Recommendations for Maternal Health and Infant Health Quality Improvement in Medicaid and the Children's Health Insurance Program

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JudyAnn Bigby, Jodi Anthony, Ruth Hsu, Chrissy Fiorentini, and Margo Rosenbach

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7500 Security Blvd.
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Submitted by:

Mathematica
955 Massachusetts Avenue
Suite 801
Cambridge, MA 02139
Telephone: (617) 491-7900
Facsimile: (617) 491-8044
Project Director: Margo L. Rosenbach, Ph.D.

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Introduction

Maternal and infant health are critical to the health of the nation. Many of the health conditions that determine whether a pregnancy ends in a healthy outcome for the woman and/or for the infant impact health for a lifetime and may transmit adverse health to future generations (Lane-Cordova et al. 2019; Cheong et al. 2016). Maternal and infant health outcomes in the United States are cause for concern, especially among America's most vulnerable populations, because they lag behind outcomes in other developed nations.

Medicaid and the Children's Health Insurance Program (CHIP) provide an important safety net for some of America's most vulnerable populations and have led important efforts to improve the quality of care and health outcomes among these groups. The Centers for Medicare & Medicaid Services (CMS) Center for Medicaid and CHIP Services (CMCS) Quality Improvement (QI) Program supports state Medicaid and CHIP agencies and their QI partners to improve health outcomes for their beneficiaries.[1] CMCS tracks improvement in quality through performance on the Medicaid and CHIP Child Core Set and Adult Core Set measures. To monitor progress on improving quality in maternal and infant health, CMCS identified the Core Set of Maternal and Perinatal Health Measures for Medicaid and CHIP and provides technical assistance to states to help them report these measures.[2]

In this report we describe the opportunities for improving maternal and infant health outcomes among Medicaid and CHIP beneficiaries. We describe the work of the Expert Workgroup on Maternal and Infant Health, convened in 2019 and 2020, which reviewed approaches to improving maternal and infant health outcomes for Medicaid and CHIP beneficiaries. Finally, we describe possible strategies for improving maternal and infant health for Medicaid and CHIP beneficiaries and the use of three of the Maternal and Perinatal Health Core Set measures (cesarean sections for low-risk pregnancies, attendance at postpartum care visits, and number of well-child visits in the first 15 months of life) to monitor progress.

Poor outcomes and disparities call for urgent actions to improve maternal and infant health

Key indicators of maternal and infant health point to opportunities to improve maternal health and infant health outcomes. Indicators of maternal health include maternal mortality[3] and severe complications from pregnancy and childbirth. As a health indicator maternal mortality reflects not only overall health status for pregnant and postpartum women, but it is also widely accepted as a reflection of the national health system, including the strengths and weaknesses of intersectoral collaboration, transparency, and disparities (Sajedinejad et al. 2015). The United States has the highest rate of maternal mortality from complications of pregnancy or childbirth among high-income countries (Gunja et al. 2018). In addition, although the maternal mortality rate in the United States is lower than the overall global mortality rate, it increased by more than 56 percent between 2000 and 2017 while the global rate declined by 38 percent (World Health

Organization 2019). Annually, approximately 700 women in this country die from pregnancy-related complications and approximately 60 to 66 percent of pregnancy-related deaths are preventable (CDC 2019; Davis et al. 2019; Petersen et al. 2019). In addition, there are significant racial and ethnic disparities in pregnancy-related deaths—which are three to four times more common among Black and American Indian/Alaska Native women than among White women (Creanga et al. 2017, Petersen et al. 2019).

Infant mortality is also considered an indicator of the nation's health. Though the overall infant mortality rate in the United States has fallen over the past decade, more than 21,000 infants died in 2018 (Ely and Driscoll 2020). In 2016, the risk of death was 76 percent greater for infants in the United States compared to the risk in 18 other Organization for Economic Cooperation and Development (OECD) nations and the United States infant mortality rate ranked the highest of the 19 nations (Thakrar et al. 2018). In 2018, the U.S. infant mortality rate was 1.5 times higher than the rate in the United Kingdom.[4] Furthermore, there are persistent and significant disparities in the infant mortality rate among racial and ethnic groups. Infant mortality is significantly higher among Blacks and American Indians/Alaska Natives than among Whites (Ely and Driscoll 2019).

The role for Medicaid and CHIP to improve maternal and infant health

CMCS, in partnership with state Medicaid and CHIP programs, is well-positioned to develop initiatives to improve maternal health and infant health outcomes and to reduce disparities.

- Two of three adult women enrolled in Medicaid[5] are in their reproductive years, ages 19 to 49. Additionally, Medicaid is the largest single payer of pregnancy-related services. In 2018 Medicaid financed 42.3 percent of all births in the United States and even higher percentages of births among Black, American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, and Hispanic women (Martin et al. 2019).
- Medicaid covered 38 percent of all children and 83 percent of children in households with incomes below 100 percent of the federal poverty level (Rudowitz et al. 2019).
- Medicaid and CHIP serve the country's lowest-income populations, and the Medicaid and CHIP delivery system provides services and care to meet the unique needs of those populations, including pregnant women.

Percentages of births in the United States covered by Medicaid, 2018

- 42.3% of all births
- 65.3% of births to Black women
- 66.2% of births to American Indian or Alaska Native women
- 58.9% to Native Hawaiian or other Pacific Islander women
- 58.9% of births to Hispanic women
- 30.1% of births to White women
- 24.1% of births to Asian women

(Martin et al. 2019)

- Medicaid and CHIP programs have increased the use of the managed care delivery system to improve quality of care for Medicaid and CHIP beneficiaries, including for woman and infants. Forty-five states provide comprehensive managed care and 70 percent of all Medicaid beneficiaries received their care through comprehensive managed care arrangements as of July 1, 2018.[6] Managed care organizations (MCOs) bring additional resources to serve Medicaid and CHIP beneficiaries, such as care coordination, and may provide additional benefits, such as car seats for infants. In addition, state Medicaid and CHIP programs can use contractual mechanisms to hold MCOs accountable for improving maternal and infant care, for example, through performance measurement, performance improvement projects, or value-based purchasing initiatives.

In June 2012, CMS convened an Expert Panel on Improving Maternal and Infant Health Outcomes in Medicaid and CHIP to explore program policy and reimbursement opportunities that could result in better care, improve birth outcomes, and reduce the costs of care for mothers and infants in Medicaid and CHIP. Based on the Expert Panel's recommendations, CMS launched the Maternal and Infant Health Initiative (MIHI) in 2014. The initiative had two primary goals: (1) to increase the rate of postpartum visits among pregnant women in Medicaid and CHIP in at least twenty states over a three-year period; and (2) to increase use of the most effective and moderately effective methods of contraception in at least twenty states over a three-year period.[7]

Five years into the MIHI, CMS contracted with Mathematica to convene a Maternal and Infant Health Expert Workgroup starting in 2019 to help chart the trajectory for the next five years for MIHI. This Workgroup included 19 members, who represented a diverse set of stakeholders based on affiliation, subject matter expertise, and experience with Medicaid and CHIP, including 10 representatives from federal agencies (see Appendix B). It also included some members of the 2012 MIH Expert Panel to ensure a sense of continuity and historical perspective.

In this report, we summarize recommendations for improving maternal and infant health outcomes for beneficiaries enrolled in Medicaid and CHIP through a combination of federal and state strategies in three focus areas: (1) cesarean section births among women at low-risk for complications during pregnancy and delivery, (2) improved postpartum care, and (3) improved well-child visits. The recommendations are informed by the MIH Expert Workgroup and by Mathematica's analysis of existing data on maternal and infant health outcomes among Medicaid and CHIP beneficiaries.[8] Mathematica is providing these recommendations to CMCS to support (1) setting goals for improving maternal and infant health over the next five years and (2) developing new technical assistance opportunities and resources to assist states in improving health outcomes for women and infants enrolled in Medicaid and CHIP.

Opportunities to Improve Maternal and Infant Health

Maternal health

Adverse maternal health outcomes are an ongoing source of concern for CMCS. About 700 women die from pregnancy-related complications in the United States each year and about 60 to 66 percent of pregnancy-related deaths are preventable (Davis et al. 2019; Petersen et al. 2019). Although the number of pregnancy-related deaths is low, more than 50,000 women annually experience severe maternal morbidity (SMM) during labor and delivery, resulting in acute medical conditions with lasting consequences (American College of Obstetricians and Gynecologists [ACOG] et al. 2016; Callaghan et al. 2012).

Moreover, racial and ethnic disparities in maternal morbidity and mortality rates remain unacceptably large in the United States (Jain et al. 2018). Black and American Indian/Alaska Native women are three to four times more likely than White women to die from pregnancy-related complications and more likely to have a preventable death (Petersen et al. 2019). Black and Hispanic women have higher rates of SMM than White women. SMM rates are similar for women enrolled in Medicaid and for uninsured women (175.0 and 176.5 per 10,000 delivery hospitalizations, respectively). These rates are higher than the SMM rate of 120.8 for women whose delivery was paid for by private insurance (Fingar et al. 2018).

Several factors associated with adverse maternal outcomes are more prevalent among women with Medicaid coverage. Among women ages 15 to 49, those with Medicaid coverage reported higher rates of obesity, high blood pressure, and diabetes than women with private insurance (MACPAC 2018). Analysis of birth certificate data reveals that 7.2 percent of women with Medicaid had a subsequent pregnancy less than six months after a previous live birth, compared to 3.0 percent of women with private insurance and 5.1 percent of women with self-pay status.[9, 10] This is cause for concern because women who have short pregnancy intervals are at increased risk for adverse fetal and infant outcomes, spontaneous preterm delivery (before 37 weeks gestation), and maternal mortality or severe maternal morbidity (Schummers et al. 2018).

As such, effective strategies to improve maternal health integrate a life course approach that focuses on comprehensive women's health care. These strategies include management of underlying chronic diseases and other conditions before pregnancy, during pregnancy, during the postpartum period, after the postpartum period, and between pregnancies (Witt et al. 2011; Verbiest et al. 2016; ACOG 2018; Margerison et al. 2020). Access to health care throughout a woman's reproductive years, particularly before pregnancy, is essential for the prevention, early detection, and treatment of many of the conditions that place women at higher risk for pregnancy-related complications. These conditions include short interval repeat pregnancies, cardiovascular disease, diabetes, and chronic hypertension. In addition, issues such as mental health conditions and domestic violence are amenable to early intervention and can affect women's health status before, during, and after pregnancy. Women who become pregnant while

they are uninsured receive delayed prenatal care and fewer prenatal care services than insured women (Institute of Medicine 2002). A significant percentage of women with Medicaid coverage during pregnancy reported that they lost Medicaid and became uninsured after pregnancy,[11] which decreased their ability to access care.

Infant health

Adverse infant health outcomes and disparities also call for urgent action. Although the overall infant mortality rate in the United States has fallen over the past decade, in 2019 the United States ranked 34th among OECD countries on infant mortality.[12] Research shows notable disparities in this area. The rate of infant mortality was higher for Blacks and American Indians or Alaska Natives than for Whites (Ely and Driscoll 2019). And the infant mortality rate for deliveries paid for by Medicaid in 2017 was 7.4 deaths per 1,000 live births, compared with 4.3 deaths for deliveries paid for by private insurance and 6.5 deaths for women with self-pay status.[13]

Not all infant deaths are preventable. However, several conditions that contribute to infant mortality are amenable to intervention. Improving the care of women before they become pregnant, prenatal care, and well-child care provide opportunities to prevent congenital malformations, treat congenital anomalies of the fetus during pregnancy, prevent preterm births and low birth weight, prevent sudden unexpected infant death (SUID), and prevent unintentional injuries, which are among the top causes of infant mortality (Ely and Driscoll 2019). Preterm births and low birth weight are leading causes of infant death among non-Hispanic Blacks (Murphy et al. 2018). In 2018, 11.2 percent of live births paid for by Medicaid were preterm deliveries, compared with 9.1 percent of births paid for by private insurance and 8.8 percent of self-pay births.[14]

Mortality rates from SUID, which includes all deaths from sudden infant death syndrome (SIDS) and from accidental suffocation, are also higher among Medicaid births than among births paid for by other payers. In 2017, the SUID rate was 154.4 deaths per 100,000 live births paid for by Medicaid, 40.5 deaths per 100,000 live births paid for by private insurance, and 80.0 deaths per 100,000 self-pay live births.[15] SUID rates per 100,000 live births for American Indian/Alaska Native (212.1) and non-Hispanic Black infants (186.9) were more than twice those of non-Hispanic White infants (84.9).[16] Risk factors for SUID include lower rates of breastfeeding and unsafe sleep practices, both of which are prevalent among Medicaid beneficiaries and other low-income populations (Child and Adolescent Health Measurement Initiative 2017; Bombard et al. 2018).

Recommendations

Workgroup recommended aims

1. Eliminate preventable maternal mortality, SMM, and inequities
2. Reduce infant mortality and eliminate inequities in infant mortality rates

Mathematica convened the Maternal and Infant Health Expert Workgroup in August 2019 to identify actions that Medicaid and CHIP could take that are feasible and could significantly improve outcomes for Medicaid and CHIP beneficiaries. First, the Workgroup identified two specific aims: (1) eliminate preventable maternal mortality, SMM, and inequities; and (2) reduce infant mortality and eliminate inequities in infant mortality rates. Second, the Workgroup deliberated on the most powerful drivers of maternal mortality and morbidity and of infant mortality and noted that maternal health status before, during, and after pregnancy is an important driver for both maternal and infant health. Other system-level drivers the Workgroup identified include health insurance coverage and access to care, availability of women-centered models of care[17], and attention to unwarranted variations in care. To identify high-priority actions that are related to these drivers and relevant for CMCS, the Workgroup proposed and then ranked actions based on their importance in improving maternal and infant outcomes and their feasibility of implementation. Workgroup members also identified cross-cutting issues necessary for Medicaid and CHIP programs to achieve these aims. The cross-cutting issues include achieving health equity; enhancing quality improvement systems, infrastructure, and data sytems; and standardizing maternal and infant health quality measures. Mathematica reviewed the deliberations of the Workgroup to inform the final recommendations presented in this report and identified three Core Set measures that are available to track progress if these recommendations are adopted and implemented. This process resulted in three recommended quality improvement focus areas for the next phase of the MIHI:

1. Strategies to decrease cesarean births among pregnant women who are at a low risk for complications from childbirth. Low risk conditions are defined as nulliparous (first-time pregnancies), term (37 or more weeks gestation), singleton, vertex (head facing down in the birth canal) or NTSV births.
2. Strategies to increase the use and quality of postpartum care visits.
3. Strategies to increase the use and quality of well-child visits.

Mathematica reviewed quality improvement initiatives, including efforts by state Medicaid and CHIP programs, to assess the feasibility of implementing change activities that would result in improved outcomes in these focus areas. The Workgroup emphasized the need to address disparities between Medicaid and CHIP beneficiaries and those with other coverage, disparities between the highest- and lowest-performing state Medicaid and CHIP programs, and disparities in outcomes for populations from racial and ethnic minority groups. Implementing strategies to address these areas of focus has the potential to improve outcomes across the continuum of maternal health care and the continuum of infant health care (Figure 1).

In the following sections, we describe the recommendations for each quality improvement focus area, strategies to achieve the desired outcomes within each focus area, and possible measures in addition to the Core Set measures to track progress. Several of the strategies are relevant to more than one focus area.

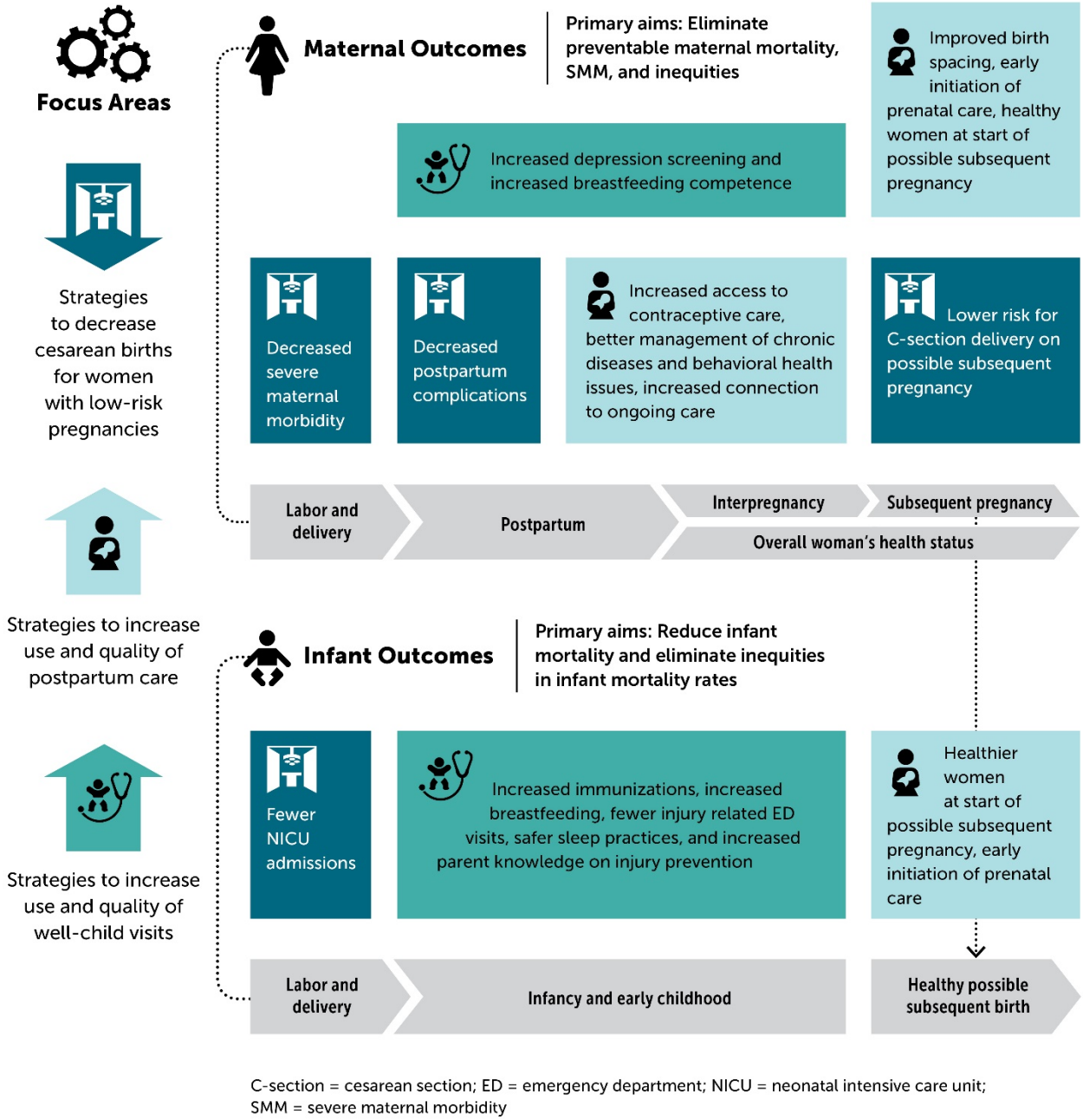
We conclude with a section on cross-cutting, foundational strategies for improving health outcomes in these three quality improvement focus areas, including strengthening the quality improvement capacity of state Medicaid and CHIP programs; improving the data, data systems, and measures critical for monitoring progress; and addressing the significant disparities in maternal health and infant health outcomes described in this report.

Recommended focus area 1: Decrease cesarean births for women with low-risk pregnancies

One factor associated with rising maternal morbidity is the increased use of cesarean sections. Between 1998 and 2008, cesarean birth rates increased in the United States by 50 percent (Main et al. 2012), and maternal morbidity also increased. While the increase in morbidity was partly due to worsening trends in underlying maternal health conditions such as obesity, diabetes, and hypertension before and during pregnancy, these conditions alone do not explain the increase in maternal morbidity (Gunja et al. 2018). Reducing the rate of cesarean births for women who have a low risk for poor pregnancy outcomes provides an opportunity to improve outcomes for both mothers and infants. Low-risk pregnancies include those that are first-time, term (ending in a birth at 37 weeks or greater gestation), a single baby, and with the baby in the vertex or head down position (NTSV). Cesarean section for women with low-risk pregnancies is an overused procedure that has not led to better outcomes for infants or women (Clark and Silver 2011; Gregory et al. 2011; Goer et al. 2012).

Cesarean section involves more risk to women and infants than vaginal birth. It is associated with increased neonatal intensive care unit admissions (Childbirth Connection 2004). Maternal complications include infections, blood clots, and the need for an emergency hysterectomy. Moreover, following the first cesarean, there is only about a 10 percent likelihood of a subsequent vaginal delivery (Osterman and Martin 2014), and women with a history of previous cesarean births have a higher risk of maternal morbidity (Curtin et al. 2015). Adverse reproductive effects include decreased fertility and increased risk of miscarriage and ectopic pregnancy (Clark and Silver 2011). Delays in production of milk and postoperative pain after cesarean births also contribute to lower rates of breastfeeding and earlier cessation of breastfeeding compared to women who have vaginal births (Karlström et al. 2007; Kozhimannil et al. 2013a; Hobbs et al. 2016). Breastfeeding is universally recommended as the best source of nutrition for most infants and is associated with lower risk for some health conditions for both infants and mothers, so decreases in breastfeeding can contribute to adverse health outcomes (U.S. Department of Health and Human Services 2011). These trends provide compelling reasons to recommend a focus on strategies to decrease unnecessary cesarean deliveries.

Figure 1. Focus areas to improve maternal and infant health quality



C-section = cesarean section; ED = emergency department; NICU = neonatal intensive care unit; SMM = severe maternal morbidity

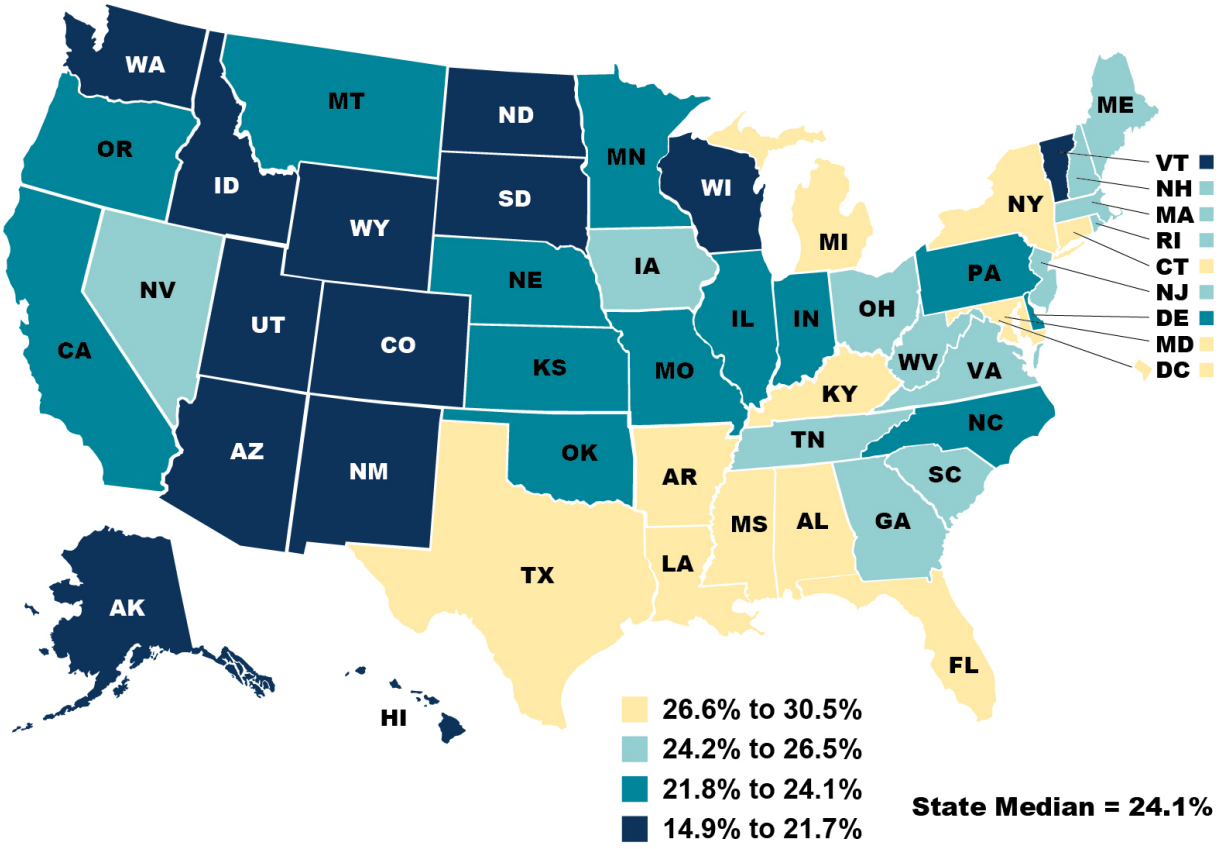
Variation in rates of cesarean births among women with low-risk pregnancies

While there is no consensus on the ideal rate of cesarean births for women with low-risk pregnancies, many authorities suggest the rate should be around 15 percent with a range of 10 to 19 percent (Joffe et al. 1994; Molina et al. 2015; World Health Organization 2015; Montoya-Williams et al. 2017). The rate of cesarean births among women with low-risk pregnancies in the United States slightly decreased from 27.5 to 25.9 percent from 2010 to 2018. However, this trend was most marked among non-Hispanic White women; in 2018 non-Hispanic Black women

had a 22 percent higher rate of cesarean births for low-risk pregnancies compared to White women (Martin et al. 2019).

As shown in Figure 2, in 2018 cesarean birth rates for low-risk pregnancies paid for by Medicaid varied by state. While the state median was 24.1 percent, rates ranged from 14.9 to 30.5 percent. The variation in the use of cesarean sections to deliver low-risk pregnancies is not explained by medical conditions and presents an opportunity for quality improvement.

Figure 2. Low-risk cesarean delivery rate per 100 deliveries, by state: Births paid by Medicaid, 2018 (lower rates are better)



Source: Mathematica analysis of National Center for Health Statistics 2018 Natality Public Use Data on CDC WONDER online database.

Approaches to decreasing cesarean births among women with low-risk pregnancies

For all the reasons provided above, reducing the rate of caesarean births among women with low-risk pregnancies in states with the highest rates is an important strategy to reduce the overall rate of cesarean births for low-risk pregnancies (ACOG et al. 2014). Approaches that are associated with lower rates of cesarean births include (1) women-centered models of care using medical and nonmedical personnel to support women, including women of color, through

pregnancy, labor, and delivery; (2) reforming maternity care payments; and (3) using quality improvement strategies. Below, we discuss these approaches, focusing on strategies that are most relevant to federal and state Medicaid and CHIP authorities.

Increasing use of women-centered care models. Increased use of non-physician providers and birth centers for low-risk births is associated with lower rates of cesarean sections without compromising the health of women or infants. In one study, compared with women who intended to give birth in an obstetric unit, women who intended to give birth in a freestanding midwifery unit were more likely to have an uncomplicated, spontaneous birth with good outcomes for mother and infant, and less likely to require caesarean section, instrumental delivery, augmented labor, or epidural analgesia (Christensen and Overgaard 2017). Similar outcomes were seen with midwifery practices integrated into team-based models of perinatal care (Carlson et.al. 2019). Additionally, increasing women's access to nonmedical interventions such as doula support during labor and delivery has been shown to reduce cesarean birth rates (Kozhimannil et al. 2013b; ACOG et al. 2014). Women who used birth centers also had lower rates of cesarean sections (Urban Institute 2018).

Implementing payment reforms. Another important strategy for incentivizing changes in maternal health care practice to reduce medically unnecessary cesarean sections is payment reform. In one Medicaid program, for example, implementing a single, blended payment to facilities and clinicians for uncomplicated births mitigated the trend toward greater use of cesarean deliveries, without raising maternal morbidity (Medicaid and CHIP Payment and Access Commission 2019). Payment is a powerful tool to hold individual providers and hospital systems accountable if they fail to provide unbiased, high-quality, evidence-based care for Medicaid and CHIP beneficiaries and women of color.[18]

Using quality improvement strategies. Initiatives that focused on quality improvement have been successful in reducing the use of cesarean sections for low-risk pregnancies (Dahlen et. al. 2017; Johri et al. 2017; Wise and Jolles 2019). For example, perinatal quality collaboratives (PQCs) [19] have been successful in decreasing medically unnecessary cesarean births (Callaghan-Koru et. al. 2019; Main et al. 2019), as well as the Alliance for Innovation on Maternal Health (AIM) program safety bundle on Safe Reduction of Primary Cesarean Birth, funded by the Health Resources and Services Administration. Medicaid and CHIP agencies have successfully partnered with PQCs to implement and scale quality improvement initiatives to decrease the use of cesarean section for low-risk pregnancies (Donnelly et al. 2019). In California, for example, one regional medical center that participated in a PQC decreased the rate of low-risk cesarean births among Medicaid beneficiaries from 24 to 16.2 percent (Gagante and Kaufman 2019).

Mathematica recommends that CMCS track national and state progress within this focus area using a Core Set measure of cesarean births.[20] The 2020 Child Core Set includes The Joint Commission measure of Cesarean Births, which was originally specified for hospital-level reporting and requires medical chart review. This measure has never been publicly reported by CMS because fewer than half the states report the measure. Instead, Mathematica recommends

using the Low-Risk Cesarean Delivery Rate measure based on state vital records submitted to the Centers for Disease Control and Prevention (CDC) Wide-ranging ONline Data for Epidemiologic Research (CDC WONDER). This measure is available annually for all states. CMS is piloting the use of the CDC WONDER measure in an effort to reduce state burden, streamline Core Set reporting for states, and improve the transparency and comparability of the data reported across states. The Title V Maternal and Child Health Block Grant uses a three-tiered performance measure framework to track program progress and impact; this framework includes National Performance Measure (NPM) 2: Low-Risk Caesarean Delivery, which aligns with the proposed measure. Currently, six state Title V programs have selected this measure to track over the next five-year reporting cycle. The Title V program provides federally available data for NPM 2 that includes U.S. and state-level estimates as well as stratified estimates for race and ethnicity, insurance status, and other factors.

Monitoring performance on the Low-Risk Cesarean Delivery Rate measure provides an opportunity to examine variation among states and to track progress at the national and state levels. Decreasing cesarean births for low-risk pregnancies has the potential to decrease SMM, which CDC currently monitors. The data can serve as an indicator of progress on reducing SMM that could, in turn, reduce medical complications associated with pregnancy-related deaths in the later postpartum period.

In Table 1, we summarize recommended strategies to decrease cesarean births for women with low-risk pregnancies and possible measures to track progress. We recommend stratifying all measures by race and ethnicity to assess the effect of any quality improvement interventions on eliminating disparities.

Table 1. Recommended strategies and potential measures to track progress to decrease cesarean births for low-risk pregnancies

Focus area	Recommended strategies	Potential measures
Reduce low-risk cesarean deliveries	• State Medicaid and CHIP programs implement administrative procedures such as credentialing to increase access to doulas, midwives, and birth centers • CMCS provides guidance on authorities available to states to provide payment to support increased access to doulas, midwives, and birth centers • State Medicaid and CHIP programs leverage managed care contracting to increase use of payment mechanisms to support the use of doulas, midwives, and birth centers • State Medicaid and CHIP programs and managed care plans implement payment reforms to support the goal of reducing low-risk cesarean deliveries • State Medicaid and CHIP programs and managed care plans partner with state PQCs to implement quality improvement projects to decrease use of low-risk cesarean deliveries	• Cesarean birth rates for low risk pregnancies • Severe maternal morbidity[a] • NICU admissions

[a] CDC reports SMM using the HCUP data from the Agency for Healthcare Research and Quality available at https://www.cdc.gov/reproductivehealth/maternalinfanthealth/severematernalmorbidity.html#anchor_how.
NICU = neonatal intensive care unit, PQC = perinatal quality collaborative.

Recommended focus area 2: Increase the use and quality of postpartum care

In recent years, postpartum care has been recognized as an important aspect of the continuum of women's health care across the life cycle. Care during the postpartum period involves not just a single postpartum visit but a series of visits tailored to the needs of the woman and the transition to ongoing health care. The American College of Obstetricians and Gynecologists (ACOG) recommends that all women have contact with their health care providers within the first three weeks postpartum, followed by individualized ongoing care as needed. ACOG also highlights the importance of timely follow-up care with obstetrician-gynecologists or primary care doctors for women who had pregnancy complications or who have chronic medical conditions. The recommended scope of care includes a full assessment of: (1) physical, social, and psychological well-being; (2) infant care and feeding; (3) sexuality, contraception, and birth spacing; (4) sleep and fatigue; (5) physical recovery from birth; (6) chronic disease management; and (7) health maintenance (ACOG 2018). As such, the ACOG recommendations significantly expand the postpartum care period beyond a single six-week postpartum check and expand the scope of care beyond recovery from childbirth.

As rates of mortality and serious complications during pregnancy and childbirth have increased in the United States, so has the focus on improving the quality of postpartum care to reverse these trends and achieve the aim identified by the Workgroup to eliminate preventable maternal mortality, SMM, and inequities. More than half of pregnancy-related deaths occur in the postpartum period, and 12 percent occur after six weeks postpartum. The leading causes of death during the late postpartum period include treatable conditions such as hypertension; cardiovascular diseases; endocrine, hematologic, immunologic, and renal medical conditions; and blood clots (Petersen et al. 2019). Women who experience hypertension, gestational diabetes, and cardiac problems during pregnancy are also at an increased risk for being diagnosed with a chronic disease after the postpartum period. The postpartum period offers a critical opportunity for preventing long-term complications and providing guidance about long-term health (Verbiest et al. 2016).

Timing of pregnancy-related deaths

- During pregnancy - 31%
- Day of delivery - 17%
- 1 to 6 days postpartum - 19%
- 7 to 42 days postpartum - 22%
- 43 to 365 days postpartum - 12%

Source: Petersen et al. 2019.

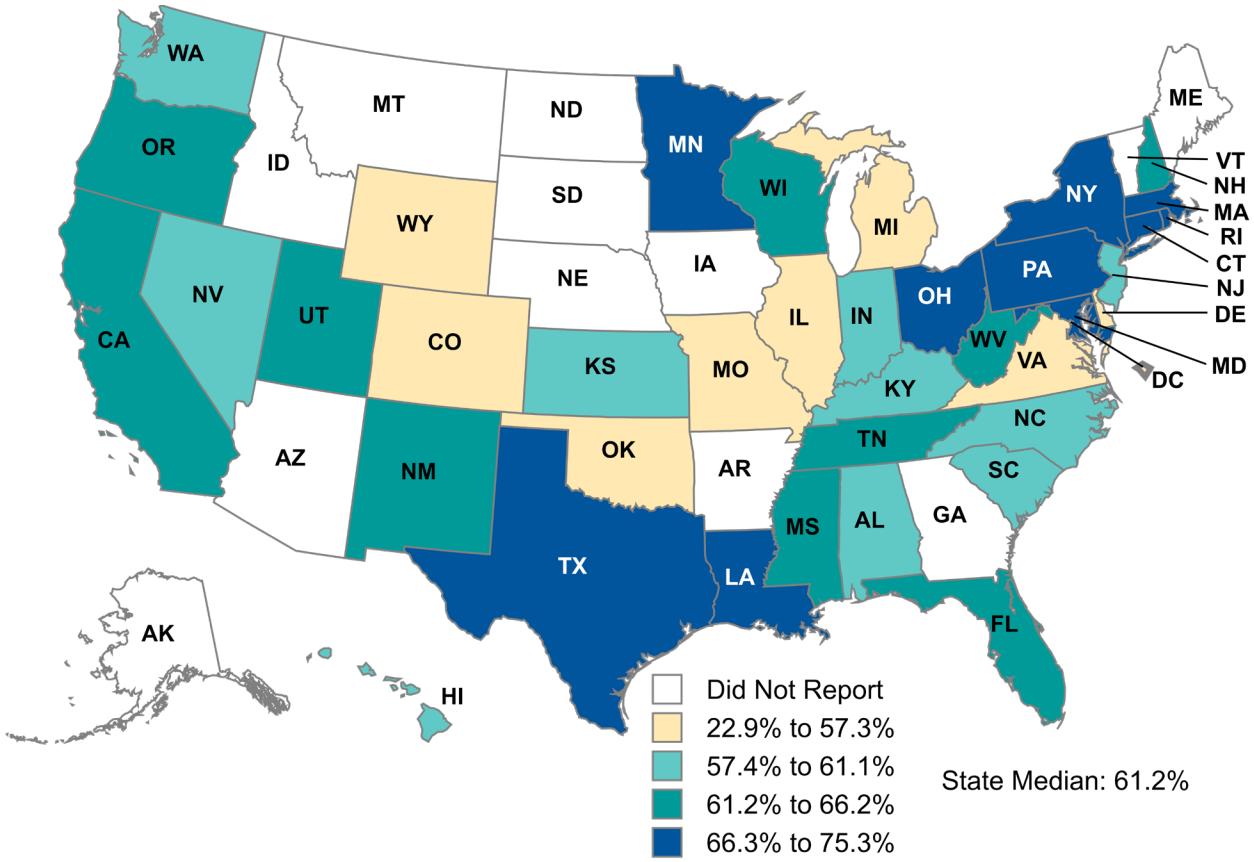
Reproductive health planning is also important during the postpartum period to support women who intend to have another pregnancy and choose to follow the recommended pregnancy interval of at least 18 months and to support women who choose not to have another pregnancy. Postpartum women are at high risk of unintended pregnancy and short pregnancy intervals are

associated with increased risk of adverse outcomes such as early preterm birth and maternal complications (Verbiest et al. 2016).

Variation in postpartum care visits

Attendance at postpartum care visits is important for ensuring that women receive the appropriate care after a delivery. Yet in federal fiscal year 2019, a median of 61.2 percent of women enrolled in Medicaid or CHIP attended their postpartum care visit between 21 and 56 days after delivery. Furthermore, as shown in Figure 3, attendance at postpartum care visits by state varied widely, ranging from 22.9 to 75.3 percent (CMS 2020a).

Figure 3. Percentage of women with Medicaid and CHIP delivering a live birth who had a postpartum care visit on or between 21 and 56 days after delivery, by state, FFY 2019 (n = 39 states)



Source: Quality of Care for Adults in Medicaid: Findings from the 2019 Adult Core Set. Chart Pack. October 2020.
Note: FFY = federal fiscal year

Approaches to increasing the use of postpartum care visits

Improving access to postpartum care has great potential to improve maternal health after delivery and reduce the rates of mortality and complications mentioned above. Key approaches include (1) expanding coverage in the postpartum period—and streamlining administrative structures to

maintain it, and (2) expanding access to supportive services that enable women to attend care visits.

Ensure continuity of coverage. For Medicaid and CHIP beneficiaries to receive postpartum care as envisioned by the ACOG guidelines, they need access to postpartum care for more than 60 days after delivery. Coverage during the postpartum period is important for facilitating access. However, women are no longer eligible for their pregnancy-related and postpartum Medicaid coverage on the last day of the month in which they reach 60 days postpartum unless they reside in a Medicaid expansion state or qualify for Medicaid coverage through another eligibility group under the state plan. Under separate CHIP, states that opt to cover targeted low-income pregnant women under the CHIP State plan may cover the cost of services for the woman until 60 days postpartum.

Women who lose their coverage at 60 days postpartum are vulnerable to health risks after and between pregnancies (Daw et al. 2017). Women with continuous Medicaid eligibility had a higher postpartum visit rate than women with pregnancy-only Medicaid (DeSisto et al. 2020). States that expanded Medicaid eligibility to provide coverage for women beyond the immediate postpartum period report an increase in postpartum care visits, continuity in coverage, and enhanced engagement of women in health care (Gordon et al. 2019; Jones and Sonfield 2016). As such, we recommend that states that have not expanded Medicaid and CHIP eligibility beyond 60 days postpartum explore ways to expand Medicaid and CHIP eligibility, preferably for one year after delivery. In states that have expanded Medicaid eligibility, the transition from postpartum care to continuing care requires transition planning and support for women who qualify for Medicaid coverage through the adult or parent group or who are eligible for a subsidized marketplace plan.

Expanding access to supportive services. Mathematica also recommends addressing barriers that prevent women from attending the postpartum visit. This can include, for example, using community-based strategies to increase visits during the postpartum period and addressing transportation needs.[21]

In Table 2, we summarize the recommended strategies to increase coverage and improve attendance at visits during the postpartum period, and possible measures to monitor progress in implementing those strategies. States currently report the Medicaid and CHIP Core Set measure on Postpartum Care (PPC-AD) to track postpartum care visit rates. To better document and act on disparities, we recommend stratifying these measures by race and ethnicity.

Table 2. Recommended strategies to increase coverage and access to postpartum care and potential measures to track progress

Focus area	Recommended strategies	Potential measures
Increase the use of postpartum care among Medicaid and CHIP beneficiaries	• Identify pathways to ensure continuity of coverage for at risk postpartum women • State Medicaid and CHIP programs streamline administrative processes to maintain coverage for women after 60 days in expansion states • Federal and state Medicaid and CHIP programs identify opportunities (such as state plan amendments) to expand access to services such as transportation, community partnerships, and home visiting that have been shown to support attendance at postpartum care visits for vulnerable populations • State Medicaid and CHIP programs use managed care contracting language to ensure access to services such as transportation	• Medicaid and CHIP enrollment and continuous eligibility for reproductive-age women • Prenatal and Postpartum Care: Postpartum Care (PPC-AD)[a]

[a] 2021 Core Set of Adult Health Care Quality Measures for Medicaid, available at https://www.medicaid.gov/medicaid/quality-of-care/downloads/2021-adult-core-set.pdf.

Quality of care in the postpartum period

Coverage and access to care help to facilitate attendance at postpartum care visits, but attendance alone is not enough to achieve high-quality postpartum care. While there is no one indicator of quality postpartum care, ACOG recommends that women receive several follow-up visits or check-ins and screenings including assessment of plans for breastfeeding, postpartum depression screening, follow-up for gestational diabetes and hypertension, reproductive life planning, and screening for substance use including tobacco. These aspects of the postpartum care visit are particularly relevant for women with Medicaid and CHIP as they have more health problems than privately insured or uninsured women. For example, compared to pregnant women who are uninsured or privately insured, women enrolled in Medicaid are more likely to be overweight or obese, have higher rates of smoking before or during pregnancy, and have higher prevalence of chronic diseases such as diabetes and hypertension (Medicaid and CHIP Payment and Access Commission 2018). One of the most common conditions for postpartum women is depression, which approximately 13 percent of postpartum women experience, with higher rates among women of color and low-income women, and rates that vary from state to state (Bauman et al. 2020).

Several reports document the gaps in postpartum care. The percentage of women who report being asked about depression during a postpartum visit ranges from 75 percent in Louisiana to 96.2 percent in Vermont (Bauman et al. 2020). Rates of postpartum follow-up among women with diabetes and/or hypertension during pregnancy ranged from 5.7 to 95.4 percent with disparities linked to Black race and Hispanic ethnicity, low level of education, and co-existing morbidities such as mental health disorders (Jones et al. 2019). Most women with gestational diabetes do not receive diabetes screening to determine their risk for having chronic diabetes after delivery (Eggleston et al. 2016; Jones et al. 2019). In a systematic review, Black women

were found to have among the lowest postpartum diabetes screening rates despite having the highest risk for progression to chronic diabetes (Herrick et al. 2020). Breast feeding rates at six months range from 38 percent in Alabama and Mississippi to 74 percent in Virginia and Washington (CDC 2020). Among states reporting the Core Set measure Contraceptive Care – Postpartum Women Ages 21–44, a median of 39 percent of postpartum women who had a live birth received a most effective or moderately effective method of contraception[22] within 60 days of delivery.[23]

Strategies to improve the quality of postpartum care

Two important factors that support women's health before, during, and after pregnancy are (1) the degree to which they receive care that is women-centered and (2) payment that supports the availability of women-centered care and the components of that care. Both factors have an impact on postpartum care.

Expanding use of women-centered models of care. Women-centered models of care, such as doula support and group-based care[24] (which includes prenatal and postpartum care), are associated with improved health outcomes. Doula support is associated with decreased likelihood of postpartum depression and near-universal breastfeeding among low-income women (Kozhimannil et al. 2013b; Trotter et al. 1992; Wolman et al. 1993). Group-based care has shown promise for reducing costs and improving birth outcomes. Group-based care may also enhance maternal outcomes, including increasing the use of postpartum contraceptives and the rates of postpartum care visits (Hale et al. 2014; Ickovics et al. 2016). Pregnancy-centered medical homes that provide care coordination and perinatal, medical, and behavioral health services—particularly for high-risk women—have shown promise to increase standardized postpartum depression screening, counseling on reproductive life planning during the postpartum period, and transition to ongoing primary care (Berrien et al. 2015).

Implementing payment reforms. Several state Medicaid agencies have successfully used payment incentives for a range of services such as midwifery-led care, doulas, and birth centers to improve maternal and infant health care quality including postpartum care (CMS 2019; Medicaid and CHIP Access and Payment Commission 2019; Moore et al. 2019; Rodin and Kirkegaard 2019). Furthermore, some states have changed their payment policies to facilitate payment to providers to increase access to contraceptive care in the immediate postpartum period (National Institute for Children's Health Quality 2016).[25, 26] To successfully implement these policies and models of care, state Medicaid and CHIP programs would need to also implement complementary administrative changes related to provider credentialing, payment, and administrative procedures.

Raising awareness. In addition to recommending strategies to support improved quality of care in the postpartum period, Mathematica recommends engaging Medicaid and CHIP providers and beneficiaries in informational campaigns to increase awareness of the expanded scope of awareness of recommendations from leading maternal health advocates, providers, and

organizations such as ACOG to extend the postpartum period and expand postpartum care including more visits, increased screening, and attention to chronic problems (ACOG 2018).

In Table 3, we summarize strategies to improve the quality of postpartum care. We also make recommendations about possible measures to assess progress. To identify and act on disparities, we recommend stratifying all data by race and ethnicity.

Table 3. Recommended strategies to improve the quality of postpartum care and potential measures to track progress

Focus area	Recommended strategies	Potential measures

Improve the quality of the content of postpartum care
• Focus on high-risk women, including women with pre-existing or pregnancy-related chronic conditions
• Increase access to postpartum contraceptive care
	• Federal and state Medicaid and CHIP programs identify structures (such as state plan amendments and 1115 waivers) to support redesign of care to increase use of doulas, midwives, group prenatal care, and other women-centered models of care
	• State Medicaid and CHIP programs implement administrative changes related to credentialing and payment to increase access to doulas, midwives, and group prenatal care
	• State Medicaid and CHIP programs and managed care plans align payment to support high quality postpartum care visits
	  ○ Pay for services such as community supports and home visiting that have been shown to improve the quality and outcomes of maternity care for vulnerable populations
	  ○ Develop payment models to support women-centered models of care
	  ○ Develop payment models to support access to contraceptive care in the immediate postpartum period
	  ○ Pay for postpartum depression screening by the pediatric provider
	• CMCS educate state Medicaid and CHIP programs, managed care plans, providers, beneficiaries, and advocates about ACOG guidelines for postpartum care visits and content
		• Contraceptive Care—Postpartum Women Ages 15–20 (CCP-CH)[a]
		• Contraceptive Care—Postpartum Women Ages 21–44 (CCP-AD)[a]
		• Contraceptive Care—All Women Ages 15–20 (CCW-CH)[a]
		• Contraceptive Care—All Women Ages 21–44 (CCW-AD)[a]
		• Postpartum Depression Screening and Follow-Up[b]
		• Screening for Depression and Follow-Up Plan: Age 18 and Older (CDF-AD)[c]
		• Antidepressant Medication Management (AMM-AD)[c]
		• Comprehensive Diabetes Care: Hemoglobin A1c (HbA1c) Poor Control (>9.0%) (HPC-AD)[c]
		• Controlling High Blood Pressure (CBP-AD)[c]
		• Medical Assistance with Smoking and Tobacco Use Cessation (MSC-AD)[c]
		• Interpregnancy birth intervals
		• Breastfeeding at 6 months

[a] 2021 Core Set of Adult Health Care Quality Measures for Medicaid, available at https://www.medicaid.gov/medicaid/quality-of-care/downloads/2021-adult-core-set.pdf.

[b] Included in the HEDIS 2020 Electronic Clinical Data System measure bundle.

[c] Included in the 2021 Adult Core Set, but not stratified by pregnancy/postpartum status, which is necessary to assess chronic disease management in the postpartum period.

Recommended focus area 3: Increase the use and quality of well-child visits

American infants are three times more likely to die of extreme prematurity and 2.3 times more likely to die of SIDS and to sustain intentional and unintentional injuries than infants living in 19 other OECD countries (Thakrar et al. 2018). Moreover, the U.S. infant mortality rate ranks 34th among OECD countries.[27] Within the United States, the infant mortality rate varies across states. New Hampshire and Vermont have the lowest infant death rates—both around the OECD average. However, Mississippi's infant mortality rate is more than twice the OECD average. (United Health Foundation 2018).

High-quality well-child visits

The American Academy of Pediatrics and Bright Futures recommend nine well-care visits by the time children turn 15 months of age. These visits should include a family-centered health history, physical examination, immunizations, vision and hearing screening, developmental and behavioral assessment, an oral health risk assessment, a social assessment, maternal depression screening, parenting education on a wide range of topics, and care coordination as needed (AAP 2012, 2014; Hagan et al. 2017).

High-quality well-child visits that conform to the American Academy of Pediatrics recommendations (see sidebar) can improve children's health, support caregivers' behaviors to promote their children's health, and prevent injury and harm. For example, when children receive the recommended number of high-quality visits, there are increases in requisite immunizations (Gill et al. 2002; Buchholz and Talmi 2012; DeVoe et al. 2018; Gullet et al. 2019), early recognition of developmental concerns (Guyer et al. 2003; Buchholz and Talmi 2012; Coker et al. 2016; Flores et al. 2018), and reduced emergency department visits (Hakim el al 2002; Coker et al. 2016, Sepulveda et al. 2016). Furthermore, mothers are more likely to breastfeed and use safe sleep practices (Guyer et al. 2003; Johnston et al. 2006). Breastfeeding, safe sleep practices, and receipt of requisite immunizations are protective factors against SUID including SIDS (Moon 2016), both significant causes of infant mortality. During the well-child visit, pediatric providers also support maternal health through screening and referral for depression, other behavioral health issues, and social needs (Earls et al. 2018; Gullet et al. 2019; Puryear et al. 2019).

Variation in use and quality of well-child visits

Funded by the Health Resources Services Administration (HRSA) with the American Academy of Pediatrics (AAP) as the current awardee, Bright Futures guidelines provide age-specific, evidence-driven clinical guidelines for preventive check-ups and visit-by-visit guidance for primary care clinicians, healthcare professionals and families. The American Academy of Pediatrics and Bright Futures recommend that children receive nine well-child visits during the first 15 months of life.[28] The Medicaid and CHIP Child Core Set includes a measure of the percentage of beneficiaries receiving six or more well-child visits by 15 months of age. As shown in Figure 4, the median rate of the Core Set Well-Child Measure was 64.0 percent across

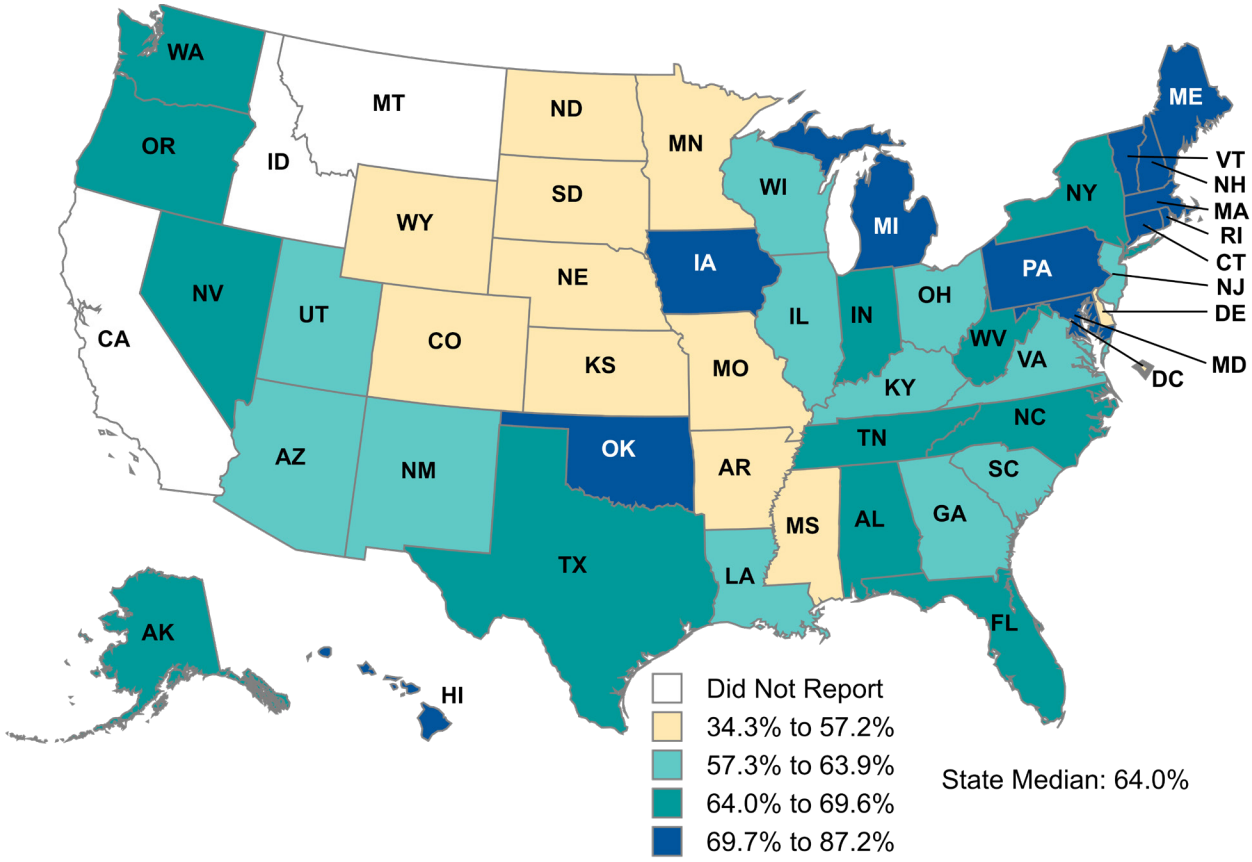
the 48 states reporting the measure, suggesting considerable room for improvement in the use of recommended well-child visits by 15 months of age. The individual state rates ranged from 34.3 percent to 87.2 percent (CMS 2019b). In addition, there are racial and ethnic disparities in the use of well-child visits. Compared to White children, Black, Asian Pacific Islander, and Hispanic children have lower rates of attending the recommended number of well-child visits, and lower odds of getting counseling and screening, or both (Flores 2010).

High-quality well-child visits are associated with increased parental satisfaction with experience of care, an important correlate of higher well-child visit attendance (Buchholz and Talmi 2012; Coker et al. 2016; Flores et al. 2018; Gullet et al. 2019). Therefore, strategies for improving the use of well-child visits should include attention to parental satisfaction.

While there is no standard measure for the overall quality of well-child visits, indicators of quality include (1) receipt of immunizations, (2) developmental screening, (3) maternal depression screening, (4) satisfaction with care, and (5) parental behaviors such as use of breastfeeding and safe sleep practices (Duncan et al. 2015.). Below we discuss performance of these indicators.

About 72 percent of children enrolled in Medicaid and CHIP were up to date on immunizations by their second birthday in federal fiscal year 2018 (CMS 2020b). Only 28 percent of children ages 9 to 35 months with public insurance had a developmental screening, as compared to 39 percent of privately insured children and 14 percent of uninsured children.[29] Maternal depression screening in pediatric practice is a relatively new addition to the well-child constellation of services. Fewer than half of all pediatric providers attempt to identify maternal depression; however, the rate of screening increased from 33 to 44 percent between 2004 and 2013 (Kerker et al. 2016).

Figure 4. Percentage of children in Medicaid or CHIP with six or more well-child visits in the first 15 months of life, FFY 2019, by state (n = 48 states)



Source: Quality of Care for Children in Medicaid and CHIP: Findings from the 2019 Child Core Set. Chart Pack. October 2020.

Note: FFY = federal fiscal year

In addition, breastfeeding and safe sleep practices may reflect positive engagement with parents and children and are potential indicators of the impact of higher quality well-child visits (Turner 2018). For 2017 to 2018, reports of breastfeeding varied by insurance status and by race and ethnicity. Mothers with public insurance had lower rates of breastfeeding for the first six months after birth compared to mothers with private insurance (62 percent versus 76.5 percent). Thirty percent of women with public insurance reported never breastfeeding, compared to 13.5 percent of women with private insurance. And non-Hispanic Black women had lower rates of breastfeeding in the first six months than all other racial and ethnic groups.[30]

The use of safe sleep practices, including positioning and sleep environments also varied by insurance status. Among women with a recent live birth in 2016, 71.5 percent of those with Medicaid reported use of safe sleep practices compared to 84 percent of those with private insurance and 67 percent of the uninsured. In addition, those with Medicaid were less likely than those with private insurance to report safe sleep environments such as infant use of a separate approved sleep surface or no use of soft objects in the bed. Receipt of provider advice was associated with increased use of safe sleep practices, underscoring the importance of well-child

visits to decrease risk. The prevalence of safe sleep practices also varied significantly by state. For example, the use of back sleep positioning ranged from 67.4 percent in Louisiana to 87.7 percent in Iowa (Hirai et al. 2019).

Approaches to increasing the use of well-child visits

Having health care coverage is an important factor that determines access to health care and health outcomes for children. In turn, having a usual source of health care for sick and preventive care facilitates the timely and appropriate use of pediatric services (Simpson 1997). As such, the percentage of children who have health insurance is one predictor of the extent to which families can reliably obtain preventive care or health care for a sick or injured child. In federal fiscal year 2017, Medicaid and CHIP covered 38 percent of all children and 83 percent of children in households with incomes below 100 percent of the federal poverty level (Rudowitz et al. 2019).

Several approaches can help increase access to well-child visits, as well as families' use of these visits and the quality of the care infants receive.

Providing continuous coverage for infants. There are several levers states can use to ensure continuous enrollment for eligible infants and young children. Section 1902(e)(4) of the Social Security Act requires that infants born to women insured by Medicaid at the time of birth have automatic and continuous Medicaid eligibility protections that begin at birth and continue through the first year of life.[31] During the period that infants are eligible, the cost of their care must be billed under their mothers' Medicaid number until the state provides a separate number for the infant. Families have a full year to apply for Medicaid for the infants to maintain continuous coverage. States can adopt strategies such as maximizing the role of technology, improving communication to beneficiaries to educate them about continuous enrollment, streamlining verification of eligibility, and using verified information about eligibility collected from other programs to improve enrollment and retention of eligible children and families (Lee et al. 2014; Center for Budget and Policy Priorities 2019).

Maintaining Medicaid and CHIP coverage for infants is important for maintaining access to care. Children whose birth was covered by Medicaid receive 12 months of coverage as newborns. However, children do not always have continuous coverage after 12 months. States have the option to provide children enrolled in Medicaid and CHIP with continuous eligibility.[32] Under this option, states allow a child to remain enrolled for a full year unless the child ages out of coverage, moves out of state, or voluntarily withdraws. Currently, 32 states provide for 12-month continuous eligibility. However, among these 32 states, only 18 states provide continuous eligibility for Medicaid and CHIP enrolled children, 8 states provide continuous eligibility for only CHIP enrolled children, and 6 states provide continuous eligibility for Medicaid enrolled children.[33] Twelve-month continuous eligibility eliminates coverage gaps due to fluctuations in income. Adopting continuous eligibility decreases errors in eliminating coverage for children, increases the accuracy of eligibility determination, and makes it easier for children to enroll, stay enrolled, and transition to other coverage when their eligibility changes (Center for Budget and

Policy Priorities 2019; Brooks et al. 2020). In a recent cross-sectional study, children in low-income families that live in states that provide twelve-month continuous Medicaid eligibility were more likely to access preventive services as compared to children living in states without the policy (Leighton and Brantley 2020).

Providing maternal coverage. Women who have health insurance themselves are more likely to take their children to well-child visits (Gill 2002; Davidoff et al. 2003; Clark et al. 2008; Clarke et al. 2011; Burak 2019). Recent research indicates that Medicaid expansion for low-income adults is associated with an increased receipt of well-child visits for their children (Venkataramani et al. 2017). Therefore, ensuring women have continuous coverage after the 60-day postpartum period is another strategy for improving attendance at well-child visits.

Linking data. Finally, some states have linked Medicaid and CHIP claims and encounter data systems with immunization registries to identify children in need of well-child visits and provide timely immunizations (Kairys et al. 2006; Brown et al. 2015).

In Table 4, we summarize the recommended strategies to increase the use of well-child visits and potential measures for monitoring progress. To identify and address disparities, we recommend collecting data to allow stratification and reporting of all measures by race and ethnicity.

Table 4. Recommended strategies and potential measures to track progress for increasing the use of well-child visits

Focus area	Recommended strategies	Potential measures
Increase use of well-child visits	• CMCS raise awareness, encourage and support states to provide 12-month continuous eligibility for infants in Medicaid or CHIP • CMCS and state Medicaid and CHIP programs provide outreach, assistance with applications, notices, necessary documentation, and renewals to maximize continuous coverage • State Medicaid and CHIP programs streamline administrative processes to maintain Medicaid eligibility for infants after one year of age • CMCS provide guidance on methods to cover maternal health care in the year following delivery • State Medicaid and CHIP programs link Medicaid and CHIP data systems with statewide immunization registry to identify children in need of immunizations and well-child visits	• Continuous enrollment in Medicaid and CHIP for infants 0 to 12 months • Number of states with linked Medicaid and CHIP data systems and immunization registries • Well-Child Visits in the First 15 Months of Life (W15-CH)[a]

[a] 2021 Core Set of Children's Health Care Quality Measures for Medicaid and CHIP, available at https://www.medicaid.gov/medicaid/quality-of-care/downloads/2021-child-core-set.pdf.

Strategies to improve the quality of well-child visits

To improve the quality of well-child visits for Medicaid and CHIP beneficiaries, CMCS and state Medicaid and CHIP programs can (1) provide guidance on the high-quality well-child visit framework as recommended by the American Academy of Pediatrics, (2) align payment to

support models of care that provide high-quality well-child visits, and (3) work with managed care plans to improve quality and decrease disparities.

Promoting a well-child visit framework. State Medicaid and CHIP programs should work with partners in their state to develop a high-quality well-child visit framework, using the American Academy of Pediatrics, Bright Futures guidelines as described on page 18. This framework should then be promoted for adoption by managed care organizations and providers to improve quality of care and health outcomes. State Title V programs are critical partners in this work due to their role in convening stakeholders, facilitating provider training, and assuring quality systems of care.

Implementing payment policies that support care models. To promote models that support high-quality care, federal Medicaid and CHIP should identify options for alternative payment methods and state Medicaid and CHIP programs and managed care plans should align payment policies. Additionally, states should align requirements for credentialing. These efforts could focus on the following components of care:

- Team-based care with team members such as behavioral health providers, parent and peer mentors, and care coordinators, with an emphasis on cultural concordance with the population served.
- Coordination of care with community providers and use of non-traditional service settings, such as evidence-based home visiting[34], offices of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and early childhood education sites (Smith 2005; HealthPartners).

Payment policies should support new models of care such as group pediatric care, home visiting, care coordination, and parent and peer mentors. Pay-for-performance, shared savings, and global budgets that include payment for high-quality pediatric care have the potential to improve quality (Bailit and Houy 2016; Goyal et al. 2016; Wong et al. 2018; Johnson and Bruner 2018; California's Children Trust 2019).

Coordinating with managed care plans. Iowa and New York have successfully included performance goals and incentives in managed care plan contracts to require performance improvement projects related to improving the percentage of infants who receive the recommended number of well-child visits and increasing immunizations (Gifford et al. 2019; NYDOH 2019). Managed care plans that have provided education and outreach to Medicaid beneficiaries and offered incentives such as transportation reported increases in well-child visit attendance (Smith 2005; HealthPartners 2020).

In Table 5, we summarize the recommended strategies to improve the quality of well-child visits and potential measures to track progress. We recommend stratifying all measures by race and ethnicity. States can also explore the use of measures available through their state Title V

programs to enhance their understanding of quality related to breastfeeding and other outcomes.[35]

Table 5. Recommended strategies and potential measures to track progress on the quality of well-child visits

Focus area	Recommend strategies	Potential measures
Increase quality of well-child visits	• Federal and state Medicaid and CHIP programs provide guidance on the framework for high-quality well-child visits and promote adoption of such visits across Medicaid and CHIP programs • State Medicaid and CHIP programs and managed care plans pay for team-based well-child models of care such as group pediatric care, home visiting, care coordination, and parent and peer mentors • State Medicaid and CHIP programs require managed care plans to conduct performance improvement projects and other quality improvement activities to improve quality of well-child visits	• Childhood Immunization Status (CIS-CH)[a] • Developmental Screening in the First Three Years of Life (DEV-CH)[a b] • Consumer Assessment of Healthcare Providers and Systems (CAHPS®) Health Plan Survey 5.0H – Child Version Including Medicaid and Children with Chronic Conditions Supplemental Items (CPC-CH)[a] • Ambulatory Care: Emergency Department (ED) Visits (AMB-CH)[a] • Parent or caregiver use of safe sleep practices • Breastfeeding at six months • Screening and referral for postpartum depression

[a] 2021 Core Set of Children's Health Care Quality Measures for Medicaid and CHIP, available at https://www.medicaid.gov/medicaid/quality-of-care/downloads/performance-measurement/2020-child-core-set.pdf.

[b] The developmental screening measure is no longer endorsed by the National Quality Forum. States deviate from technical specifications thus resulting in inconsistent Core Set reporting.

Quality improvement infrastructure, data, and equity

In addition to recommendations related to the three focus areas, the Workgroup emphasized several cross-cutting factors that are necessary to facilitate efforts to improve maternal health and infant health outcomes. These cross-cutting factors are (1) the Medicaid and CHIP quality improvement infrastructure; (2) data, including data systems and measures to track quality; and (3) health equity and the strategies to monitor and reduce health inequities among Medicaid and CHIP beneficiaries. The Workgroup acknowledged the importance of providing technical assistance to states on basic quality improvement, assisting states to enhance their data for monitoring maternal and infant health outcomes and to assess the success of quality improvement efforts, and implementing strategies to reduce disparities and achieve health equity. One important opportunity for assessing and improving quality is state partnerships with MCOs. Increasingly states have adopted managed care to increase the quality of care and decrease health care costs.

Below we discuss these recommendations, and in Table 6 we summarize the recommendations related to each cross-cutting factor.

Quality improvement infrastructure

The Workgroup emphasized that state Medicaid and CHIP programs require a robust infrastructure to conduct quality improvement to improve maternal health and infant health. To increase quality improvement capacity, Mathematica recommends that state Medicaid and CHIP programs have the following basic infrastructure components:

- Leadership and dedicated staff
  - Leaders who have responsibility for developing, supporting, and operating the quality improvement program and oversight over choosing the areas of focus.
  - Medicaid and CHIP teams consisting of supervisors, managers, and staff who have responsibility for implementing and monitoring quality improvement activities.
- Quality assessment capacity
  - Formal process for assessing quality and identifying quality improvement initiatives. Resources to collect, display, and report data to identify trends, patterns, and performance levels that suggest opportunities for quality improvement.
- Quality improvement framework
  - Quality strategy and a framework for establishing a plan for performance improvement. One example of a quality improvement framework is the Model for Improvement, developed by Associates in Process Improvement and widely implemented by the Institute for Healthcare Improvement. [36] The Model for Improvement incorporates the classic PDSA (Plan, Do, Study, Act) cycle for testing and implementing improvement options after identifying time-specific and measurable aims for the population of interest.
- Tracking and reporting capability
  - Resources to analyze data to track and report progress on specific quality improvement initiatives until improvement goals have been achieved, disseminated, and sustained. Use public reporting as a means to support public accountability toward progress.
- Collaboration with partners with common goals
  - Partnerships with groups interested in improving maternal and infant health quality for Medicaid and CHIP beneficiaries. For example, programs might form partnerships with managed care plans, state public health departments, state obstetric and pediatric societies, perinatal quality collaboratives, infant mortality review committees, maternal mortality review committees, and advocates for equity in maternal and infant health. Programs can also seek to strengthen the statutorily mandated partnership with state Title V programs which have a shared goal of promoting the health of mothers and infants by providing and assuring access to quality maternal and child health services.

Data and data systems

The Workgroup noted the importance of using data to identify opportunities to improve care, set performance goals, and monitor progress. However, there are challenges to accessing timely data

on maternal and perinatal outcomes and to reporting maternal health and infant health quality outcomes for the comprehensive care we recommend in this report. These challenges include the lack of integrated data systems related to service use, quality measurement, and outcomes and timely linkage of vital statistics, Medicaid claims, and other data. The Workgroup recommended using a standardized set of maternal and infant health measures to drive improvement and track progress across several levels (national, state, managed care, and providers). The standardized set of measures should include the subset of maternal and perinatal health measures in the core set of health care quality measures for children and adults in Medicaid and CHIP (Child and Adult Core Sets). [37]

Mathematica recommends several approaches to address the data challenges mentioned above. States need access to robust data sources to make inferences to effectively shape policy and implement evidence-based interventions. States such as Iowa,[38] Minnesota,[39] and Oklahoma[40] that link vital records data with Medicaid and CHIP claims data have made progress on monitoring infant mortality and risk factors. Mathematica recommends exploring ways to expand linking Medicaid and CHIP claims with vital records data. Mathematica also recommends investigating using data from other sources, such as the Pregnancy Risk Assessment Monitoring System (PRAMS), to report important maternal and infant health outcomes. Collaboration with the state Title V program may also offer opportunities for data linkages.[41]

To implement the Workgroup's recommendation to use a standardized set of maternal health and infant health measures for quality improvement, Mathematica recommends that CMCS provide technical assistance to states to help them build capacity to calculate, report, and use the maternal and perinatal health measures in the Child and Adult Core Sets for quality improvement. In addition, CMCS could consider opportunities to broaden the measures available for tracking quality improvement efforts in maternal health and infant health as reflected by the Workgroup discussions. CMCS should consider expanding the Core Set of Maternal and Perinatal Health Measures for Medicaid and CHIP to include measures to track breastfeeding, screening for postpartum depression, SMM, chronic disease management, maternal experience of care, and interpregnancy interval. Existing Adult Core Set Measures that may be appropriate to include as maternal measures include Screening for Depression and Follow-Up Plan: Age 18 and Older (CDF-AD), Controlling High Blood Pressure (CBP-AD), Comprehensive Diabetes Care: Hemoglobin A1c (HbA1c) Poor Control, (>9.0%) (HPC-AD), and Medical Assistance with Smoking and Tobacco Use Cessation (MSC-AD) stratified for pregnancy and postpartum status. Other existing measures that could be added to the Core Set of Maternal and Perinatal Health Measures to track quality improvement efforts for infants include Childhood Immunization Status (CIS-CH), Developmental Screening in the First Three Years of Life (DEV-CH), and Consumer Assessment of Healthcare Providers and Systems (CAHPS®) Health Plan Survey 5.0H – Child Version Including Medicaid and Children with Chronic Conditions Supplemental Items (CPC-CH).

Satisfaction with maternity care is a key measure of quality that is important for understanding a range of patient related factors including why women don't attend postpartum care visits and to

understand the experiences of Black, American Indian/Alaska Native, and other women's experience with care based on race. The Workgroup noted that the current measures of patient satisfaction do not appropriately address maternity care and recommends developing adaptations to patient satisfaction surveys (National Partnership for Women & Families 2015).

Addressing inequities in maternal and infant health

The Workgroup identified disparities in maternal and infant health outcomes as an issue requiring urgent attention with particular relevance for the Medicaid and CHIP population. They emphasized that achieving equity in outcomes for racial and ethnic minority populations is an important driver of improving quality for Medicaid and CHIP beneficiaries. However, health care disparities represent system failures at multiple interrelated levels starting with societal structures that perpetuate economic, educational, environmental, and social inequalities (Howell 2018). The recommendations address actions that federal and state Medicaid and CHIP authorities can take to address disparities and do not address the full range of changes in other systems that would be necessary to eliminate disparities. Actions to address disparities must ensure that health systems are responsive to the unique needs and circumstances of Medicaid and CHIP beneficiaries. Achieving health equity requires recognition of the roles of racism and bias in health care systems including those providing maternal and infant health services (Moore et al. 2019; Muse 2018). Health equity implies that all women have a fair opportunity to attain their full health potential and that no one should be disadvantaged from achieving this potential due to race, ethnicity, language, income, geographic location, or other characteristics. Achieving equity requires that systems meet the needs of the populations served by (1) removing structural barriers to getting and maintaining Medicaid and CHIP insurance; (2) finding providers who accept Medicaid and CHIP; and (3) organizing clinical settings to meet the needs of populations being served in terms of the characteristics of the personnel, hours of operation, social supports offered, and attitudes of clinical and non-clinical staff that demonstrates respect for women as equals. Systems must be held accountable for achieving equity through reporting of maternal health and infant health outcomes stratified by relevant beneficiary characteristics (Moore et al. 2019; Muse 2018; Hall et al. 2015). Black women are more likely to report that they receive respectful, culturally competent, safe and high-quality health care when it is women-centered and when systemic issues that result in discrimination and poor treatment are addressed (Muse 2018; National Partnership for Women & Families 2018).

An integral component of quality improvement is organizational commitment to identifying and eliminating health care disparities. With this commitment, organizations can identify evidence-based interventions to reduce disparities or modify and test interventions that have been successful for other populations. For example, Louisiana achieved a reduction in Black/White disparities in SMM due to hemorrhage and hypertension using QI methods that focused on obtaining high quality race and ethnicity data, stratifying data to illustrate the extent of disparities, communicating the extent of the disparities to providers and the public, and identifying strategies to achieve a specific aim to eliminate disparities (Kieltyka et al. 2018).

California also has reduced the performance gap in rates of SMM due to hemorrhage between Black and White women using QI strategies (Main et al. 2020).

Collecting race and ethnicity data is essential to identifying and monitoring disparities, guiding the plan to achieve equity, and tracking progress (Bingham et al. 2019). Several states, including Louisiana and Ohio have been able to monitor and act on outcomes by race and ethnicity by using a variety of data sources such as the PRAMS [42] and state vital records (Ohio Department of Health 2014; Kieltyka et al. 2018).

Partnering with community organizations that have experience with racial and ethnic minority populations and with advocates for elimination of disparities are strategies that assist in identifying successful approaches to achieve health equity.

Table 6. Recommended strategies to improve quality improvement infrastructure, data, and equity

Focus area	Recommended strategies	Potential measures
• Increase quality improvement capacity among state Medicaid and CHIP programs • Implement data collection and strengthen data systems to support quality improvement • Support efforts to identify and reduce disparities and increase equity in maternal and infant health care	**Quality improvement infrastructure** • State Medicaid and CHIP programs review their quality improvement approaches to ensure they have the necessary components • CMCS provides quality improvement technical assistance to state Medicaid and CHIP programs and their partners, such as managed care plans, to increase familiarity and capability of executing the quality improvement program **Data** • CMCS provides technical assistance to states to enhance data systems and explore use of existing data sources • CMCS expands the list of maternal health and infant health measures available for tracking quality improvement, including those on the Adult and Child Core Sets • State Medicaid and CHIP programs and managed care plans collect race and ethnicity data and report measures and outcomes by race and ethnicity **Equity** • State Medicaid and CHIP programs partner with community-serving organizations to inform equity strategy • CMCS and state Medicaid and CHIP programs collect data to identify the determinants and distribution of disparities in maternal and infant care risks and outcomes • State Medicaid and CHIP programs monitor effectiveness of interventions to reduce disparities in maternal and infant care services and outcomes, implement strategies to spread successful programs, and revise strategies that do not show improvement	• How and whether state Medicaid and CHIP programs and managed care plans report Maternal and Child Core Set measures • The extent that state and managed care plan performance measures are stratified by race, ethnicity, and other relevant characteristics • Number of maternal and infant health quality improvement initiatives that address maternal and infant health quality outcomes • Number of quality improvement initiatives with specific strategies to address racial and ethnic disparities • Progress in achieving aims to eliminate disparities in care for minority group populations

Conclusion

As noted in this report, maternal mortality and infant mortality are universally seen as indicators of a nation's health, but in this country, there is cause for concern in both areas. Every year, more than 700 women in the United States die from pregnancy-related complications, although 60 to 67 percent of these deaths are preventable. Additionally, more than 50,000 women annually experience SMM during labor and delivery. These outcomes affect segments of the population in different ways. Racial and ethnic disparities in maternal morbidity and mortality rates remain unacceptably large, with Black women and American Indian/Alaska Native two to three times more likely than White women to die from pregnancy-related complications. The infant mortality rate in the United States ranked 34th among OECD countries in 2019. Infant mortality was higher among Blacks and American Indians/Alaska Natives than among Whites in 2017 and the infant mortality rate for deliveries paid for by Medicaid in 2017 was higher than for privately insured deliveries and deliveries with self-pay status.

These poor outcomes and disparities in health for women and infants from racial and ethnic minority groups and for Medicaid and CHIP beneficiaries call for urgent action. Mathematica recommends focused attention in three areas:

1. Strategies to decrease cesarean section births among low-risk pregnant women.
2. Strategies to increase the use and quality of postpartum care visits.
3. Strategies to increase the use and quality of well-child visits.

Improvements in these three focus areas will promote better maternal health outcomes across the continuum of maternal health care including prenatal care, labor and delivery, postpartum care, and interpregnancy care. Improving maternal outcomes and increasing the use and quality of well-child visits will also improve infant outcomes from birth through the first year of life.

Federal and state Medicaid and CHIP programs can implement quality improvement programs that ensure women and infants have health care coverage and access to care. They can also work to improve the delivery system to address the unique circumstances of women and infants in Medicaid and CHIP with attention to incentives such as payment and models of care that expand access to providers such as midwives, doulas, peer educators, and care teams that include physicians, nurses, home visitors, and other health care workers. Quality improvement interventions designed by federal and state Medicaid and CHIP programs must include specific actions to address inequities in health care and monitor outcomes to ensure that disparities are eliminated.

Endnotes

[1] A description of the CMCS Quality Improvement Program is available at https://www.medicaid.gov/medicaid/quality-of-care/quality-improvement-initiatives/index.html.

[2] The 2020 Core Set of Maternal and Perinatal Health Measures for Medicaid and CHIP is available at https://www.medicaid.gov/medicaid/quality-of-care/downloads/performance-measurement/2020-maternity-core-set.pdf. Reporting by state Medicaid and CHIP agencies is currently voluntary. Beginning in 2024, states will be required to report the Child Core Set measures and the behavioral health measures in the Adult Core Set.

[3] In this report, we provide information on maternal mortality as defined by the World Health Organization (WHO) when comparing the United States to other countries, and on pregnancy-related deaths as defined by the Centers for Disease Control and Prevention (CDC). It is important to understand the difference between the WHO and CDC definitions of maternal mortality and to distinguish both from pregnancy-related death. The definitions are as follows:

- Maternal mortality (WHO): Maternal mortality is the death of a woman while pregnant or within 42 days of the end of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.
- Maternal mortality (CDC): Maternal mortality is the death of a woman while pregnant or within one year of the end of pregnancy, irrespective of the duration and site of the pregnancy, from any cause including accidental or incidental causes.
- Pregnancy-related death (CDC): A pregnancy-related death is defined as the death of a woman while pregnant or within one year of the end of a pregnancy—regardless of the outcome, duration or site of the pregnancy—from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

[4] OECD. Infant mortality rates. Available at https://data.oecd.org/healthstat/infant-mortality-rates.htm.

[5] Throughout this report, we describe outcomes among Medicaid or CHIP beneficiaries as they are defined in the primary data source. Depending on the source "Medicaid" could include CHIP beneficiaries, a state-named governmental program, or other public insurance programs.

[6] Comprehensive managed care includes comprehensive benefits such as acute care, primary care, and specialty care or the Program of All-inclusive Care for the Elderly. For a complete description of Medicaid managed care data see the CMS report "Medicaid Managed Care Enrollment and Program Characteristics, 2018" available at https://www.medicaid.gov/medicaid/managed-care/downloads/2018-medicaid-managed-care-enrollment-report.pdf.

[7] Information about the Maternal and Infant Health Initiative is available at https://www.medicaid.gov/medicaid/quality-of-care/downloads/maternal-and-infant-health-initiative.pdf.

[8] The MIH Beneficiary Profile is available at https://www.medicaid.gov/medicaid/quality-of-care/improvement-initiatives/maternal-infant-health-care-quality/index.html.

[9] Based on Mathematica's analysis of data from the 2018 Natality Public Use File, produced by the National Center for Health Statistics. See https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm.

[10] According to the User Guide to the 2018 Natality Public Use File (https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm), the NCHS classifies women as "self-pay" if they do not have third party coverage including private insurance and are not covered by Medicaid or a similar state program for low-income women, the Indian Health Service; CHAMPUS/TRICARE; other federal, state, or local government programs; or charity. They represent a group that pays out of pocket and therefore may be more economically advantaged than women who qualify for Medicaid or other state programs. Their economic status may decrease their risk for poor maternal and infant outcomes compared to women with Medicaid or CHIP.

[11] Based on Mathematica's analysis of selected 2017 maternal and child health data from the Pregnancy Risk Assessment Monitoring System (PRAMS). Data available at https://www.cdc.gov/prams/prams-data/mch-indicators/states/pdf/2018/All-PRAMS-Sites-2016-2017_508.pdf.

[12] OECD, *op cit.,* p. 29.

[13] Based on Mathematica's analysis of data from the 2017 Period Linked Birth/Infant Death Public Use File, produced by the National Center for Health Statistics. See https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm.

[14] Based on Mathematica's analysis of data from the 2018 Natality Public Use File, produced by the National Center for Health Statistics. See https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm.

[15] Based on Mathematica's analysis of data from the 2017 Period Linked Birth/Infant Death Public Use File produced by the National Center for Health Statistics. See https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm.

[16] CDC/NCHS, National Vital Statistics System, Period Linked Birth/Infant Death Data. Rates calculated via CDC WONDER using latest available data.

[17] There is no single definition of women-centered care. However, women-centered care includes the following components: focuses on a woman's health needs; is holistic and recognizes social, emotional, physical, spiritual, and cultural needs; recognizes every woman's right to self-determination; provides continuity of care; recognizes every woman's responsibility to make informed decisions; is informed by scientific evidence as well as by collective and individual experience; is designed to follow each woman across the interface between institutions and the community; focuses on the woman rather than on institutions; and includes collaboration and consultation between health professionals (Fahy 2012).

[18] For more information on how states can advance value-based care see the September 15, 2020 CMS State Medicaid Directors letter available at https://www.medicaid.gov/Federal-Policy-Guidance/Downloads/smd20004.pdf.

[19] For more information on state perinatal quality collaboratives, see https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pqc-states.html.

[20] The Centers for Medicare & Medicaid Services annually publishes sets of core measures showing the quality of care and health outcomes for adults participating in Medicaid, and children enrolled in Medicaid and the Children's Health Insurance Program (CHIP). For information on the measures, see https://www.medicaid.gov/medicaid/quality-of-care/quality-of-care-performance-measurement/adult-and-child-health-care-quality-measures/index.html.

[21] CMS Maternal and Infant Health Initiative. "Resources on Strategies to Improve Postpartum Care Among Medicaid and CHIP Populations." Technical Assistance Resource. 2015. Available at https://www.medicaid.gov/medicaid/quality-of-care/downloads/strategies-to-improve-postpartum-care.pdf.

[22] Information on the effectiveness of different forms of contraception is available at http://www.contraceptivetechnology.org/the-book/take-a-peek/contraceptive-efficacy/.

[23] Mathematica analysis of MACPro reports on the Contraceptive Care – Postpartum Women Ages 21–44 Core Set measure for the federal fiscal year 2018 reporting cycle.

[24] Group based care models, which includes prenatal and postpartum care, are designed to improve patient education and include opportunities for social support while maintaining the risk screening and physical assessment of individual pregnancy care. The model brings women with similar needs together for health care encounters, increases the time available for the educational component of the encounter, provides an opportunity for peer support, improves efficiency, and reduces repetition. Essential standardized elements guide the structure and content of the group sessions and emphasize health-promoting behaviors. Groups are composed of approximately eight to ten women of similar gestational age, their support partners, an obstetrician or other obstetric care provider, and co-facilitator and meet every 2 to 4 weeks. Pregnancy complications are managed through additional individual visits and specialist referrals. More information about group based care is available at https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2018/03/group-prenatal-care.

[25] Center for Medicaid and CHIP Services. Informational Bulletin. State Medicaid Payment Approaches to Improve Access to Long-Acting Reversible Contraception. April 8, 2016. Available at https://www.medicaid.gov/federal-policy-guidance/downloads/CIB040816.pdf.

[26] Information on measures to assess access to contraceptive care is available at https://www.medicaid.gov/medicaid/quality-of-care/downloads/mihi-contraceptive-measures.pdf.

[27]The 2020 Core Set of Maternal and Perinatal Health Measures for Medicaid and CHIP is available at https://www.medicaid.gov/medicaid/quality-of-care/downloads/performance-measurement/2020-maternity-core-set.pdf.

[28] For a detailed description of the American Academy of Pediatrics and Bright Futures recommendations see the periodicity schedule available at https://downloads.aap.org/AAP/PDF/periodicity_schedule.pdf.

[29] Mathematica analysis of Child and Adolescent Health Measurement Initiative. 2017–2018 National Survey of Children's Health data query. Available at https://www.childhealthdata.org/.

[30] Mathematica analysis of Child and Adolescent Health Measurement Initiative. 2017–2018 National Survey of Children's Health data query. Available at https://www.childhealthdata.org/.

[31] Social Security Act. Section 1902 (e)(4)). Available at https://www.ssa.gov/OP_Home/ssact/title19/1902.htm.

[32] Centers for Medicare & Medicaid Services. Facilitating Medicaid and CHIP Enrollment and Renewal in 2014. State Health Officer #13-003. Available at https://www.medicaid.gov/sites/default/files/Federal-Policy-Guidance/downloads/SHO-13-003.pdf.

[33] Continuous Eligibility for Medicaid and CHIP Coverage. https://www.medicaid.gov/medicaid/enrollment-strategies/continuous-eligibility-medicaid-and-chip-coverage/index.html

[34] Evidence-based home visiting programs have been shown through rigorous evaluation to improve specific family and child outcomes, such as access to postnatal and well-child care. As of December 2020, nineteen home visiting models meet the U.S. Department of Health and Human Services' criteria for evidence of effectiveness and are eligible for state and territory MIECHV Program funding. For more information, please see the federal Maternal, Infant, and Early Childhood Home Visiting Program brief available at https://mchb.hrsa.gov/sites/default/files/mchb/MaternalChildHealthInitiatives/HomeVisiting/pdf/programbrief.pdf.

[35] The Title V program's existing performance measurement framework includes several measures, which may be helpful for states in this work: NPM 4A: Breastfeeding Initiations, NPM 4B: Exclusive Breastfeeding through 6 Months, NPM 5: Safe Sleep Practices, and NPM 6: Developmental Screening. More information about these measures is available at https://mchb.tvisdata.hrsa.gov/PrioritiesAndMeasures/NationalPerformanceMeasures.

[36] Science of Improvement: How to Improve. Available at http://www.ihi.org/resources/Pages/HowtoImprove/ScienceofImprovementHowtoImprove.aspx.

[37] The 2020 Core Set of Maternal and Perinatal Health Measures for Medicaid and CHIP is available at https://www.medicaid.gov/medicaid/quality-of-care/downloads/performance-measurement/2020-maternity-core-set.pdf.

[38] 2014 Iowa Medicaid Birth Certificate Match Report. Available at https://idph.iowa.gov/Portals/1/userfiles/68/Medicaid/2014%20-%20Medicaid%20prenatal%20care%20coordination.pdf.

[39] Gyllstrom, M.E., J.L. Jensen, J.N. Vaughan, S.E. Castellano, and J.W. Oswald. "Linking Birth Certificates with Medicaid Data to Enhance Population Health Assessment: Methodological Issues Addressed." *Journal of Public Health Management and Practice*, vol. 8, no. 4, 2002, pp. 38-44.

[40] Oklahoma Medicaid-Birth Certificate Linkage Project (https://www.ok.gov/health/Family_Health/Maternal_and_Child_Health_Service/Data_and_Evaluation/Medicaid-Birth_Certificate_Linkage_Project/index.html.)

[41] Collaboration with state MCH Epidemiologists, including senior CDC MCH Epidemiology Assignees, who are supported by the state Title V program or the State Systems Development

Initiative (SSDI) program, can facilitate this work. One of the main goals of the SSDI program is to improve access and use of MCH data sources including the linkage of vital records to claims data.

[42] The Pregnancy Risk Assessment Monitoring System (PRAMS) is a surveillance project of the CDC and state health departments. PRAMS collects state-specific, population-based data on maternal attitudes and experiences before, during, and shortly after pregnancy. PRAMS surveillance currently covers about 83 percent of all U.S. births. More information on PRAMS is available at https://www.cdc.gov/prams/index.htm.

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Appendix A: List of Acronyms

AAP	American Academy of Pediatrics
ACOG	American College of Obstetricians and Gynecologists
CDC	Centers for Disease Control and Prevention
CHIP	Children's Health Insurance Program
C-section	Cesarean section
CMCS	Center for Medicaid and CHIP Services
CMS	Centers for Medicare & Medicaid Services
ED	Emergency department
HEDIS	Healthcare Effectiveness Data and Information Set
MCO	Managed care organization
MIH	Maternal and infant health
MIHI	Maternal and Infant Health Initiative
NCQA	National Committee for Quality Assurance
NICU	Neonatal intensive care unit
NQF	National Quality Forum
NTSV	Nulliparous, term, singleton vertex
OECD	Organisation for Economic Co-operation and Development
PQC	Perinatal quality collaborative
PRAMS	Pregnancy Risk Assessment Monitoring System
SMM	Severe maternal morbidity
SIDS	Sudden infant death syndrome
SUID	Sudden unexpected infant deaths
WIC	Special Supplemental Nutrition Program for Women, Infants, and Children
WONDER	Wide-ranging ONline Data for Epidemiologic Research

Appendix B:
2019 Maternal and Infant Health Expert Workgroup on Improving Maternal and Infant Health Outcomes in Medicaid and CHIP

Workgroup Members

Andrea Gelzer, MD
AmeriHealth Caritas Family of Companies

Angie Truesdale, MPA
Centering Healthcare Institute

Cameual Wright, MD, MBA
CareSource

Carol Sakala, PhD, MSPH
Childbirth Connection Program,
National Partnership for Women & Families

Charlie Homer, MD
EMPath

Cheryl Larry-Osman, RN, MS, CNM, CNS
Henry Ford Hospital

Debra Bingham, DrPH, RN, FAAN
Institute for Perinatal Quality Improvement
University of Maryland School of Nursing

Diana Jolles, PhD, CNM, FACNM
American College of Nurse-Midwives

Elliott Main, MD
California Maternal Quality Care Collaborative
Stanford University School of Medicine

Jonathan Goldfinger, MD, MPH, FAAP
Goldfinger Health

Judy Zerzan, MD, MPH
Washington State Health Care Authority

Kate Maas, MPH, CHES, CPDPE
Virginia Premier Health Plan, Inc.

Kay Johnson, EdM, MPH
Johnson Group Consulting

Ken Schellhase, MD
Medical College of Wisconsin

Kimberly Gregory, MD, MPH
Maternal Fetal Medicine, Cedars-Sinai Medical Center

Martin McCaffrey, MD, CAPT USN (Ret)
University of North Carolina Chapel Hill
Perinatal Quality Collaborative North Carolina

Mary Applegate, MD, FAAP, FACP
Ohio Department of Medicaid

Pooja Mehta, MD, MSHP, FACOG
Cityblock Health

Rahul Gupta, MD, MPH, MBA, FACP
March of Dimes

Federal Ex Officio Members

Esther Eisenberg, MD, MPH
National Institute of Child Health and Human Development, National Institutes of Health

Danielle Ely, PhD
Division of Vital Statistics, National Center for Health Statistics, Centers for Disease Control and Prevention

Suzanne England, DNP, APRN
Great Plains Area Indian Health Service, Indian Health Service

Justine Larson, MD, MPH, MHS
Substance Abuse and Mental Health Services Administration

Karen Matsuoka, PhD
Division of Quality and Health Outcomes, Center for Medicaid and CHIP Services, Centers for Medicare & Medicaid Services

Lisa M. Romero, DrPH, MPH
Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention

Judith Steinberg, MD, MPH
Bureau of Primary Health Care, Health Resources and Services Administration

Lee A. Wilson
Maternal and Child Health Bureau, Health Resources and Services Administration

Lorraine Yeung, MD, MPH
National Center on Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention

Kristen Zycherman, RN, BSN
Division of Quality and Health Outcomes, Center for Medicaid and CHIP Services, Centers for Medicare & Medicaid Services