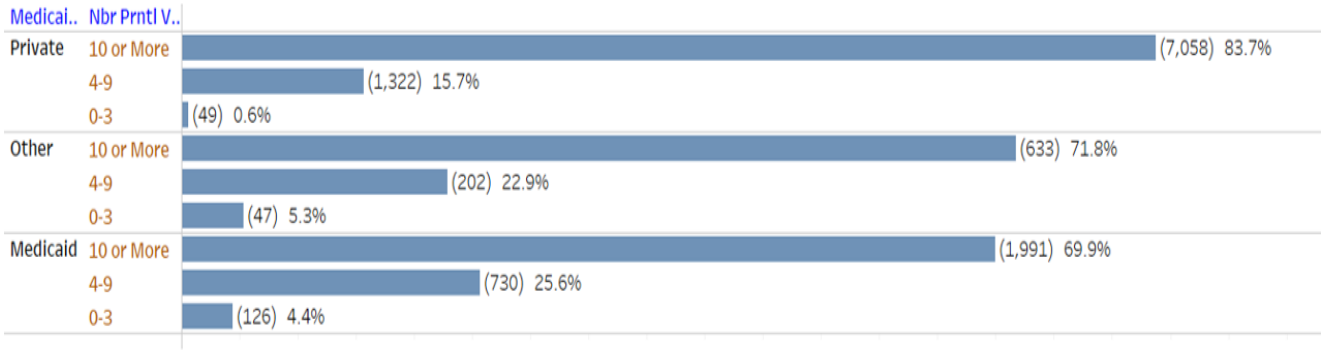


Based on the Kotelchuck Index (see Glossary)
Data Source: NH Vital Records | Data Analysis: NH DHHS MCH Epidemiologist

In addition, more people residing in rural counties had inadequate prenatal care compared to urban areas in NH. Rural birthing hospital closures in addition to other challenges such as inadequate public/private transportation, higher substance use in rural NH and low socio-economic status impact on prenatal care utilization in rural NH as compared to urban NH. The Kotelchuck Index is a useful tool to describe adequacy more robustly as it incorporates both the initiation time of prenatal care, the number of prenatal care visits leading up to birth from the birth certificate data adjusted for gestation age at birth.

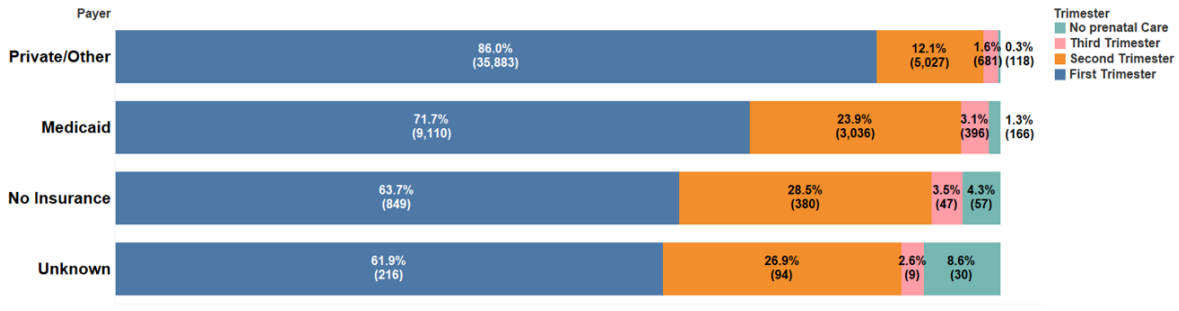
Medicaid insured birthing people were less likely to obtain 10 or more prenatal care visits and had significantly more proportions of those who started prenatal care in the second trimester compared to those who were privately insured in NH during 2022 (**Figure 12 and Figure 13**). Non-insured birthing people also had more birthing people starting prenatal care in the second trimester (**Figure 13**).

Figure 12. Number of Prenatal Care Visits by Payer, 2022 Births Occurring in NH



Data Source: Vital Records Birth Certificate Data
Data Updated: 6/8/2023 11:26:46 AM
Prepared by MCH Epidemiologist

Figure 13. Timing of First Prenatal Care Visit by Payer, 2020-2022 NH resident Births



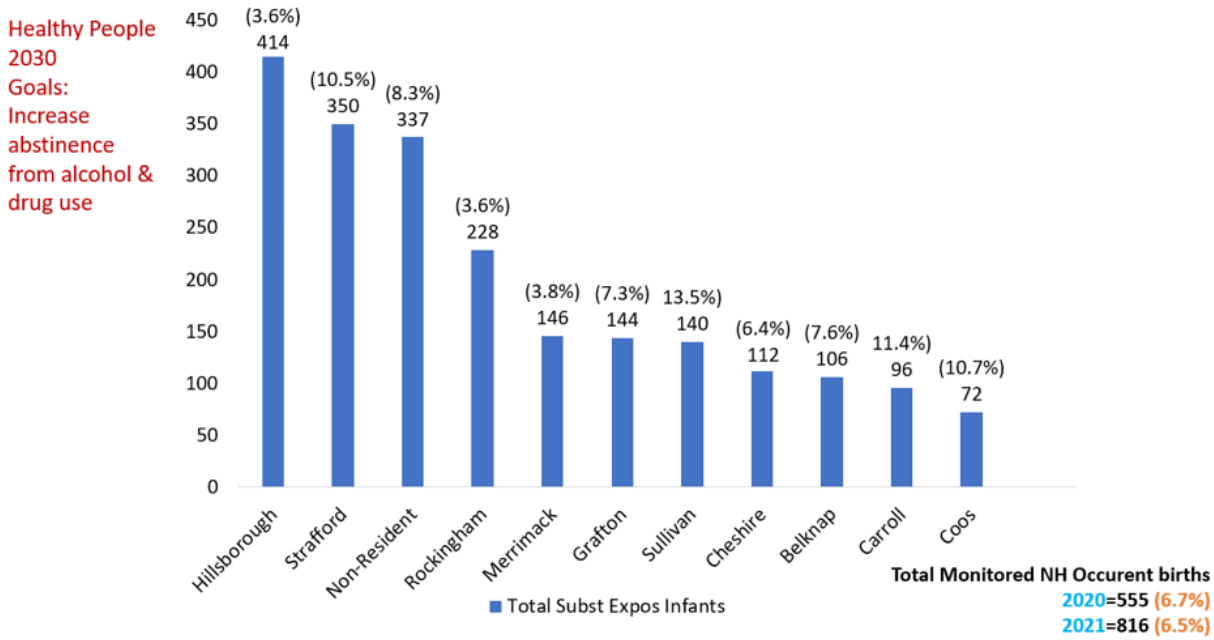
Data Source: NH Vital Records || Data Analysis: MCH Epidemiologist

Substance Exposure and Prenatal Care Utilization

Substance exposure monitoring is also recorded and disaggregated at the county level to indicate accessibility of screening services. Urban counties- Hillsborough, Rockingham, Merrimack, and Strafford- had the highest counts of substance exposed infants between 2020-2022. However, rural NH had the highest rates of substance exposed birthing people **(Figure 14)**.

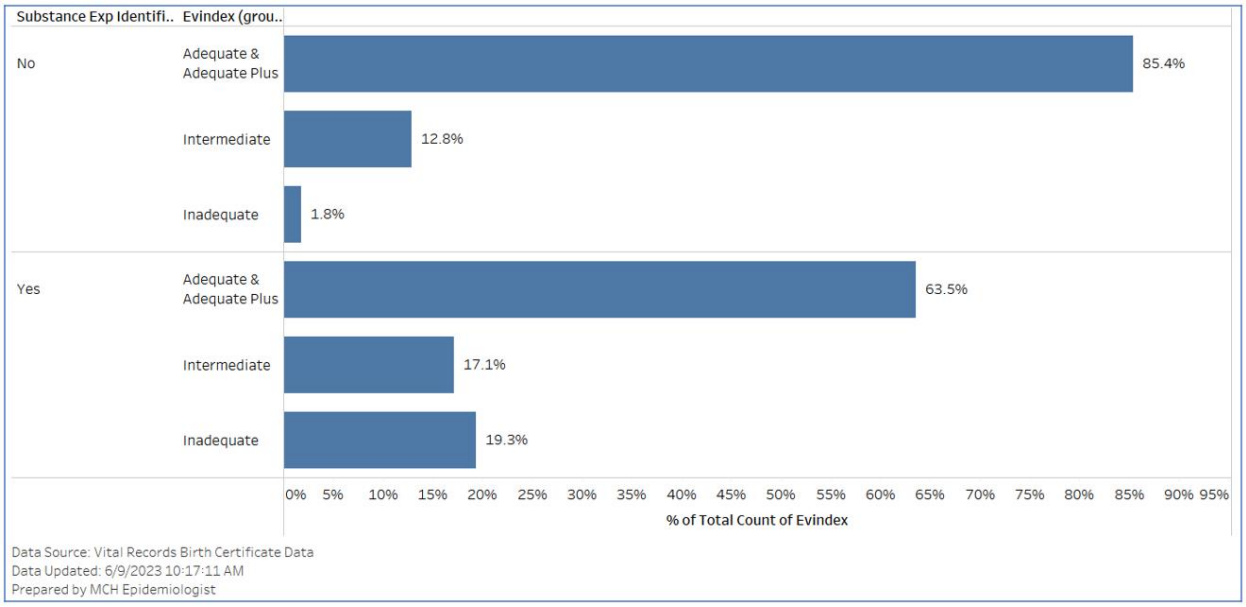
Figure 15 below shows that mothers who deliver babies with effects of in-utero substance exposure have significantly inadequate prenatal care visits as compared to those whose infants are not affected by in utero substance exposure.

Figure 14. Infants Monitored for Substance Exposure During Pregnancy by Mother's County of Residence (NH Birth Worksheet Q82A: 2020-2022 NH Occurrent Births)



Data Source: VR_BIRTH (EBI_DATAMART) NHDPHS Maternal and Child Health Section

Figure 15. Adequacy of Prenatal Care by Infants Affected by In Utero Substance Exposure (NH Occurrent Births, 2020- 2022)



Other Maternal Health Indicators

The federal US Department of Health and Human Services outlines goals for maternal health indicators, including maternal mental health, in the current Healthy People 2030 program. The Healthy People Program began in 1980 with the objectives of improving access to care through data collection. As a national program, the values are based on average improvements and changes across the country. Many, but not all, of the New Hampshire maternal health indicators meet the current 2030 goals, yet the programs identification of areas for health improvement serves as functional guidelines for health improvement in the state. Some essential goals outlined in Healthy People 2030 Maternal Infant and Child Health (MICH) include increasing adequate prenatal care, reducing alcohol use, reducing drug use, and increasing screening for postpartum depression (goals MICH-8, -9, -11, -01 respectively). One Healthy People goal for prenatal care is to have at least 80.5% of birthing people nationally receive adequate or better prenatal care by 2030. For more information see **Goals 2 & 3** or visit Data Brief.

Birthing Friendly Hospital Designation and Baby Friendly Initiatives

The "Birthing-Friendly" hospital designation is a novel initiative to promote a publicly reported standard of care in quality and safety of birthing facilities, improving birthing operations for both patients and providers[15]. The federal guidelines written by the Centers for Medicare & Medicaid Services (CMS) under the Department of Health and Human Services (HHS) are set to be implemented Fall of 2023[16]. In 1992, the World Health Organization and UNICEF initiated a similar "Baby-friendly" hospital designation program which New Hampshire hospitals currently use to indicate their infant feeding care expertise. The initiative aims to create a healthcare environment where breastfeeding is the norm, and practices known to promote the well-being of all mothers and infants are promoted. The "Baby-friendly" hospitals are those that have adopted and implemented the "Ten Steps to Successful Breastfeeding" (BF) which include policies, training, and communication guidelines for employee and patient reference to promote mother-child bonding and healthy feeding practices.[15] In 2014, 50% of NH deliveries occurred in "baby-friendly" hospitals, well surpassing the US national average of 18.3%[17]. In 2022, 90.8% of all hospital births were breastfed at discharge. Lower BF rates at discharge were reported among infants exposed to Substance Use Disorder (SUD) during pregnancy (30.8%), those with neonatal abstinence syndrome (NA) (45.4%), Medicaid delivery (15.5%) and those enrolled in Women Infant and Children (WIC) food (14.3%). These factors have a high correlation e.g. those exposed to SUD are likely to have NAS hence further inferential analysis such as multivariate analysis will control for these confounding effects.

Maternal Mental Health

In May of 2022, HHS launched the first nationwide maternal health hotline dedicated to maternal mental health crisis service during the perinatal period.[1] It can be reached by dialing 1-833-9-HELP4MOMS (1-833-943-5746) and offers free, confidential, 24/7 service in Spanish and English languages.[1] The service also provides accessible support for those who are deaf or hard of hearing by dialing 711 followed by the hotline.[1] The initiation of new support programs tailored to mental health for mothers is an important component of both national and New Hampshire maternal health initiatives which will assist in combatting mental health related

morbidity and mortality during the perinatal period. The proportion of birthing people affected by maternal depression in New Hampshire has increased overtime, from about 17% in 2013 to 24% in 2020, during the COVID pandemic.[3,18] Behavioral health disorders, including substance use disorder (SUD), are identified and analyzed in the PRAMS and hospital discharge data. Monitoring the access and quality of improvement measures such as the crisis hotline and the new AIM patient safety bundle on perinatal mental health recently implemented in NH are an important component of New Hampshire's behavioral health services during the perinatal period. AIM patient safety bundles are further described under **Goal 5** as a freely accessible support measure for birthing people; the NH mental/behavioral health workforce on screening, substance exposure and perinatal mental health data is further described under **Goals 3&4.**

Goal 2: Ensure Those Giving Birth are Heard and are Decision makers in Accountable Systems of Care

Incorporating patients in shared decision making at the individual and community level is the best way to ensure the health needs of birthing people are heard and met. Programs, collaborative groups, and researchers support efforts to improve visibility of those giving birth and identify areas of inequity in health systems. In recent years, scientific journals have highlighted publications emphasizing the importance of "co-production" which describes a patient centered decision making effort incorporating perceptions and desires for care of the patient in provider recommendations.[19]

The Community Collaborations Program has established an integrated support approach to target prevention by promoting continuum between maternal health, substance abuse treatment, home visiting, and other programs- with the ultimate goal of reducing the number of children entering foster care and child welfare systems. Regional Family Support Councils, a part of NH DHHS Family Support Services, incorporate community health workers into preventative family services promoting early initiatives to strengthen and retain family connections. Regional Public Health Networks, 13 of which exist throughout the state, contract with DHHS for community health worker (CHW) projects such as social determinant related health service initiatives. CHWs have worked to increase cultural competencies among health care providers, especially those serving vulnerable populations. Programs that bolster accountability between community, provider, and patient are an important asset to the birthing people and health systems in NH.

Perinatal Quality Collaborative (PQCs) are one way the New Hampshire and broader New England area is working to improve communication and collaboration in maternal health. The Northern New England Perinatal Quality Improvement Network (NNEPQIN), founded in 2003, includes maternal health professionals from Maine, New Hampshire, and Vermont and provides educational resources/conferences, quality improvement projects, case review, and clinical guidelines. NNEPQIN, in collaboration with NH-DHHS has supported implementation of the Alliance for Innovation in Maternal Health (AIM) program in New Hampshire. The

collaborative members include the 15 birthing hospitals, community volunteers, physicians, nurses, and midwives. The NH AIM staff in collaboration with NH birthing hospitals is actively implementing the Care for Pregnant and Postpartum People with Substance Use Disorders bundle and will start engaging the community and all NH reproductive health care providers in the perinatal mental health patient safety bundle. Project ECHO (Extension for Community Healthcare Outcomes) led by the NH Citizens Health Initiative a program of the Institute for Health Policy and Practice, University of New Hampshire, includes materials pertaining to shared decision making- balancing patient autonomy, with evidence-based practice and public health.

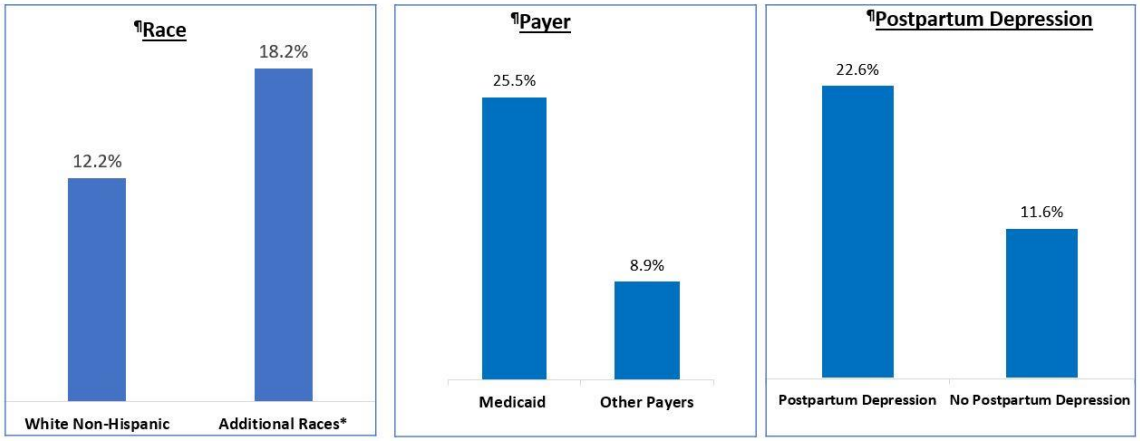
Community health needs assessments (CHNAs) also offer unique insight into the maternal experience across the state, segregated geographically by hospital catchment area. Many CHNAs incorporate direct quotations of representative community voices. The CHNA requirement for nonprofit hospitals was originally implemented under the Patient Protection and Affordable Care Act (2010) to be completed every 3 years. CHNA teams often include hospital administrators, graduate students, community health workers, and other members of the serviced area.[20]

The Health Resources and Services Administration (HRSA) supports visibility and promotes accountable care systems for people giving birth through the Maternal, Infant, and Early Childhood Home Visiting (MIECHV) Program. In communities identified as having greater risk for adverse maternal health outcomes, the HRSA MIECHV Program aims to improve maternal and child health by reducing and preventing domestic violence, abuse, and neglect and promoting education, school participation, and community connections with health resources. Like PRAMS, the MIECHV Program focuses on regionally significant topics such as smoking cessation referrals during the gestational period. Additionally, NH Family Voices supports visibility of underrepresented groups in medicine and emphasizes the family unit as the center of health care through interventions such as the Medical Home Initiative.

In 2013, New Hampshire joined the national data collection effort through the Pregnancy Risk Assessment and Monitoring Service (PRAMS) funded by the Centers for Disease Control and Prevention (CDC). The project, like most of the aforementioned initiatives, resides within the

Maternal Child and Health Section of the Division of Public Health Services under the New Hampshire Department of Health and Human Services. PRAMS collects and interprets holistic measures of health including maternal attitudes and behaviors and experiences before, during and after pregnancy at the state level with the goal of improving health programs and outcomes for birthing people. PRAMS selected topics for New Hampshire include breastfeeding, social networking, work leave time, and discrimination while accessing services, as well as perinatal exposures such as arsenic, Lyme disease, and smoking.[21] Between 2016-2020, birthing people who reported unfair treatment when seeking health care related services were captured with the PRAMS survey.[17] Survey participants who financed perinatal care with Medicaid or who identified as Hispanic, Black Non-Hispanic, Asian Non-Hispanic, American Indian or Alaskan Native, more than one race, or other (i.e., Non-White survey participants) were more likely to report unfair treatment when seeking health care related services (**Figure 16**.)[17]

Figure 16. Proportion of Birthing People who Reported Unfair Treatment When Seeking Health Care Related Services^,12-months prior to the NH PRAMS Survey†, 2016-2020



^Clinic visits, doctors', or nurse's office visits, applying for health insurance, applying for Medicaid, etc.
† Participants are randomly selected on a monthly basis from NH resident births to participate in PRAMS surveillance. Data is weighted in analysis. **The Y and X axis for each bar chart is independent of other bar charts.**
*Additional races include Hispanic, black Non-Hispanic, Asian Non-Hispanic, American Indian or Alaska Native, other, more than one race (the numerator was small for some races therefore aggregated)

¶ The difference between the groups is statistically significant **p<0.05**
Data Source: NH PRAMS | | Data Analysis: NH DHHS MCH Epidemiologist

The PRAMS initiative promotes the holistic, patient-centered healthcare the nation's health systems are striving toward through improvements in quantitative data collection and reporting and reentering health needs based on patient needs. The *NH PRAMS 2021 Data Summary* on

health care providers' advice and services is another example of state level improvement efforts to increase experiential transparency and communication between patients and providers.[21] Per the *NH PRAMS 2021 Data Summary*, among those surveyed the most frequently perceived basis of discrimination were body weight, insurance type, income level, and substance addiction status.[21]

The US DHHS's Healthy People 2030[vii], described in **Goal 1**, incorporates health communication into the nation's health care goals. Increasing the proportion of adults whose healthcare providers involved them in decisions as much as they wanted, the proportion of adults whose healthcare provider checked their understanding, and the proportion of adults with limited English proficiency who say their providers explain things clearly are all components of health communication. Decreasing the overall proportion of adults who report poor communication with their healthcare provider is also listed. These goals help identify some marginalized populations in health services and provide visibility and accountability in decision making processes.

To better understand the experience of birthing people in NH, representative data on experiences of discrimination, shared decision making, health literacy, and communication should continue to be integrated into the PRAMS annual resident survey to align with the Healthy People 2030 goals. Data on communication competency training for providers would also provide insight and visibility into the quality of patient provider relationships when accessing perinatal care. While acknowledging these deficits in data on communication and accountable systems, the state offers many comprehensive programs and services intended to improve patient experiences with health systems as described above. By collaborating with existing programs and resources NH is actively working to improve health outcomes for birthing people as it relates to health system accountability and shared decision making.

[vii] https://health.gov/healthypeople/objectives-and-data/browse-objectives/health-communication/increase-proportion-adults-whose-health-care-providers-involved-them-decisions-much-they-wanted-hchit-03

Goal 3: Advance Data Collection, Standardization, Harmonization, Transparency, and Research

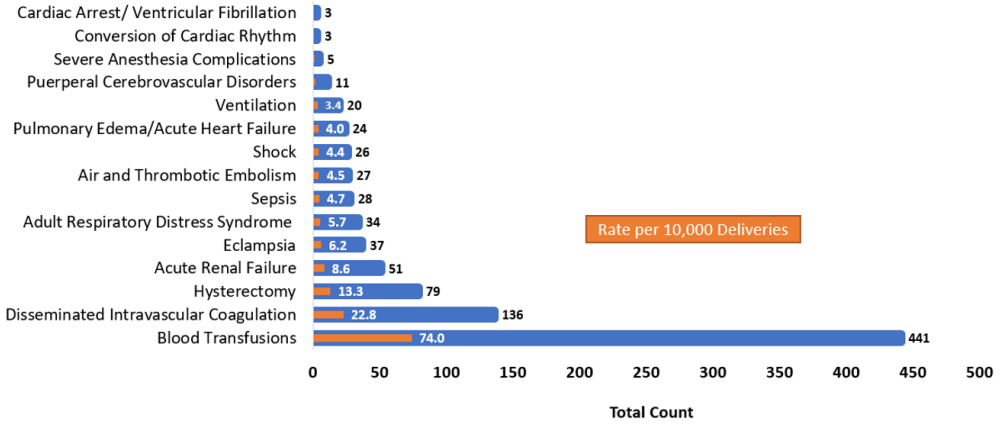
Hospital Discharge Data

The state captures hospital discharge data (HDD) annually. Improving data collection on screening services and rates disaggregated by racial and ethnic groups including minority groups such as American Indian and Alaska Native (AIAN) and African/Black American will enable improved transparency and showcase disparities in maternal health research. HDD on race and ethnicity is not consistent with the self-reported race and ethnicity data from Vital Records (i.e., birth certificate data) (See *Race & Ethnicity in Data* below).[2] HDD is used to calculate severe maternal morbidity and assess the prevalence of Perinatal Mental Health Conditions.

Severe Maternal Morbidity (SMM)

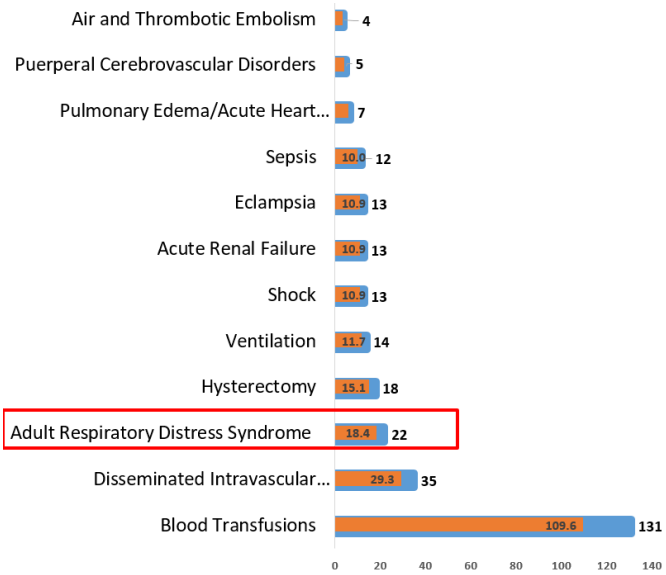
SMM is a discrete set of life threatening complications defined by CDC as unexpected outcomes of labor and delivery that result in significant short- or long-term consequences to a woman's health. Between 2016-2020 the 5-year aggregate SMM excluding transfusions was 67.2 per 10,000 deliveries for NH occurrent births.[5] Transfusions are often excluded in SMM calculations to avoid false positives.[5] Disseminated intravascular coagulation, hysterectomy, and acute renal failure were the leading indicators of SMM between 2016-2020, however, in 2021, adult respiratory distress was the third leading indicator. (**Figure 17 and Figure 18)**.[5]

Figure 17. Count and Rate of Severe Maternal Morbidity (SMM) Indicators, 2016-2020



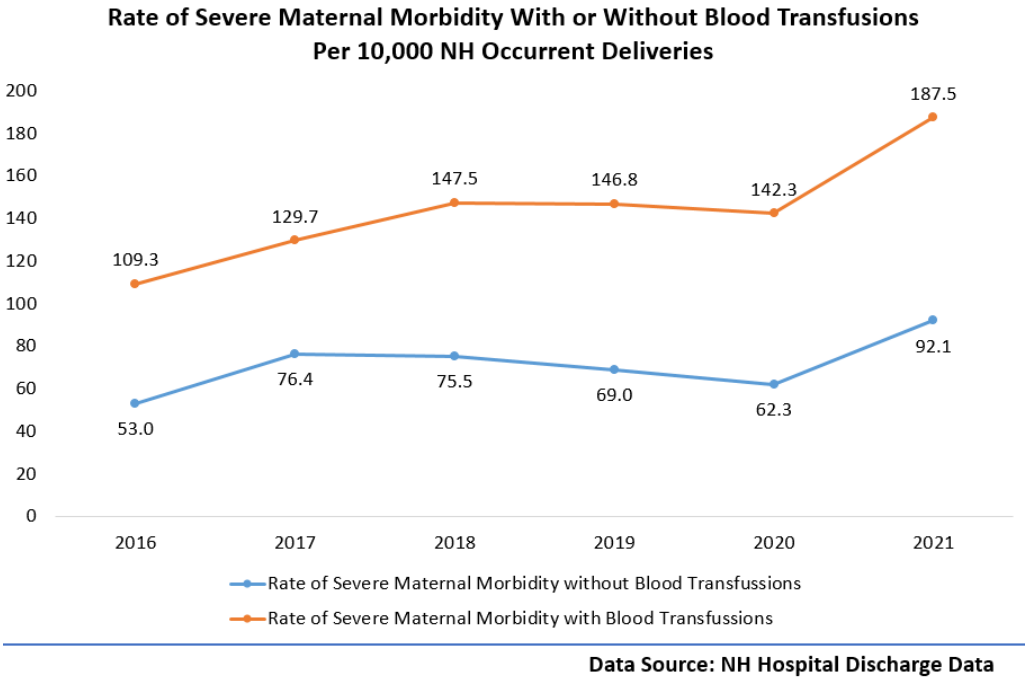
Excluding transfusion, between 2016 and 2020 for occurrent births in NH, disseminated intravascular coagulation (which may cause stroke), hysterectomy, and acute renal failure were the leading indicators for SMM, respectively.
Rates are marked using the orange color and white font in the bar charts. Amniotic Fluid Embolism, Aneurysm and Sickle Cell Disease were excluded due to small counts.
Data Source: NH Inpatient Hospital Discharge Data | | Data Analysis: NH DHHS MCH Epidemiologist

Figure 18. Count of 2021 NH Severe Maternal Morbidity (SMM) Indicators



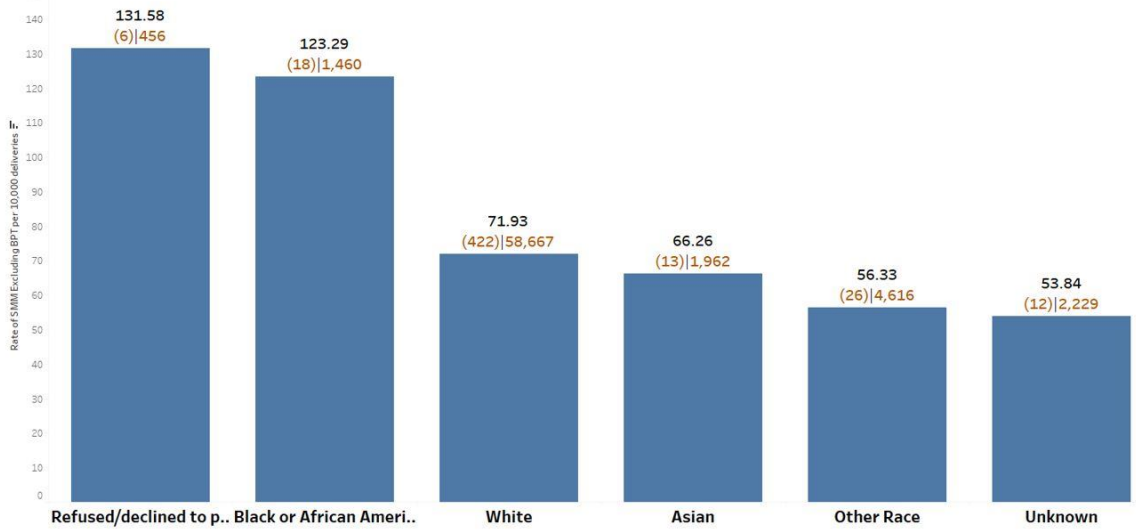
The rates of Severe Maternal Morbidity (SMM) increased significantly from 2020-2021 by over 30% for SMM with blood product transfusions and over 40% for SMM without blood transfusions, **Figure 19.**

Figure 19. Trend of NH SMM Rates among Hospital Occurrent Births



Disaggregated 2016-2020 HDD by the birthing people's race, indicates that SMM were highest among those who identified as Black/African American and those who declined to respond (**Figure 20**).[5] However, the rates calculated with numbers less than 20 in the numerator are considered unstable.[5] Disaggregation by race often produces unstable values because birthing people who do not identify as White Non-Hispanic are not very populous in NH.[5] HDD shows SMM rates were highest among birthing people aged >35 years between 2016-2020 (**Figure 21**).[5] The higher SMM rate is expected for birthing people aged >35 years, which qualifies the pregnancy as advanced maternal age and can put pregnancies into the high-risk category.[5]

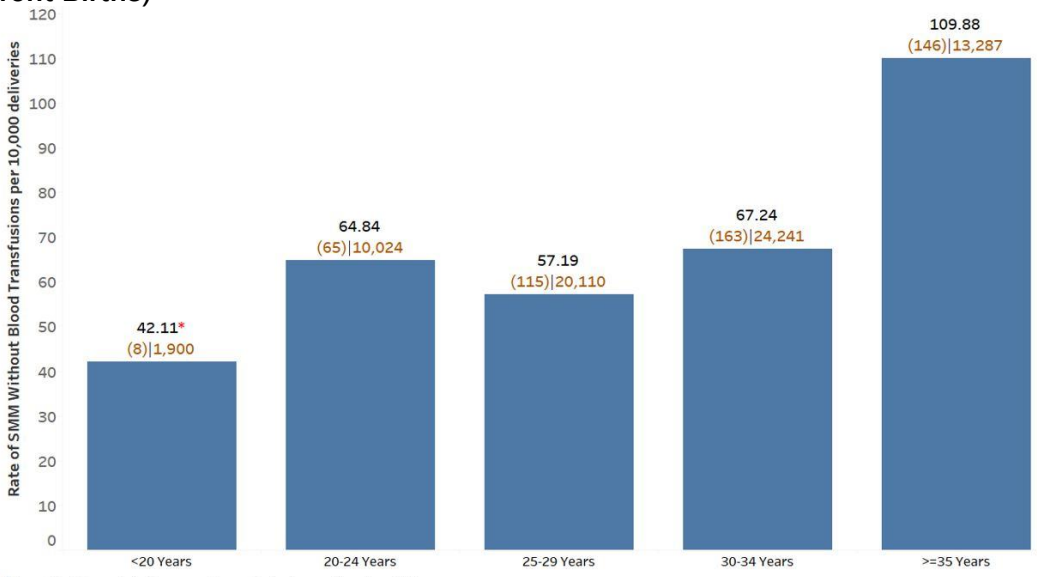
Figure 20. Rate of SMM without Blood Transfusion by Mother's Race (2016-2021, Occurrent Birth)



Data Source: NH Inpatient Hospital Discharge Data Set
Specifications: AIM SMM Codes List 2022 Implementation Resources for Maternal Morbidity Prevention | AIM (saferbirth.org)
Prepared by MCH Epidemiologist

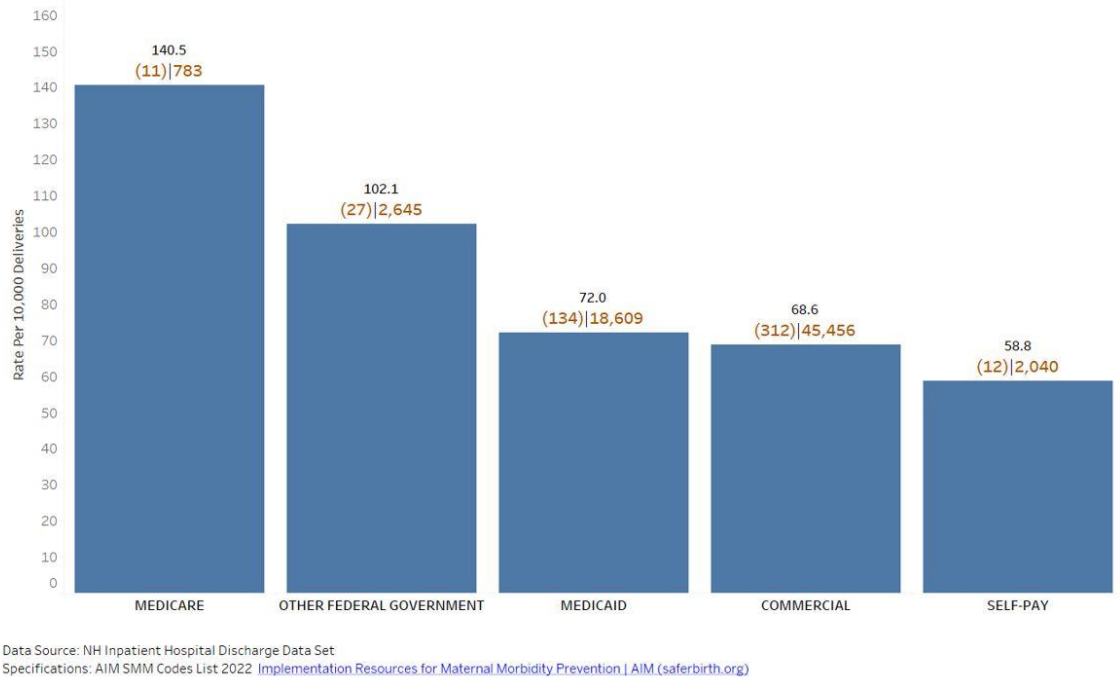
Between 2016 and 2020 NH birthing people who identify as Black or African American experienced, on average, the highest rate of SMM. However, the event count was less than 20 for all racial and ethnic groups reported except White. Though disparities in maternal health outcomes for American Indian Alaskan Natives and Hawaiian Natives may exist in NH, the numbers are too small to report confidently. *Rates with <20 events in the numerator are typically considered unstable.
The SMM counts are represented by the numerator in brackets, the denominator represent the total population in each race category. There were 90 American Indian Alaskan Natives and 42 Hawaiian Natives but the SMM rate for both races were 0 and therefore excluded from the graphic.
Data Source: NH Inpatient Hospital Discharge Data Set || Data Analysis: NH DHHS MCH Epidemiologist

Figure 21. SMM Rates without Blood Transfusions by Mother's Age (2016-2021 Occurrent Births)



*Rates with <20 events in the numerator are typically considered unstable.
Data Source: NH Inpatient Hospital Discharge Data Set
Specifications: AIM SMM Codes List 2022 Implementation Resources for Maternal Morbidity Prevention | AIM (saferbirth.org)
Carolyn.K.Nyamasege@affiliate.dhhs.nh.gov

Figure 22. SMM Rates without Blood Transfusions by Payer (2016-2021 Occurrent Births)

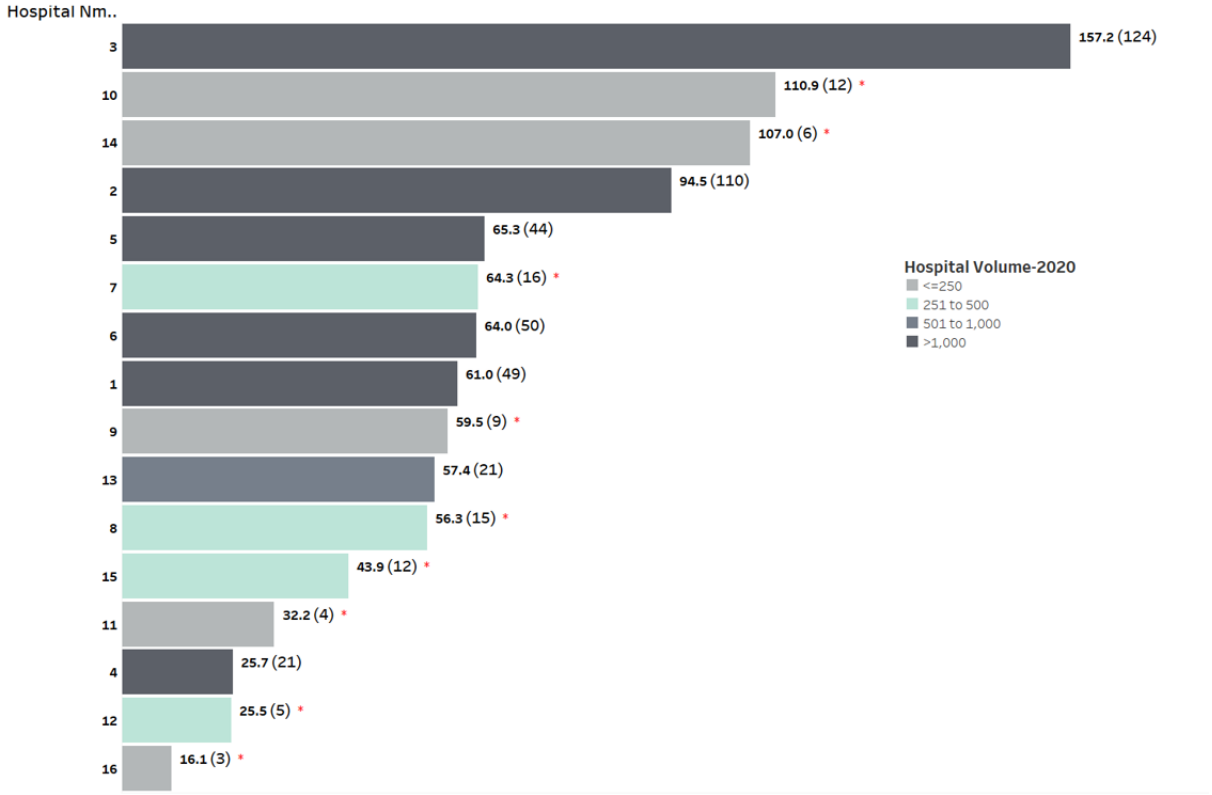


Data Source: NH Inpatient Hospital Discharge Data Set
Specifications: AIM SMM Codes List 2022 Implementation Resources for Maternal Morbidity Prevention | AIM (saferbirth.org)

Rates with <20 events in the numerator are typically considered unstable. The SMM counts are represented by the numerator in brackets, the denominator represent the total population in each payer.
Data Source: NH Inpatient Hospital Discharge Data Set || Data Analysis: NH DHHS MCH Epidemiologist

SMM rates were highest among Medicare beneficiaries, though the count of deliveries who were Medicare payer is unstable (**Figure 22**).[5] Additionally, higher rates of SMM are expected in the Medicare payer group due the presence of adverse health conditions and disability which create additional challenges during pregnancy and birth.[5] **Figure 23** highlights SMM rates per birthing hospitals. Hospital 3 has the highest SMM rates as compared to other high birth volume birthing hospitals. Some birthing hospitals have a higher SMM rate as compared to others since patients with a high risk pregnancy are often referred to hospitals with more resources to cater for the patient's need.

Figure 23. Hospital Rates of Severe Maternal Morbidity (per 10,000 deliveries) Excluding Blood Transfusions (New Hampshire Hospital Births: 2016-2021)

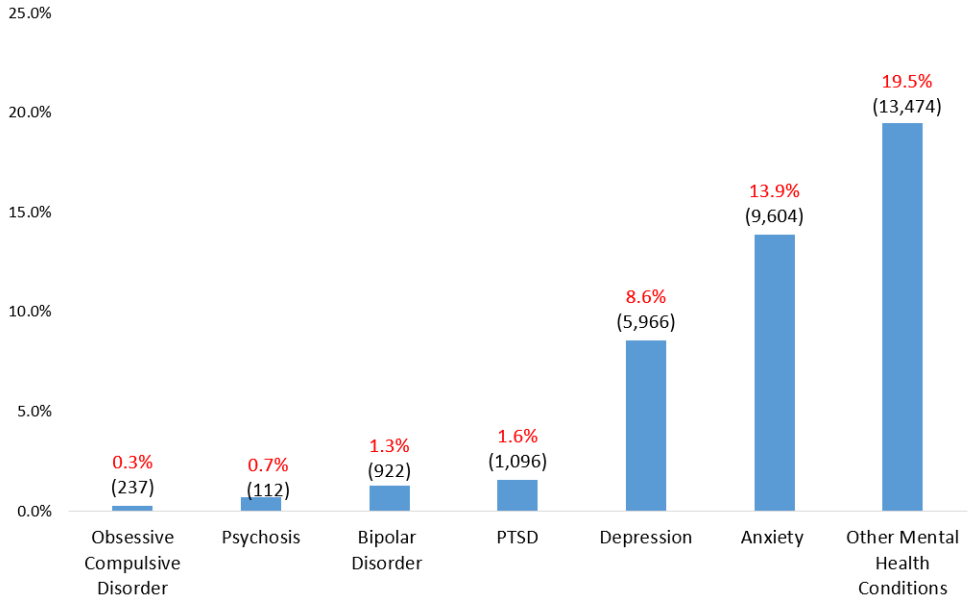


Data Source: NH Inpatient Hospital Discharge Data Set || Data Analysis: NH DHHS MCH Epidemiologist

Perinatal Mental Health Conditions (PMHC)

NH Hospital Discharge Data was also used to assess the prevalence of mental health conditions using ICD 10 codes for various perinatal mental health conditions (PMHC) listed on **Figure 24.** Other mental health conditions were the leading followed by anxiety and depression. **Figure 25** presents the prevalence of any PMHC by year. The prevalence has increased over time. When disaggregated by hospital, high birth volume hospitals had more prevalence of PMHC.

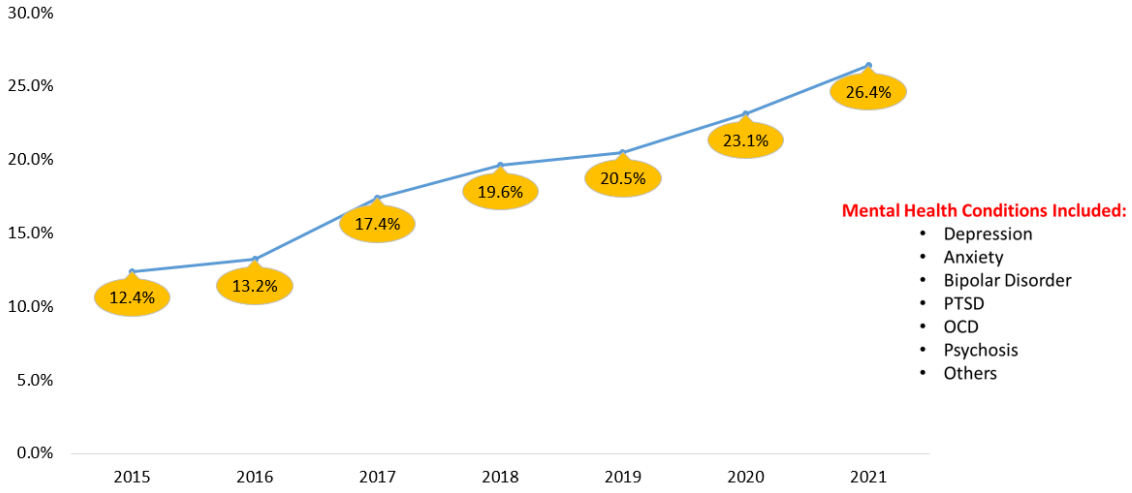
Figure 24. Proportions* of Mental Health Conditions by Category, (2016-2021) NH Delivery Hospitalization Data



*These are the counts of MHC cases not individuals, a patient may have been diagnosed with more than 1 MHC, hence the % are not mutually exclusive.

Data Source: NH Inpatient Hospital Discharge Data

Figure 25. Prevalence of Maternal Mental Health Conditions in NH, Hospital Delivery Hospitalization Inpatient Data (2016-2021) Occurrent Births



Data Source: NH Inpatient Hospital Discharge Data

Vital Records

Vital records are birth and death certificate data which are managed by the NH Division of Vital Records Administration. This data is important for measuring maternal outcomes, performing linkages for more detailed analysis to understand risk factors associated with maternal and infant outcomes such as SMM, infant deaths, teen pregnancies, low birth weight, preterm births, and adequacy of prenatal care (**Goal 1**), among others. Vital record data can be disaggregated by race, ethnicity, payer, educational status, and other subgroups to reveal disparity in maternal and infant health outcomes which are important in targeting our interventions and determining needs assessments for state and federal funded programs.

Maternal Mortality (MM) & Maternal Mortality Review Committees (MMRCs)

The Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) Grant from the CDC supports state level MMRC efforts. The Maternal Mortality Review Information Application (MMRIA) is a tool for accessing and facilitating MMRC functions including maternal mortality data entry and maternal death review available through the CDC. Maternal mortality is mainly determined from vital records death certificate data through a pregnancy check box on the death certificate. Other postpartum pregnancy associated deaths are identified through linking death certificate records to birth certificate data. Cases are abstracted through collection of medical records data and performing informant interviews. The NH MMRC generally meets quarterly to review maternal deaths. The MMRC team consists of several subject matter experts who use vital record and interview data to determine and report preventability contributing factors, categorize the case as pregnancy-associated, -related, -associated but not related deaths and make committee recommendations for future prevention activities. (see **Glossary**).[4] More information can be obtained from the yearly- 2022 Annual Report on Maternal Mortality.

The MMRC reviewed 32 maternal deaths between 2017-2021 (**Table 3**).[4]

Table 3. Characteristics of NH Residents Maternal Mortality Data (2017-2021)

Maternal Deaths Reviewed (2017-2021)	**N=32**		
Causes of Pregnancy Associated Deaths			
Overdose	59.4% (19)		
Cardiovascular and/or Cardiomyopathy	12.5% (4)		
All Other Causes	28.1% (9)		
Frequency of Circumstances Contributing to Death	Yes	No	Probably/Unknown
Obesity	2	23	1
Discrimination	0	13	7
Mental Health Conditions	13	7	6
Substance Use Disorder	15	7	4
Educational Attainment of Mother			
High School Diploma Equivalent or less	56.3% (18)		
Completed some college	12.5% (4)		
Associate or bachelor's degree	28.1% (9)		
Completed advanced degree	3.1% (1)		
Age Group of Mother (years)			
<25	15.6% (5)		
25-29	18.8% (6)		
30-34	43.8% (14)		
35-39	6.2% (2)		
40+	15.6% (5)		
MMRC Determinations on Pregnancy Relatedness			
Pregnancy Associated not Related	37.5% (12)		
Pregnancy Related	53.1% (17)		

Table 3 continued. Characteristics of NH Residents Maternal Mortality Data (2017-2021)

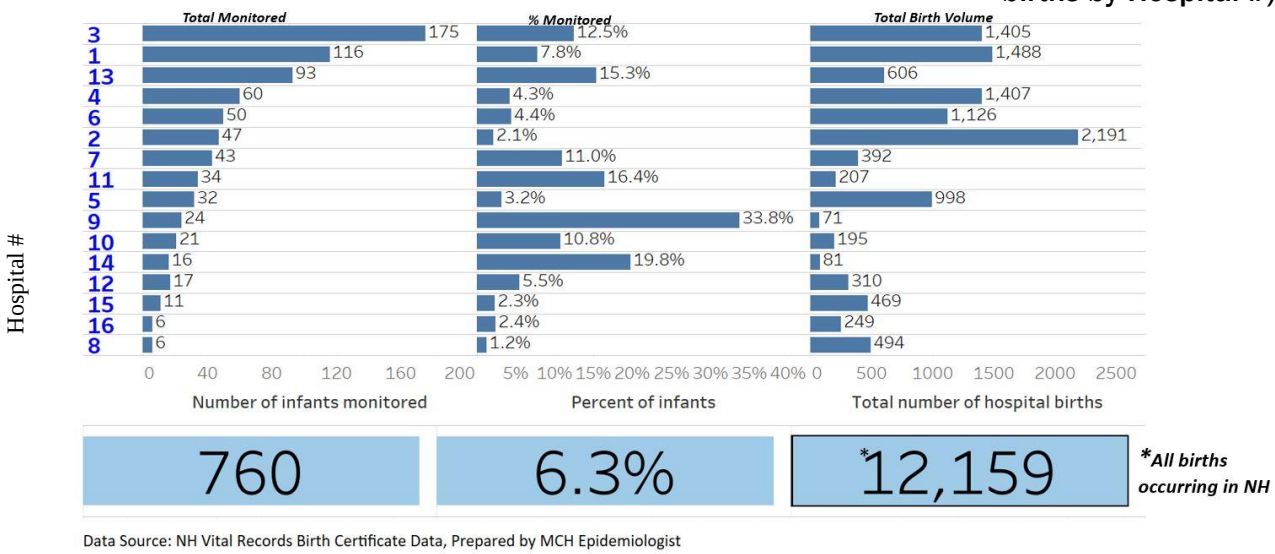
MMRC Determinations on Pregnancy Relatedness	
Awaiting Review/Under Investigation	9.4% (3)
Timing of Death	
During pregnancy	28.2% (9)
Within 42 days of pregnancy	21.8% (7)
Within 43 days to 1 year of pregnancy	37.5% (12)
Missing	12.5% (4)
History of Social and Emotional Stress	Number of deaths
History of Substance Use	16
History of Substance Use Treatment	12
History of Psychiatric hospitalizations or treatment	7
Prior Suicide Attempts	6
Unemployment	7
Child protective services involvement	6
Deaths Considered Preventable by MMRC N=32	
Preventable	18
Not Preventable	5
Undetermined	9

Substance Exposure

On average, NH birth certificate data records a prevalence of 6.5% infants who're monitored for in utero substance exposure each year.[2] In 2022, across 16 birthing hospitals 6.3% of infants were monitored for substance exposure (**Figure 26)**.[2] The proportion of infants monitored by hospital varies greatly, from 1.2% to 33.8% in 2022 (**Figure 26**).[2] A 3-year aggregate of birth

data indicates that counties with low birth volumes have significantly more infants, by proportion, monitored for substance exposure during pregnancy.[2]

Figure 26. Infant Monitored for Substance Exposure by Birthing Facility (2022 occurrent births by Hospital #)



Data Source: NH Vital Records Birth Certificate Data, Prepared by MCH Epidemiologist

Table 4. Substance Exposure & Health Determinants/Circumstances among Full Term Births by Mothers Who Had Less Than 10 Prenatal Care Visits in NH (2020-2022 Birth Data)

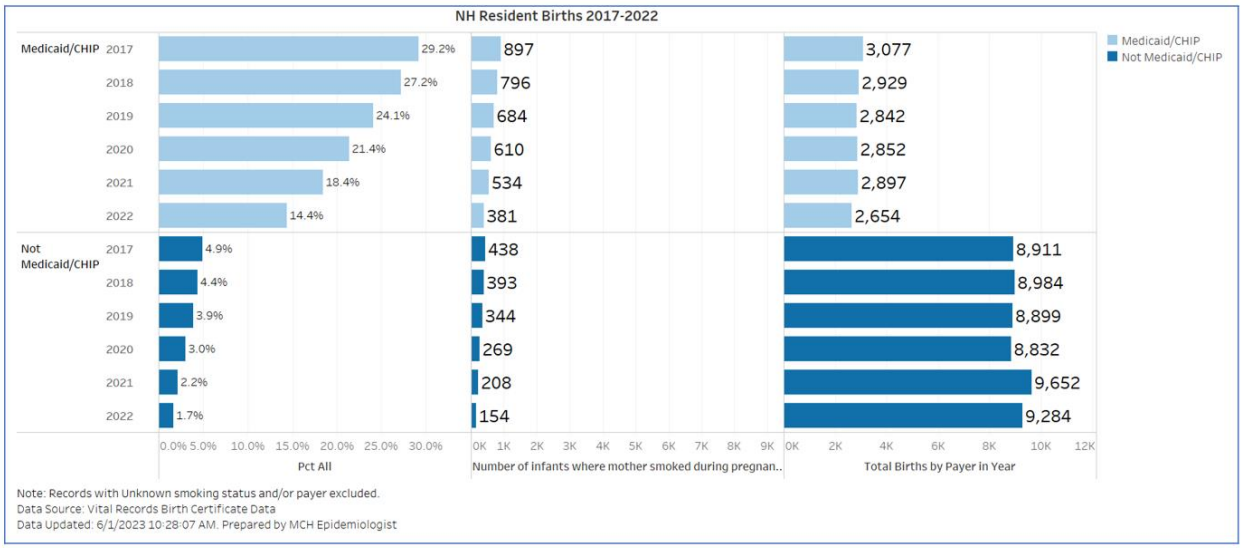
	Total Full Term Births Among Substance Exposed Mothers with <10 visits n=658	**Total Full Term Births Among Non-Substance Exposed Mothers with <10 visits** n=5,622
Low Birth Weight	.6% (50)	2.9% (161)
Medicaid Deliveries	76.9% (506)	27.1% (1,522)
Resides in a Rural Area	33.1% (218)	22.1% (1,244)
High School Graduate or Less	26.2% (466)	5.6% (1,606)
Mother's Age <29	56.5% (372)	43.5% (2,445)
Received WIC food during pregnancy	43.9% (289)	18.1% (1,021)
First Time Mother	11.4% (203)	7.3% (2,095)

Data Source: Vital Records || Data Analysis: NH DHHS MCH Epidemiologist

Table 4 above illustrates maternal social determinants of health (SDOH) among substance exposed and non-substance exposed birthing people who had less than 10 prenatal care visits. Those who were substance exposed were more likely to be insured by Medicaid, had a high school or less level of educational attainment, aged less than 29 years, and were recipients of

Women, Infants and Children (WIC) food as compared to non-substance exposed birthing people who had an inadequate quantity of prenatal care visits. (i.e., <10).

Figure 27. Smoking During Pregnancy, New Hampshire Resident Births Disaggregated by Payer



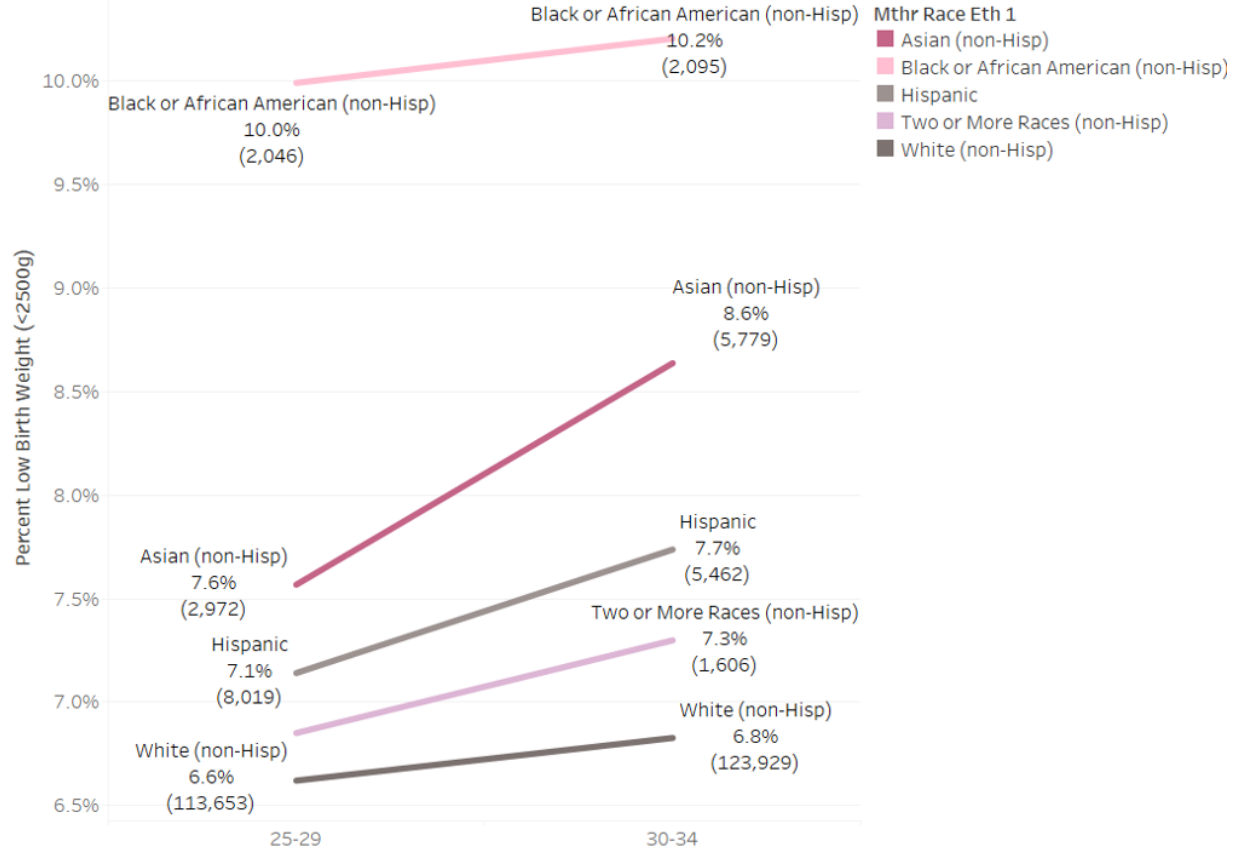
Birth certificate data is also used to track the progress of smoking during pregnancy. Between 2017 and 2022 the proportion of birthing people who smoked during pregnancy has steadily decreased, however the proportion of those smoking during pregnancy has remained significantly higher among the Medicaid payer group versus private and other payer groups (**Figure 27**).[2] The PRAMS reported smoking values vary some from vital records due to the nature of retrospective surveying questions which can be subject to recall bias.[2] NH Title V Block Grant, Maternal and Child Health, 5-year action plan has a national performance measure (NPM) under the Women's/Maternal Health domain to decrease the use and abuse of alcohol, tobacco, and other substances among pregnant women. Hence, many intervention measures such as tobacco cessation programs are implemented to reduce the prevalence of smoking during pregnancy.

Preterm Birth and Low Birth Weight

Significantly more birthing people who identify as Black or African American and Asian deliver low birth weight compared to mother's who identify as White in NH (2005-2023). Increased

maternal age at delivery is also a risk for LBW (**Figure 28**).[3] Preterm birth is a strong indicator of infant mortality and morbidity and is associated with a number of other poor health outcomes including cerebral palsy, vision and hearing difficulties, asthma, motor skills, and learning disabilities.[23] Across the US, the economic burden is estimated to be $26.2 billion annually, or $51,600 per preterm infant. [24]

Figure 28. Percent Low Birth Weight by Maternal Age Group and Race/Hispanic Origin (Birth Years 2005-2023)



Data Source: Vital Records || Data Analysis: NH DHHS MCH Epidemiologist

Figure 29 presents the prevalence of low birth weight (LBW) by maternal race and education status. Higher rates of LBW were observed among Asians with a high school graduate level of education, Black or African American with some college or associate degree and among Whites with less than high school education.

Figure 29. Percent Low Birth Weight by Maternal Race/Hispanic Origin and Education

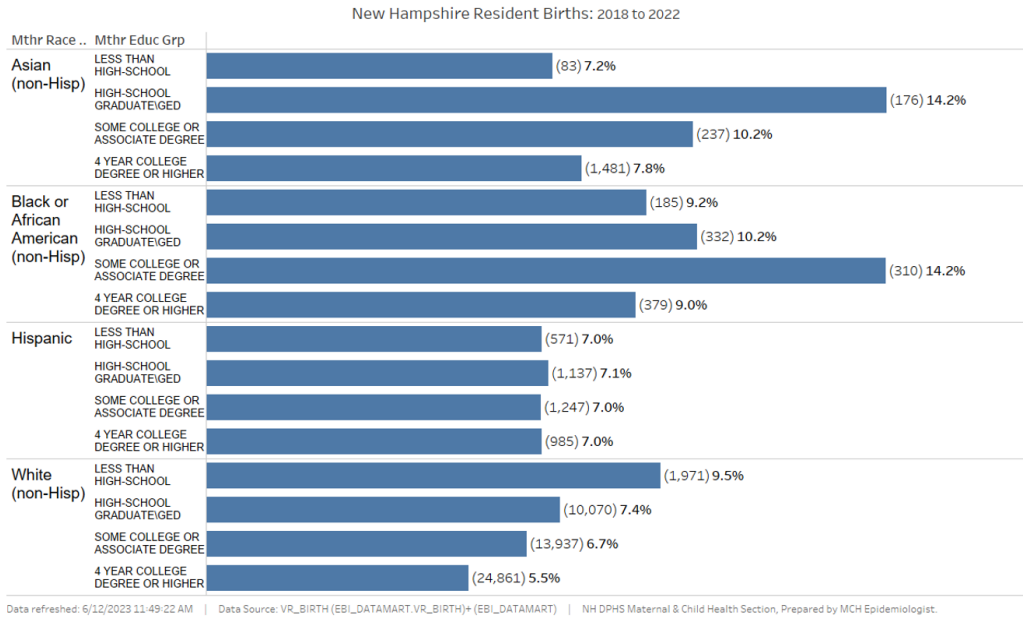
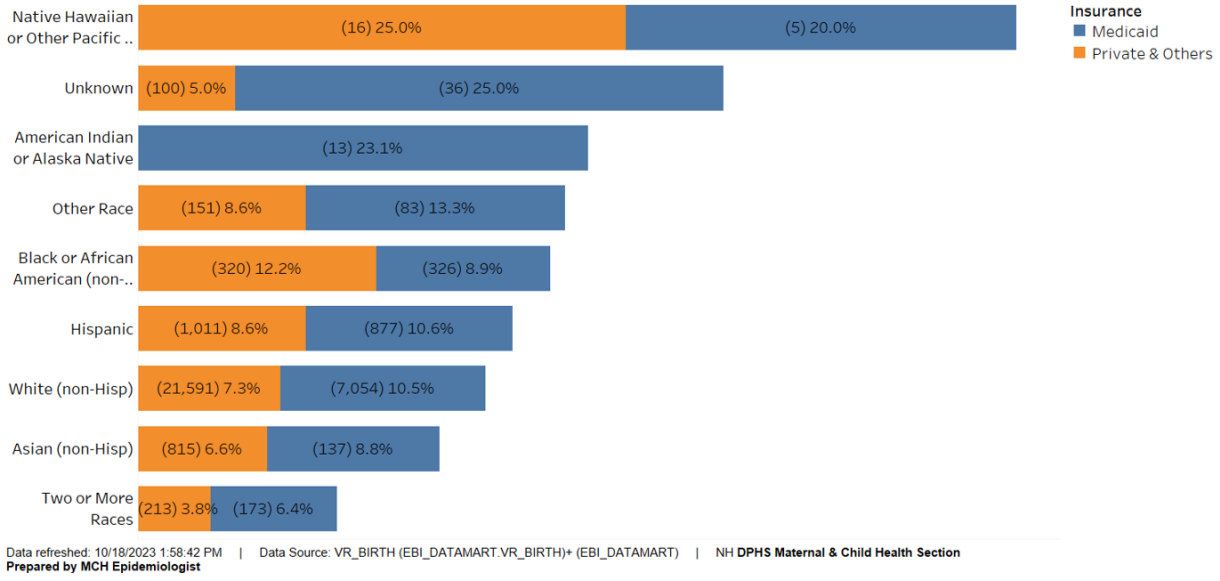


Figure 30 illustrates prevalence of preterm births by Maternal Race/Hispanic origin and payer. A higher prevalence of preterm births was observed among races with fewer births in NH and those who paid their deliveries by Medicaid except for Black/African Americans who has more preterm births among the private payers as compared to Medicaid payers.

Figure 30. Percent Preterm (<37 wks.) by Maternal Race/Hispanic Origin and Payer, Deliveries Occurring in New Hampshire: 2020-2022



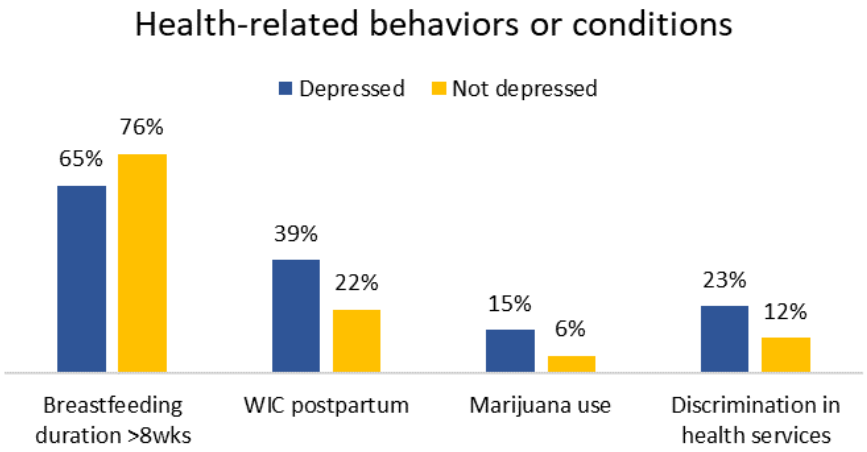
PRAMS

The PRAMS data collection initiative to understand experiences during the perinatal period (before, during, and after pregnancy) and resultant health outcomes for infants and birthing people is the most comprehensive state level questionnaire on the maternal health experience including both exposures to and attitudes of birthing people. PRAMS has conducted exposure data collection for maternal health in arsenic, lead, oral care, marijuana and vaping, Lyme disease, and depression via the PRAMS survey questionnaire which is published on the Maternal and Child Health Section webpage of NH DHHS. PRAMS data is weighted to accurately depict the birthing population in the state, creating high external validity of the survey participants' results to the broader NH birthing population.

Depression

Maternal mental health, a subset of behavioral health, impacts approximately one in five pregnant and postpartum people each year in the US.[25] The cost of untreated maternal mental health conditions is estimated to reach about $14 million during the time from conception to 5-years postpartum, which includes lost wages due to mental health conditions and poor health outcomes for mothers and children.[26] About 16% of birthing people in New Hampshire indicate postpartum depression.[17] Health related behaviors including those who were enrolled in WIC postpartum, those who used marijuana, and those who reported discrimination in seeking healthcare related services were more common among birthing people with depression between 2016-2020, while breastfeeding for longer than eight weeks was more common among birthing people who did not report depression (**Figure 31**).[17]

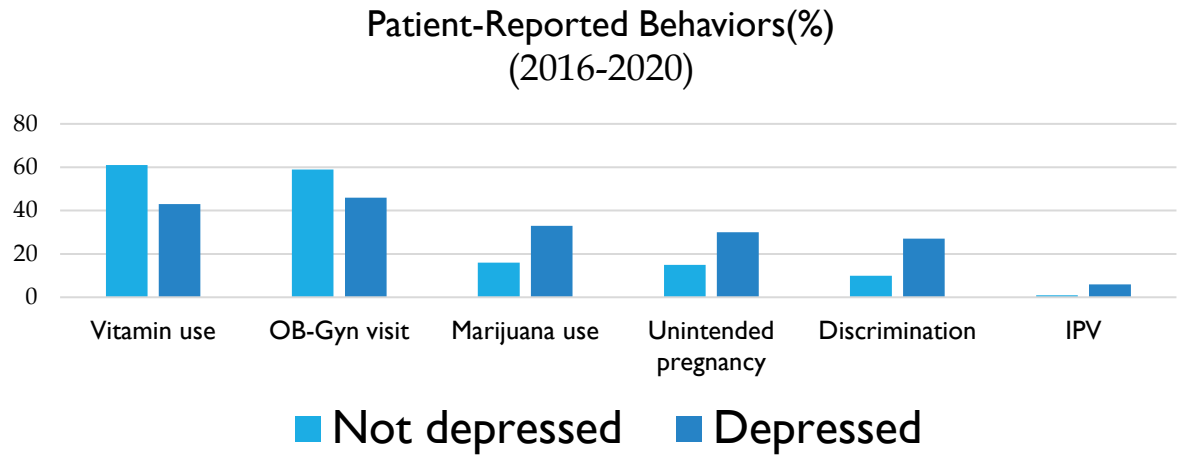
Figure 31. 2022 NH PRAMS Data Brief: Depression and Health Behaviors/Conditions



The proportion of PRAMS survey participants indicating WIC supplemental food use, marijuana use, and discrimination in health services was higher among those participants who also report depression. Breastfeeding past 8 weeks postpartum was more common among participants who did not report depression. These are some of the selected health related behaviors and circumstances included in the PRAMS 2022 survey.

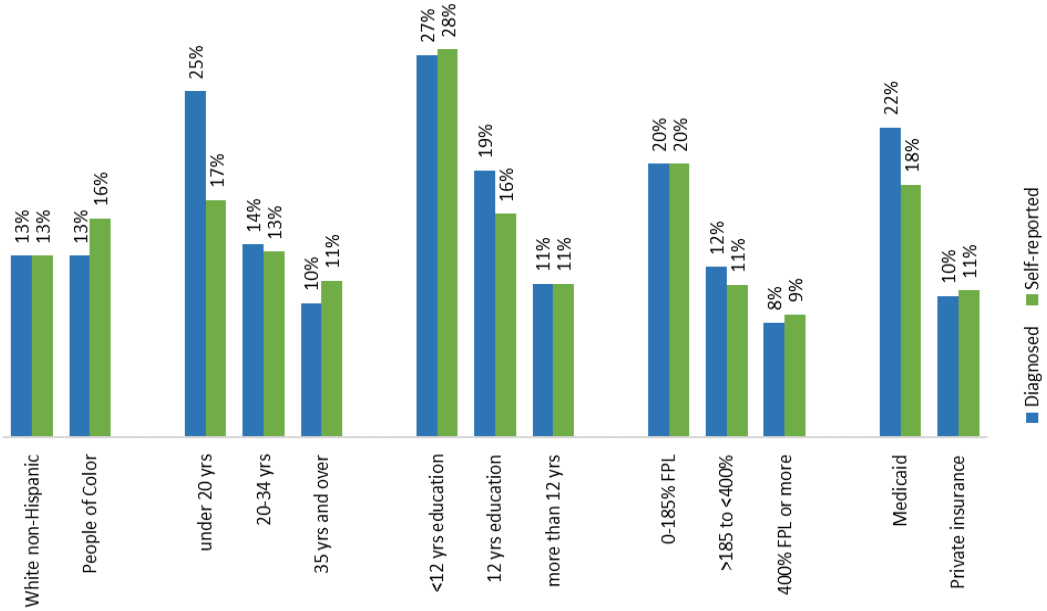
Between 2016-2020, PRAMS survey participants with depression were more likely than participants without depression to report intimate partner violence, discrimination, unintended pregnancy, and marijuana use (see **Figure 32**).[17] Not depressed participants were more likely than depressed participants to report vitamin use and OB/GYN visits (see **Figure 32**).[17] Postpartum depression was more common among birthing people in NH between 2016-2020 who were under age 20, with less than 12 years of education, below 185% Federal Poverty Level (FPL), and who are enrolled in Medicaid (**Figure 33**).[17]

Figure 32. NH PRAMS Data Brief: Depression and Reported Behaviors



Data Source: 2022 NH Prams Data Brief

Figure 33. Postpartum Depression among Sub-Groups* in NH (2016-2020)



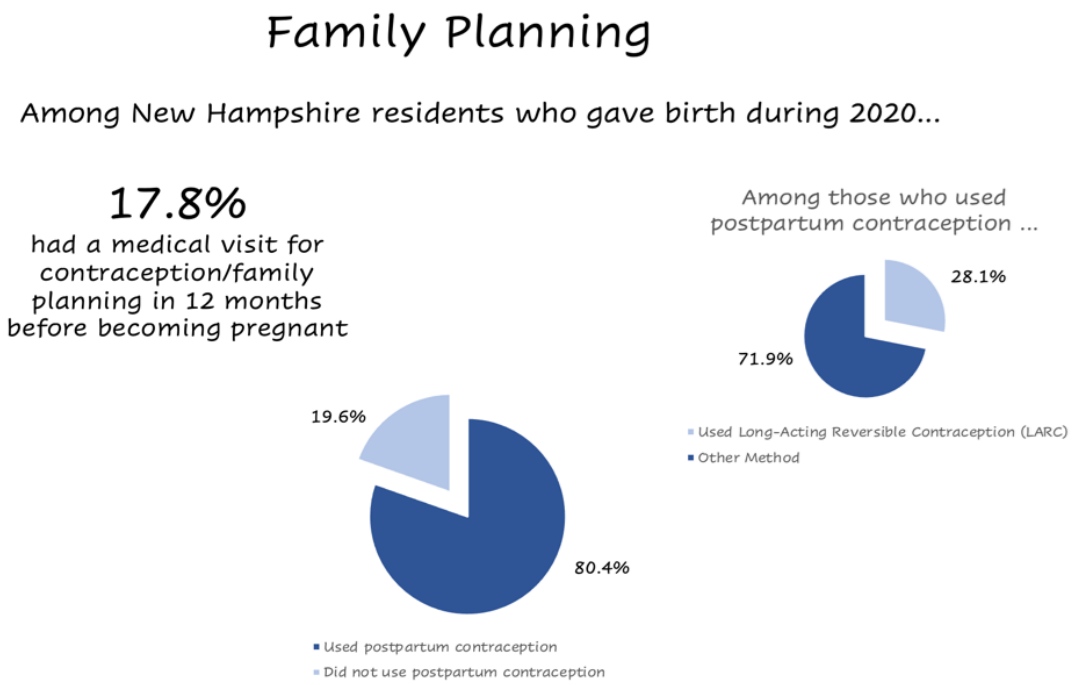
Family Planning

The family planning graphic below illustrates data from the PRAMS survey for residents who gave birth in 2020 in New Hampshire (**Figure 34**).[27] Experiential questions, such as those related to contraceptive use, improve the quality of reporting on maternal health exposures and experiences during the perinatal period.[27] During 2020, 17.8% of birthing people had a medical visit for contraception/family planning in the 12 months before becoming pregnant.[27] Additional resources that provide easily accessible family planning and reproductive health data tools include the County Health Rankings, March of Dimes, and Kaiser Family Foundation. Between 2014-2020, the County Health Rankings reports Coos (19 per 1,000 women aged 15-19 years) and Sullivan (16 per 1,000 women aged 15-19 years) counties as having the highest teen birth rates.[28]

The PRAMS 2020 survey questionnaire includes contraception and family planning access and utilization. Discussion of family planning pre pregnancy is an important indicator to help reduce unwanted pregnancy. Postpartum, 80.4% of respondents used contraception, and 28.1% of these postpartum contraception users elected to use long-acting reversible contraception methods

including the IUD, injection, arm implant. LARC methods are most effective at preventing pregnancy compared to the pill and physical barriers.

Figure 34. Family Planning PRAMS Survey 2020



Data Source: 2020 NH PRAMS Survey | | Graphic: Shea Kelley, MPH

The tables below present data collected using PRAMS survey questionnaire. The data shows the prevalence of various pre-conception topics such as taking vitamins during pregnancy and information received during their pregnancy visit. Other tables report maternal health outcomes for various indicators. This data is similar to publicly available yearly PRAMS data summary.

Preconception Health

Table 5. PRAMS 2020 Summary of Preconception Health Questions

Percent of mothers who...	% [95% CI]
Took a vitamin or folic acid a least once a week during the month before pregnancy	56.2% [51.5-60.8]
Had a healthcare visit (including medical, dental, or mental health) in the year before pregnancy	80.9% [76.9-84.4]

Table 5 continued. PRAMS 2020 Summary of Preconception Health Questions

Pregnancy visits included advice or discussion with a health care worker on ...	
Smoking cigarettes	84.1% [79.9-87.6]
Taking folic acid	39.0% [34.1-44.1]
Feeling down or depressed	70.5% [65.6-74.9]
Emotional or physical abuse	62.1% [56.9-67.0]
Using contraception	39.6% [34.6-44.7]
Maintaining a healthy weight	37.1% [32.3-42.2]
Sexually transmitted infections (STIs)	22.4% [18.4-27.0]
Controlling chronic conditions	8.6% [6.1-12.0]

Insurance

Table 6. PRAMS 2020 Summary of Insurance

In the month before they became pregnant, were enrolled in Medicaid	18.7% [15.1-22.8] *
In the month before they became pregnant, were uninsured	5.9% [4.0-8.8]
Had prenatal care paid by Medicaid	27.5% [23.4-32.1]
Had insurance for dental care during pregnancy	72.2% [67.6-76.3]

*This proportion is smaller than the NH Vital Records report (23.9% in 2020 and 22.5% in 2022)

Maternal Characteristics

Table 7. PRAMS 2020 Summary of Maternal Characteristic[7]

Wanted to be pregnant then or sooner	69.9% [65.3-74.1]
Enrolled in WIC during pregnancy	17.4% [14.0-21.6]
Enrolled in WIC postpartum	20.0% [16.3-24.4]
Had a postpartum check-up	90.3% [86.9-92.9]

Diabetes

Table 8. PRAMS 2020 Summary of Diabetes Health Question

Had diabetes before pregnancy	2.1% [1.2-3.9]
Had gestational diabetes during pregnancy	10.8% [8.2-4.2]
Reported receiving follow-up care for diabetes after giving birth	7.2% [5.0-10.1]

Hypertension

Table 9. PRAMS 2020 Summary of Hypertension Health Questions

Had high blood pressure before pregnancy	4.1% [2.6-6.3]
Had high blood pressure during pregnancy	10.8% [12.4-19.2]
Reported receiving follow-up care for hypertension after pregnancy	9.2% [6.9-12.2]

Lyme Disease

Table 10. PRAMS 2020 Summary of Lyme Disease[7]

Reported ever being diagnosed with Lyme disease	2.6% [1.5-4.6]

Immunizations

Table 11. PRAMS 2020 Summary of Immunization Questions

Reported receiving advice from a health care worker to get a flu shot within 12 months before birth	92.2% [89.3-94.4]
Got a flu shots within 12 months before birth	75.1% [70.8-79.0]
Reported getting a Tdap shot during pregnancy	86.7% [83.2-89.6]

Substance Use

Table 12. PRAMS 2020 Summary of Substance Use

Alcohol	
Drank alcohol in the previous two years	80.1% [76.0-83.7]
Drank alcohol in the 3-months before pregnancy	71.6% [67.1-75.6]

Table 12 continued. PRAMS 2020 Summary of Substance Use

E-cigarettes	
Used e-cigarettes in the previous two years	9.2% [6.8-12.5]
Used e-cigarettes in the 3-months before pregnancy	6.3% [4.3-9.3]
Used e-cigarettes in the last 3-months of pregnancy	1.5% [0.7-3.3]
Marijuana/Hash	
Used marijuana or hash during pregnancy	7.5% [5.5-10.7]
Used marijuana or hash since giving birth	9.2% [6.8-12.5]
Tobacco^	
Smoked cigarettes in the previous two years	17.9% [14.4-22.0]
Smoked cigarettes in the 3-months before pregnancy	15.6% [2.3-19.5]
Tobacco^	
Smoked cigarettes in the last 3-months of pregnancy	5.5% [3.6-8.1]
Smoked cigarettes at the time of the survey (2-6 months postpartum)	6.3% [4.3-9.1]

Understanding Race & Ethnicity in NH Data

Profound racial and ethnic disparities in maternal and perinatal health outcomes exist in the United States.[29] The ability to disaggregate data by race and ethnicity is essential to allow health systems to identify these disparities, trace their root causes, and develop strategies to address them. As part of a statewide perinatal quality initiative focused on improving the use of race and ethnicity data to identify maternal health disparities, a project was completed by professionals with Oregon Health and Science University and Portland States University professionals to assess the accuracy of severe maternal morbidity data contained in the Electronic Health Record (EHR) by comparing it with birth data contained in vital records.[29] Since the EHR is the source for Hospital Discharge Data, the results of this project are far reaching in terms of raising questions regarding the accuracy of demographic data based on health records alone. The race and ethnicity data from the birth record are self-reported and thus is considered the gold standard between these two sources.

For the purpose of quality improvement, NH EHR data were linked with NH vital records birth data for birthing people over a recent multi-year span to assess concordance of race and ethnicity data between the two sources within each of two hospitals in NH (Hospital A and Hospital B). The concordance rate, calculated as the number of concordant pairs divided by the total number of pairs, was assessed. Concordance was strikingly lower when multiple or other than white race was selected (A: 33.9%, B: 53.7%) vs when only white race was selected (A: 80%, B: 97.2%), and similarly for when Hispanic origin was selected (A: 73.1%, B: 58.5%) vs when non-Hispanic origin was selected (A: 96.4%, B: 98%). NH birth certificate data identified nearly 50% more racial diversity than the EHR in Hospital A, and 13% more in Hospital B. This finding raises questions about whether the lower quality of demographic data in NH EHRs results in under-acknowledgement of diversity among birthing people, and whether this may diminish the ability to identify and address disparities in care and clinical outcomes.[29] The results from a similar work were published in 2021 in the American Journal of Epidemiology.[29]

Goal 4: Expand and Diversify the Perinatal Workforce

A significant barrier to maternal health improvements is the lack of adequate staff resources to meet the need. Both clinical (i.e., OB/GYN, Family Medicine providers, a Nurse Midwives, and highly trained perinatal nurses) and non-clinical (i.e., Doulas) members of the maternal health workforce are essential parts of the maternal health care team.[1] As reported by the US Health Resources and Services Administration (HRSA), there is some county level variance in the ratio of OB/GYN provider rates by county across the state.[30] The highest provider rate is in Grafton County where one rural birthing hospital services a large catchment area including many out of state residents (**Table 13**).

Table 13. Hospital and OB/GYN Provider by County in NH

County	Hospitals with Obstetric Care	OB/GYN provider rate per 100,000
Belknapᵠ	0	8.2
Carroll	1	10.2
Cheshire	1	7.9
Coos	1	6.3
Grafton	3	43.3*
Hillsborough	5	14.2
Merrimack	1	12.6
Rockingham	1	8.4
Stafford	1	9.2
Sullivanᵠ	0	11.6

*The Dartmouth Hitchcock Medical Center (academic) is located in Grafton County but serves the entire state as the state's obstetric tertiary care center

ᵠ Belknap and Sullivan counties are identified as rural care maternity deserts. The counties lack a hospital presence.

Data Source: Health Resources and Services Administration (HRSA) Maternal and Child Health. Maternal and Infant Health Mapping Tool. Accessed December 29, 2022.
https://data.hrsa.gov/maps/mchb/?utm_medium=email&utm_source=govdelivery

Belknap and Sullivan counties are identified as rural care maternity deserts[viii] due to the absence of a hospital labor and delivery unit (**Table 13**).[9] An additional way to identify rural care maternity deserts is by OB/GYN provider location. At present, all New Hampshire counties are serviced by at least one obstetrics and gynecology provider.[30] Sullivan is also underserved for mental health providers indicated by a 460:1 ratio of people to provider, ranking lowest of NH counties next to Coos county at 450:1 (**Figure 35**).[31] Again, Sullivan county is among the most underserved NH counties for primary care providers (PCP) by ratio of population to provider (1,400:1) (**Figure 36**).[31] Strafford, Belknap, and Cheshire counties also rank lower on the health index for PCP **(Figure 36),** while Grafton obtains the lowest ratio at 520 residents to every one provider (i.e., 520:1) (**Figure 36**).[31] Diverse service providers including OB/GYNs, PCP, and mental health providers are all essential parts of the maternal health workforce in NH. Ensuring adequate workforce capacity to meet the needs of birthing people in the area will improve accessibility of services.

Figure 35. Mental Health Care Providers Rate in NH by County Health Rankings (2014-2020)

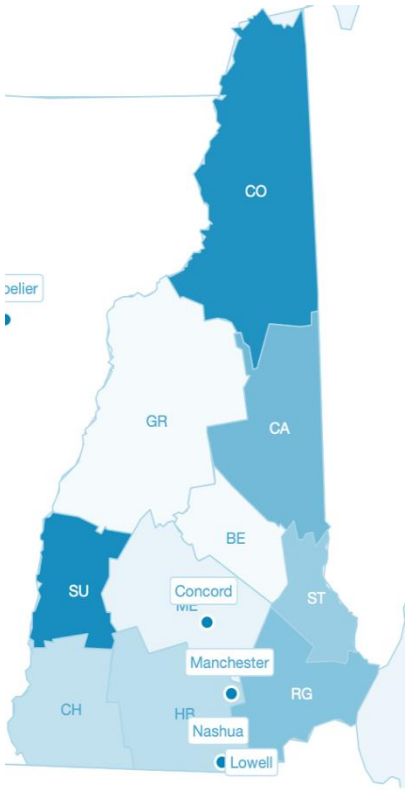
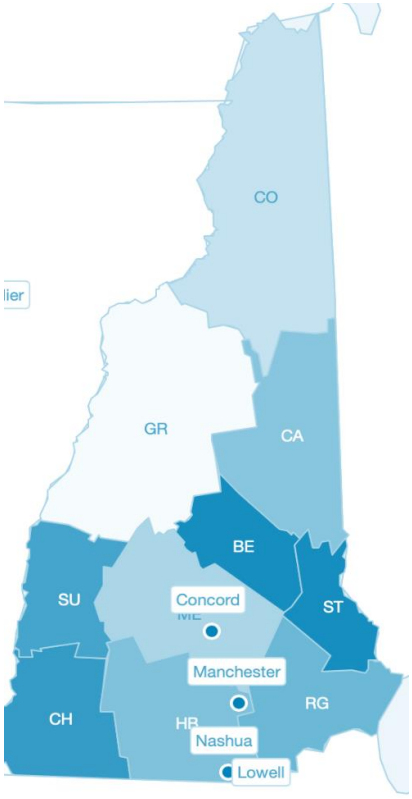


Figure 36. Primary Care Provider Rate in NH by County Health Rankings (2014-2020)



Three NH hospital facilities had at least 25% of their births attended by a CNM in 2021 (**Figures 37**).[9] Certified nurse midwifes were more likely to attend births in rural areas than micro[ix] and

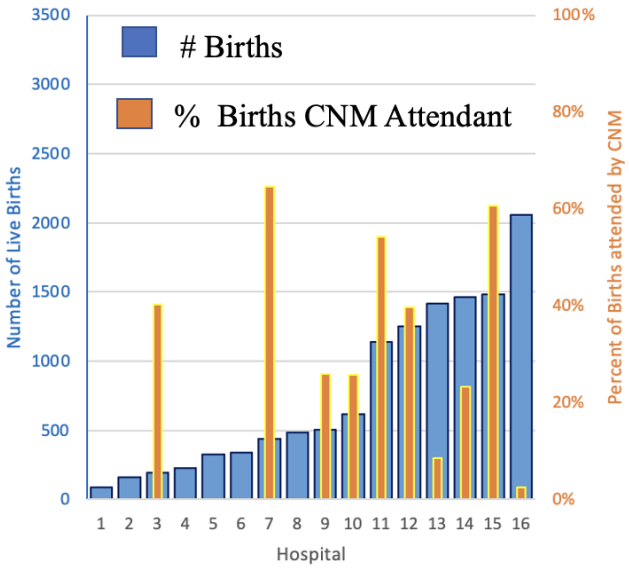
[viii] Rural Care Maternity Deserts: counties lacking a hospital labor and delivery unit

[ix] Rural: Micro: Metro: Metropolitan and micropolitan statistical areas (collectively known as core based statistical areas, or Core Based Statistical Areas and Counties (CBSAs) consist of one or more counties or equivalent entities. 33_New Hampshire_2020 (census.gov)

metro regions of NH in 2021 (34.4% of births in rural, 25.4% in urban, and 27.0% in micro during 2021) [9] Figure 38 presents deliveries by birth attendant across NH birthing hospitals. Rural Birthing hospitals have more births attended by a CNM. This is an important consideration for creating work programs and employment incentives to improve diversification of the perinatal workforce in areas where certain specialties are underrepresented. Additional information on CNM as it pertains to rural and urban areas in NH is under **Goal 1**.

Diversification of the perinatal workforce includes not only diversification of clinical and non-clinical roles, but also training and funding initiatives within the perinatal workforce, primary care physicians, and mental health providers as well. Across the state, the Endowment for Health works to source local residents with the intention of retaining professionals and enhancing the perinatal workforce. To continue expanding the maternal health resources equitably across the state, improving and extending collection of data on the perinatal workforce to include non-clinical workers will be useful in improving overall access and care during pregnancy. More information on birth attendants and workforce is presented in **Goal 1**.

Figure 37. Birth Attendants by Hospital in 2021



Data Source: NH Vital Records

Figure 38 presents birth attendant in each birthing hospital. Most deliveries are attended by a medical doctor (MD) or Doctor of Osteopathic Medicine (DO) while some birthing hospitals have deliveries attended by a certified nurse midwife.

Figure 38. Birth Attendant by Facility, New Hampshire 2019-2022 Hospital Births

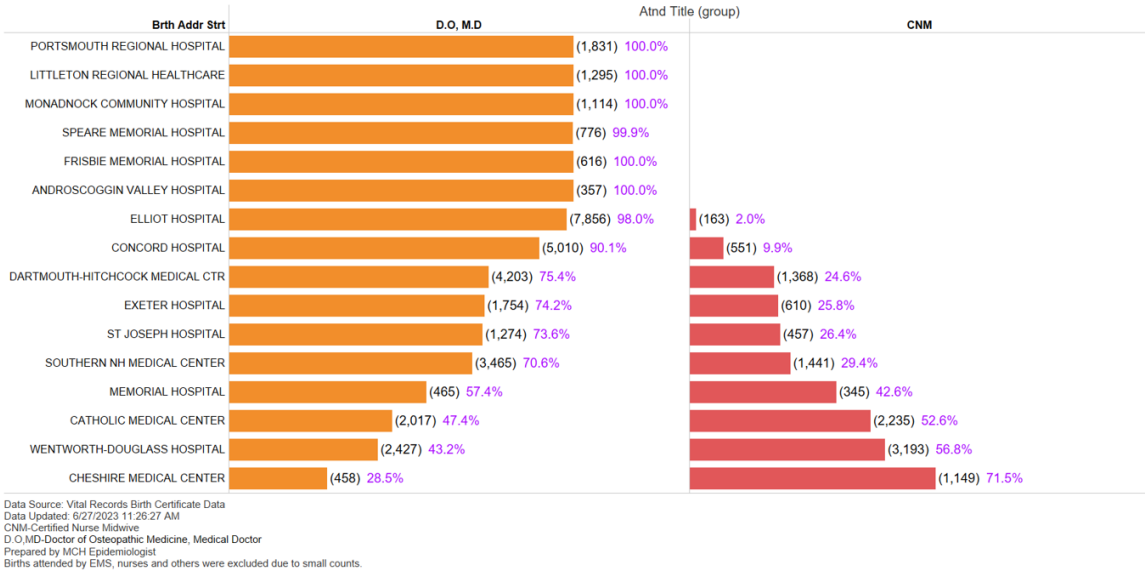
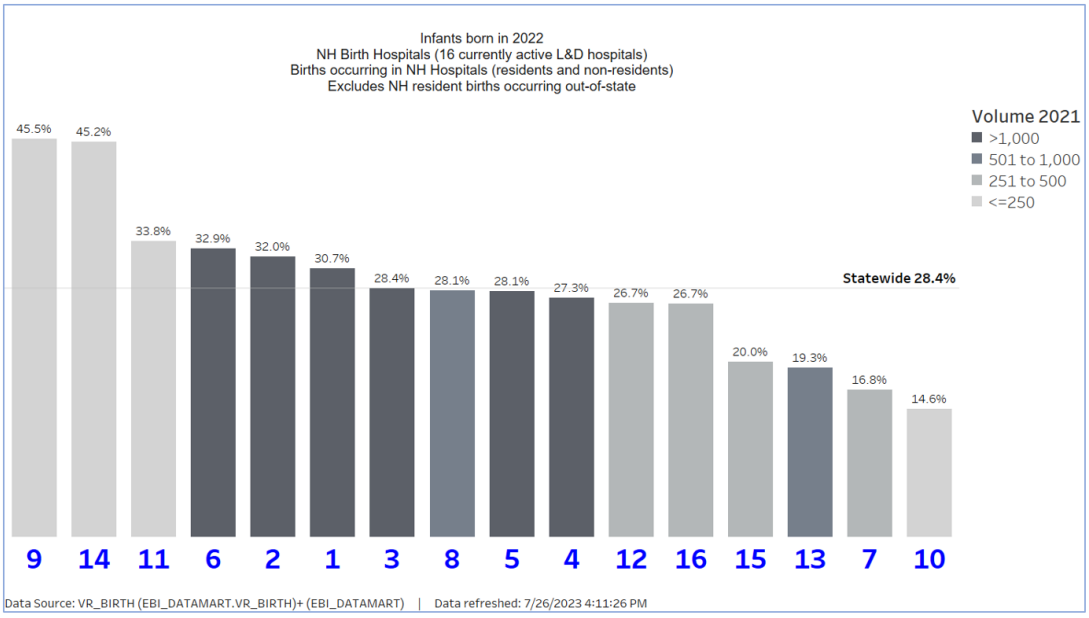


Figure 39 presents the overall NH prevalence of low risk cesarean delivery (aka) Nulliparous, Term, Singleton, Vertex (NTSV) Cesarean Birth and % distribution per birthing hospital. In 2021, the NH rates of NTSV cesarean delivery was 28.7% as compared to 26.3% national rates. NH was ranked 42 out of 51 states in this National performance measure. Measures should be put in place to reduce the increasing NTSV cesarean rates, **Figure 39.** Low volume birthing hospitals have a higher NTSV cesarean rate as compared to high volume birthing hospitals.

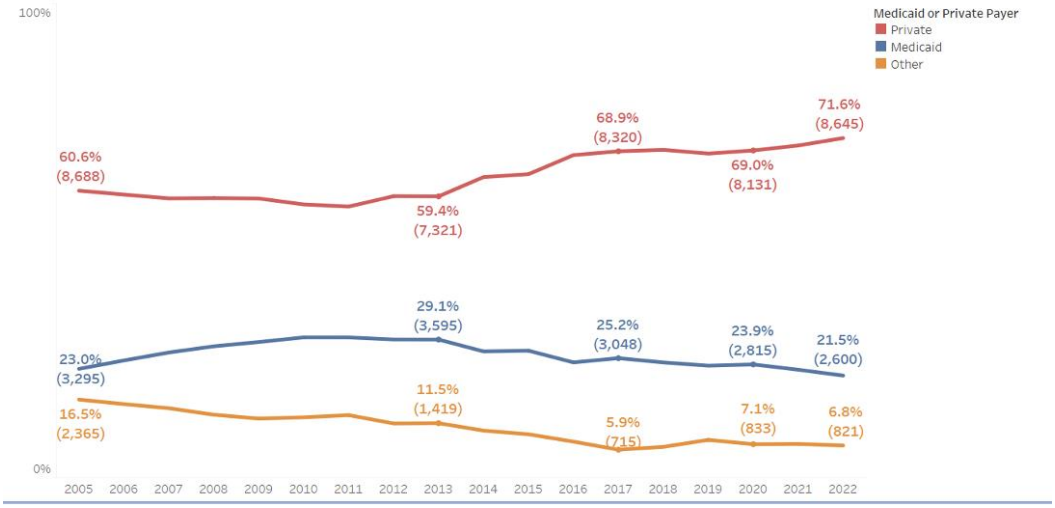
Figure 39. 2022 NTSV Cesarean Rate by NH Hospital, Occurrent Births



Goal 5: Strengthen Economic and Social Support for People Before, During, and After Pregnancy

Since the passage of the Affordable Care Act (2010), states have accepted varying degrees of expansion packages under Medicaid. New Hampshire initially began expanded coverage in 2014.[32] Today, the Granite Advantage Program (i.e., Medicaid Expansion) covers most pregnant women with annual incomes less than 200% of the federal poverty level during pregnancy and up to 60 days post-partum.[32] The state of NH reports a 43% reduction in uninsured rates from 2013 to 2019 among pregnant people, since Medicaid expansion was implemented in 2014.[32] Still, despite reduction in uninsured rates, birthing people who qualify for Medicaid experience more adverse circumstances contributing to poorer health outcomes during the perinatal period in NH (see **Goal 3**).[3] Since 2005, the proportion of resident births in New Hampshire who were privately insured has increased by about 10%, increasing steadily beginning in 2013 (**Figure 40**).[3] After initially increasing from 2005 to 2013, resident births by those insured under Medicaid has decreased by about 1.5%. Other payer methods include uninsured and TRICARE (i.e., veteran health insurance plan) (**Figure 40**). [3]

Figure 40. Trend of Resident Births by Payer (2005-2022)



Data Source: NH Vital Records, Data Analysis: NH MCH Epidemiologist

In 2020, among NH residents who gave birth and completed the PRAMS survey, 27.5% of birthing people insured their pregnancy with Medicaid.[27] Some variation in health outcomes and exposures has been identified in PRAMS surveys among Medicaid compared to privately insured patients. Both social experiences in accessing care, as well as economic stress and difficulty contribute to the observed disparity in health comes among Medicaid financed births. PRAMS has contributed to transparency and representation social and economic experiences of birthing people in NH by incorporating questions about clinical interactions and engagement as well as lived experiences. NH PRAMS has investigated attitudes and perceptions of maternity leave standards across the state (see **Goal 3**). In 2020 among women surveyed who planned to return to work after giving birth, being able to afford to take leave and company paid leave offerings were the most important factors indicated in the PRAMS survey results.[27] The data collected from the PRAMS survey provides insight into the determinants contributing to the maternal health experience of birthing people in NH. Greater transparency of experience allows programs and services to be catered to the unique needs of the birthing population. Special areas of need in NH indicated by the PRAMS results include birthing people with Medicaid payer insurance status and rural status. Other disparities revealed in data apart from economic variables, such as educational attainment, are described under the PRAMS section of **Goal 3**.

These surveys, in addition to publicly reported data available through the Health Resource Service Administration (HRSA) and CDC vital records, enable improved identification and communication of social and economic barriers that may impact maternal health outcomes. **Table 14** below presents data from HRSA on households in poverty and maternal health parameters for the state by county. Sullivan and Belknap counties are identified as rural care maternity deserts and had 7.5% and 6.1% of households in poverty respectively during 2021.[9,30] Coos county had the highest percent of households in poverty by county (8.0% in 2021) (**Table 14**).[30]

Table 14. HRSA Data on Birth Rates, Poverty, and Population Distribution in NH

New Hampshire Birth Rate, Population Distribution, and Proportion of Households in Poverty by County 2021			
County	Birth Rate (per 1,000)	Population Count (Women 15-44 Years of Age)	Households in Poverty (<100% the Federal Poverty Level) (%)
Belknapᵠ	7.9	9,707	6.1
Carroll	6.6	6,595	4.5
Cheshire	8.5	13,974	4.8
Coos	7.3	4,390	8.0
Grafton	7.6	17,205	5.8
Hillsborough	10	78,577	5.1
Merrimack	8.5	27,409	4.0
Rockingham	8.6	52,903	2.9
Stafford	8.9	28,593	4.9
Sullivanᵠ	8.8	7,039	7.5

ᵠ Belknap and Sullivan counties are identified as rural care maternity deserts. The counties lack a hospital presence[3]

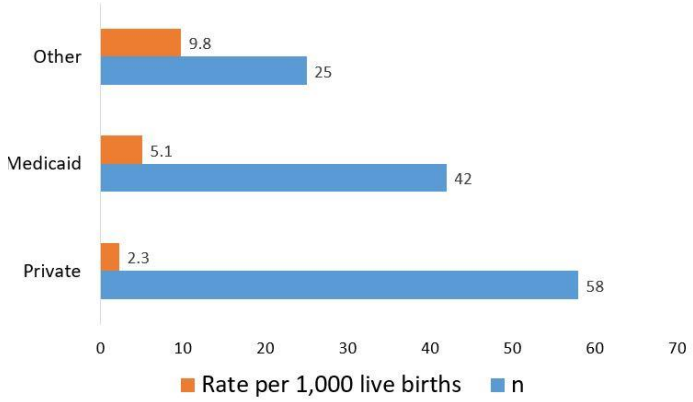
Data Source: Health Resources and Services Administration (HRSA) Maternal and Child Health. Maternal and Infant Health Mapping Tool. Accessed December 29, 2022.
https://data.hrsa.gov/maps/mchb/?utm_medium=email&utm_source=govdelivery

Unplanned birth locations and postpartum care

The rate of unplanned location births between 2020-2022 in NH was highest among the other payer category (9.8 per 1,000 live births) (**Figure 41**).[3] Births under Medicaid accounted for the second highest rate of unplanned births in NH between 2020 and 2022 at 5.1 per 1,000 live births (**Figure 41**).[3] More on unplanned births in NH is available under **Goal 1**.

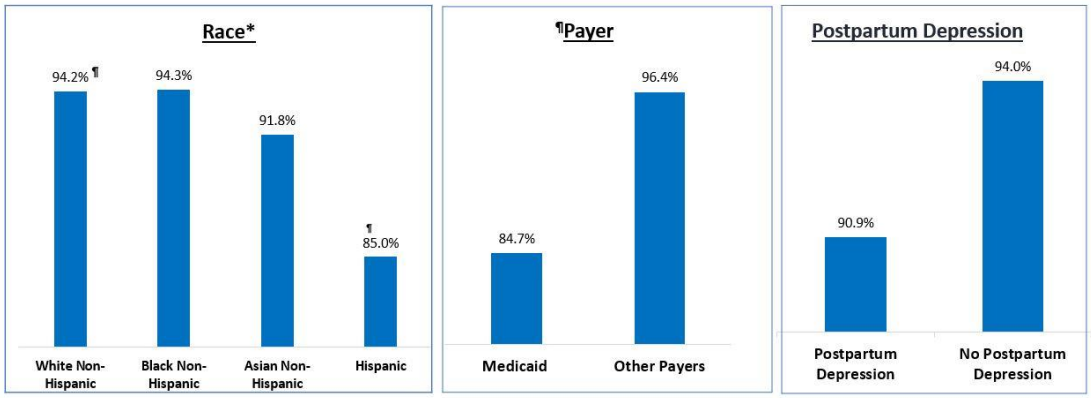
Figure 41. Rate and Count of Unplanned Location Births* by Payer 2020-2022 NH Resident Births

Data Source: NH Vital Records, Data Analysis: NH MCH Epidemiologist.



The figure below indicates that postpartum care by various factors. Birthing people affected by mental health disorders, those ensured by Medicaid and those who identify as non-White non-Hispanic received less care than their counterparts in this PRAMS survey period (**Figure 42**).[17]

Figure 42. Birthing People who Reported a Postpartum Care Visit by Race, Payer and Depression Status (2016-2020)

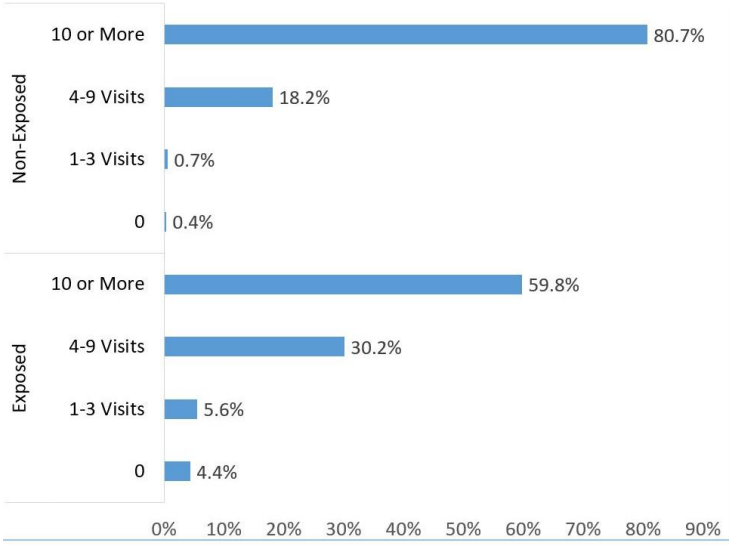


*The numerator for other races (e.g., American Indian, or Alaska Native, Native Hawaiian and more than 1 race) was small (i.e., n<10) hence not presented
¶ the difference between the group is statistically significant (i.e., p<0.05)
Data Source: NH PRAMS Survey 2016-2020, Data Viz.: NH MCH Epidemiologist

Figure 43 illustrates that the proportion of <10 prenatal care visits was higher among birthing people who were exposed to substance use as compared to non-exposed. Majority (76.9%) of those exposed who had less than 10 prenatal care visits were insured by Medicaid as illustrated on Table 4. This indicates that insurance provider, a conduit for income level, is correlated with lower quantity of prenatal care visits among Medicaid payers who were exposed to substance use during pregnancy.[17]

Figure 43. Substance Exposure, Prenatal Care, and Payer Status (2020-2022) NH Full Term Births

Data Source: Vital Records, Data Analysis: NH MCH Epidemiologist.

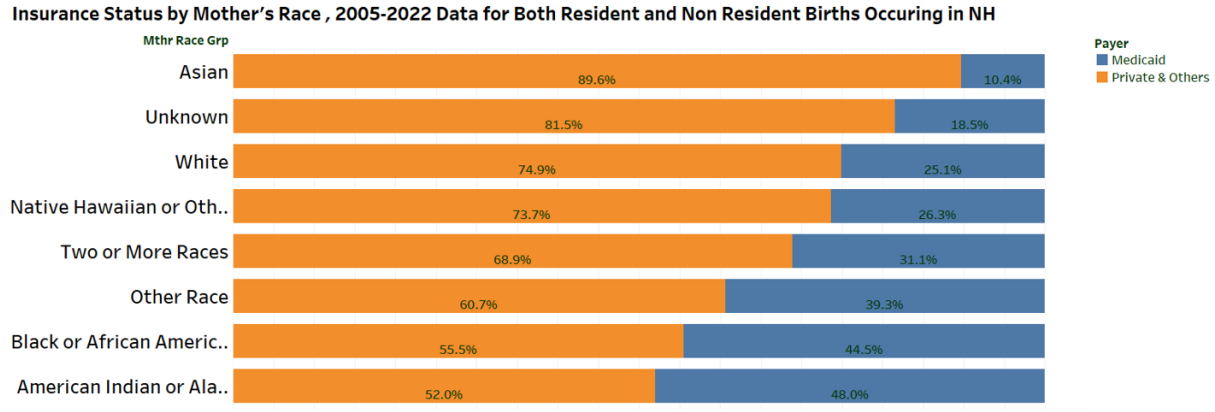


To mitigate the disparity in health outcome and adverse circumstances for birthing people insured by Medicaid, among other disproportionately impacted groups, the Alliance for Innovation on Maternal Health (AIM) patient safety bundles are accessible at no cost online[10]. Patient Safety Bundles are a structured way of improving the processes of care and patient outcomes. They are collections of evidence-informed best practices, developed by multidisciplinary experts, which address clinically specific conditions in pregnant and postpartum people[11]. Currently, NH MCH in collaboration with NH Perinatal Quality Collaborative (PQC) are working with birthing hospitals to implement two of the eight AIM patient safety bundles: Care for Pregnant and Postpartum People with SUD and Perinatal Mental Health Conditions bundle. More information about bundle elements can be obtained online from AIM website [12] and NH bundle implementation topics can be obtained from NNEPQIN website.

Social support during the perinatal period comes from many levels of the larger maternal health systems in the area. While physicians and nurses provide preventative care and screening services, local support groups for pregnant persons provide social support, advocacy, and other community services. At present, sixteen states have Medicaid expansion options to include doula reimbursement and fifteen states acting in relation to doula care under Medicaid.[33] The state of New Hampshire legislator has taken recent action to enact the proposed State Bill 175 (SB175) which mandates that the Department of Health and Human Services extend Medicaid coverage for pregnant women to 12 months postpartum, to cover doula services, to cover lactation services, and to cover donor breast milk for eligible infants, and creates appropriations thereof.[22] Almost half of all births among Black/African American birthing people were paid for by Medicaid between 2005-2022 in NH (**Figure 44**).[3] US studies have demonstrated that adverse health outcomes for birthing people, especially those who identify as Black or African American or are Medicaid by payer, are lessened by improving social support during the perinatal period with doula care supported plans.[33-35]

[10] Patient Safety Bundles For Safer Birth | AIM
[11] https://saferbirth.org/patient-safety-bundles/#what-are-psbs
[12] https://saferbirth.org/patient-safety-bundles/

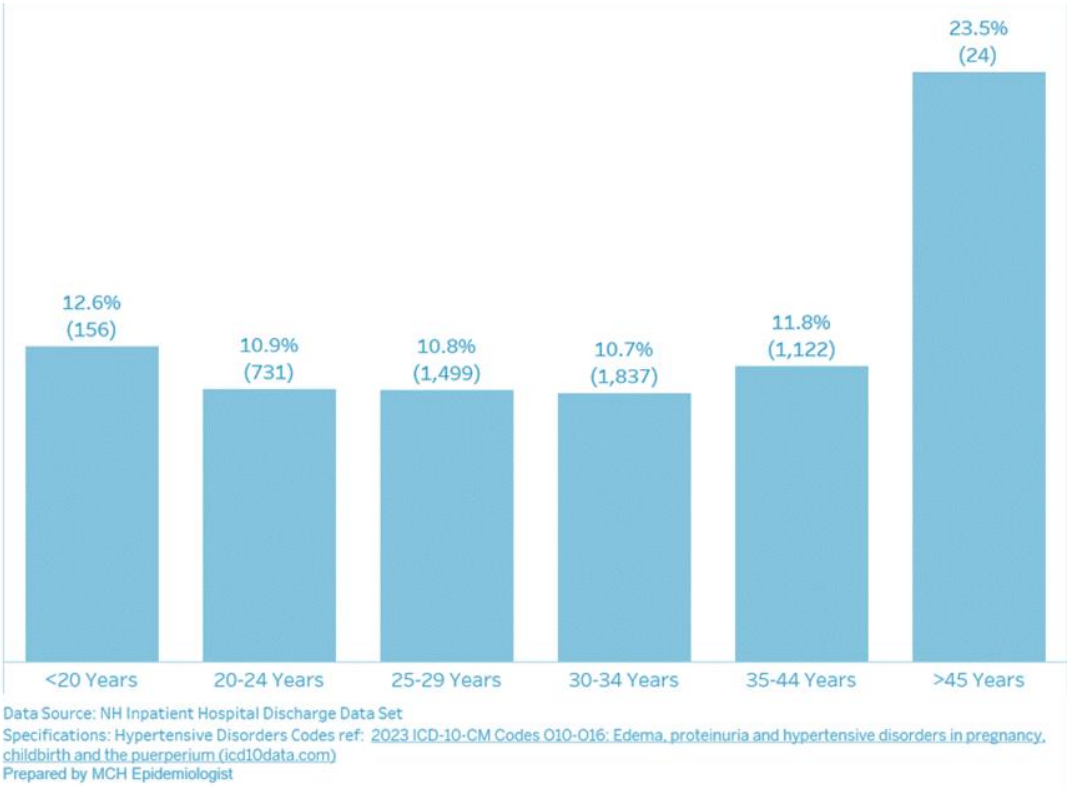
Figure 44. Insurance Status by Mother's Race, 2005-2022 Data for Both Resident and Non-Resident Births Occurring in NH



Data Source: Vital Records, Data Analysis: NH MCH Epidemiologist.

Based on the data presented in **Figures 27 & 43**, NH Medicaid insured birthing people will likely benefit from Medicaid expansion postpartum up to 1 year and to include doula reimbursement as both a social and economic health support. A doula is a non-clinical health worker who provides support during the perinatal period, including transitioning into and out of pregnancy and the workforce.[36] Doulas have been shown to improve both the experience of women during the perinatal period, as well as improve birth outcomes including reduced cesarean section rates among women who utilized doula support during the perinatal period.[33-35] The number of certified and informal doulas is currently not reported in NH or through the United States Bureau of Labor and Statistics (USBLS). Further, maternal age is also a determining factor in majority of maternal outcome. The prevalence of poor outcomes such as preterm births, low birth weight, hypertension and gestational diabetes are higher among younger and older birthing people, **Figure 45.** Social support and education should be provided to birthing people in this age group due to increased risk of poor birth outcomes.

Figure 45. Hypertensive Disorders In Pregnancy by Mother's Age, 2018-2021 NH Inpatient Delivery Hospitalization Data



Summary of New Hampshire Maternal Health Resources

Alliance for Innovation on Maternal Health (AIM) Patient Safety Bundles

https://saferbirth.org/patient-safety-bundles/

Topics: Obstetric hemorrhage, severe hypertension in pregnancy, safe reduction of primary cesarean birth, cardiac conditions in obstetrical care, care for pregnant and postpartum people with substance use disorder, perinatal mental-health conditions, postpartum discharge transition, sepsis in obstetrical care

CDC Enhancing Reviews and Surveillance to Eliminate (ERASE) Maternal Mortality (MM) Project

https://www.reviewtoaction.org/tools/networking-map/new-hampshire

https://www.nnepqin.org/nh-alliance-for-innovation-on-maternal-health-aim-erase-maternal-mortality-morbidity/

After establishing the state's MMRC which began reviewing maternal deaths in 2012, the ERASE MM project in New Hampshire has been active in reducing the impact of substance use disorder on birthing people in New Hampshire.

Hotline for Pregnant and Postpartum Individuals

1-833-9-HELP4MOMS (1-833-943-5746)

The Federal Government launched a new federal hotline for pregnant and post-partum individuals facing mental health challenges in 2022.

Medicaid Registration Portal

https://www.dhhs.nh.gov/programs-services/medicaid

Pregnant individuals may apply for Medicaid in New Hampshire based on the requirements listed on the linked DHHS site.

Patient Family Engagement Council

https://www.dhhs.nh.gov/programs-services/disability-care/developmental-services/children-special-health-care-needs/family

Family centered services and engagement is described on the DHHS site.

Conclusion

Representative data and accessible resources will help to shape the future of maternal health in New Hampshire. As needs become more diverse, equity is at the forefront of public health and clinical work. Understanding regional need and disparity will allow policy makers, birthing people, and the clinical workforce to properly meet the underserved populations in New Hampshire and improve maternal health outcomes for the birthing population. These improvements are essential to improving quality of care for the population of birthing people in the area. This will also reduce the unmet burden of behavioral/mental illness and unplanned location births place on economic resources and emergency facilities, as well as providers. While New Hampshire often scores well in state-by-state comparison of maternal health indicators, improvements especially in data collection of underrepresented racial and ethnic groups, rural care outreach and access, and behavioral and mental health screening services are of top priority for the state. Additionally, understanding what values for indicators such as adequate perinatal care or prenatal workforce rate per region is another area of ongoing research across the nation and state. The disparities and health concerns revealed by granulating data, are best represented, and resolved by incorporating systems thinking, as discussed in the introduction. Conceptual modeling enables public health practitioners to visualize health outcomes and determinants from social, economic, and political spheres of influence and incorporate principals of health equity into solutions[13].

The data presented in this report indicate high (28.5%) cesarean deliveries occur in low-risk pregnancies compared to a national value of 26.3%.[8] This measure could indicate over utilization of care, or unnecessary surgical procedure and therefore risk to birthing people delivering in the area. Further, disparities such as race and payer occur in maternal and birth outcomes. Inadequate prenatal care was also reported among 13.2% of NH birthing population. These are mothers who received care beginning in the fifth month or later of pregnancy or receiving less than 50% of the appropriate number of visits for the infant's gestational age.[8] The NH 2017-2022 maternal death timing data indicates that half of the maternal deaths between 2017-2022 occurred outside of 43 days postpartum (see Table 3 under Goal 3) and substance use overdose was the leading cause of death. The timing, cause, and categorization (i.e., preventability,

[13] https://pubmed.ncbi.nlm.nih.gov/31910039/

pregnancy associated, pregnancy related) determinations of maternal deaths at the state level has improved transparency on maternal mortality for birthing people in NH as well as nationally through the CDC's ERASE Maternal Mortality Grant program.

March of Dimes indicates policy measures including Medicaid expansion, Medicaid extension, midwifery policy, MMRC, PQC, and a doula policy as state level legislative efforts to improve maternal (and infant) health outcomes.[8] In NH, Medicaid extension and doula policy were enacted into law (State Bill 413) and other policy measures recommended by March of Dimes have been implemented. Vital records birth attendant data should be expanded to include doula attendance during birth and the perinatal period to improve statistical representation of the doula workforce in NH or use of Medicaid claims data to determine doula workforce and their effect on maternal health outcomes. The American College of Obstetricians and Gynecologists (ACOG) also recommends doula utilization for continual social support to limit intervention during labor and birth.[37]

The data presented in this report as it pertains to the five goals outlined in the federal administration's *Blueprint* indicate that NH maternal health concerns also represent similar areas of need nationally. Moving forward the NH DHHS and NNEPQIN/NH PQC aim to improve maternal health outcomes and health equity during the perinatal period with programs especially catered toward the rural and Medicaid payer sub-groups of birthing people. Disaggregating existing data by racial and ethnic background over several years will continue to reveal disparities in health outcomes and various social determinants of health to guide data driven interventions. New Hampshire is a comparatively safe state for birthing people as shown by maternal health outcome indicators including maternal mortality and morbidity compared to other regions in the US. New targeted interventions should be recommended in addition to existing ones to assist impacted birthing people in NH including rural residing and Medicaid payer groups, as well as minimizing racial and ethnic disparities in maternal health outcomes.

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Glossary

Kotelchuck Index aka Adequacy of Prenatal Care Utilization (APNCU)

"The index attempts to characterize prenatal care (PNC) utilization on two independent and distinctive dimensions - namely adequacy of initiation of PNC and adequacy of received services (once PNC has begun). The index uses information readily available on U.S. birth certificates (month of initial PNC visit, number of visits, and gestational age). It is a major improvement over existing indices and is consistent with the 1985 American College of Obstetricians and Gynecologist (ACOG) recommendations for PNC utilization. This index does not assess quality of the prenatal care that is delivered, only its utilization."[13]

Pregnancy-Associated Death

A death during or within one year of pregnancy, regardless of the cause. These deaths make up the universe of maternal mortality; within that universe are pregnancy-related and pregnancy-associated, but not related deaths.[4]

Pregnancy-Associated, but not Related Death

A death during or within one year of pregnancy, from a cause that is not related to pregnancy.[4]

Pregnancy-Related Death

A death during or within one-year of pregnancy, from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.[4]

Preventability

A death is considered preventable if there was at least some chance of the death being prevented by one or more reasonable changes to patient, family, provider, facility, system, and/or community factors. This definition is used my MMRCs to determine if a death they review is preventable.[4]

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