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Maternal Morbidity and Mortality Measurement Recommendations Report

FINAL REPORT

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Key Terminology

Defining and identifying maternal morbidity and mortality in a comprehensive and consistent manner is challenging. Capturing a maternal mortality requires confirmation of pregnancy within a particular period of time relative to death and/or some discernible connection between the pregnancy and the cause of death. However, different definitions can have distinct aims or levels of data availability, and so they use differing time periods and associations to pregnancy to achieve these disparate goals. As a result, existing measures of maternal mortality, including maternal death, pregnancy-related death, and pregnancy-associated death, contain notable differences. Similar to maternal mortality, definitions for maternal morbidity can also vary. These differences can be exacerbated when definitions are used inconsistently across entities or agencies. To minimize confusion and remain consistent with the definitions used in the environmental scan, the following terminology is used throughout this report:

- **Maternal morbidity:** refers to unexpected short- or long-term negative outcomes that result from pregnancy or childbirth¹
- **Severe maternal morbidity (SMM):** refers to unexpected outcomes of labor and delivery that result in significant short- or long-term consequences to a woman's health²
- **Maternal death:** the death of a woman while pregnant or within 42 days of termination 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. This time frame is used by the World Health Organization (WHO) as well as the Centers for Disease Control and Prevention (CDC) for the National Vital Statistics System (NVSS)³⁻⁵
- **Pregnancy-related death:** the death of a woman while pregnant or within one year of termination of pregnancy—regardless of the duration or site of the pregnancy—which may be caused by a pregnancy complication, a chain of medical events initiated by the pregnancy, the worsening of an unrelated condition because of the pregnancy, or other factors, but not from accidental or incidental causes. This time frame is used by CDC for the Pregnancy Mortality Surveillance System (PMSS)⁶⁻⁸
- **Pregnancy-associated death:** all deaths during pregnancy or within one year of termination of pregnancy regardless of cause⁹
- **Maternal mortality:** used in this report as a general descriptor for the deaths of pregnant women or mothers

Executive Summary

The Maternal Morbidity and Mortality project aims to build a foundation of tangible recommendations for enhancing maternal morbidity and mortality measurement in the United States (U.S.) and achieving larger goals of improving health outcomes in maternity care. The National Quality Forum (NQF), with funding from the Centers for Medicare & Medicaid Services (CMS), convened a multistakeholder Maternal Morbidity and Mortality Committee (detailed in [Appendix A](#); henceforth referred to as *the Committee*) of experts in maternal morbidity and mortality to develop these recommendations.

The Committee first guided an environmental scan that describes and summarizes relevant definitions, important influencing clinical and nonclinical risk factors, existing measures, and innovative measurement programs related to maternal morbidity and mortality. The environmental scan also includes existing measures and innovative programs in maternal morbidity and mortality measurement.

The Committee then informed the final Recommendations Report to address challenges identified in the environmental scan. For this Recommendations Report, the Committee created two measurement frameworks, one for maternal morbidity and one for maternal mortality; two sets of recommendations for measurement, one each for morbidity and mortality; and a discussion of three measure concepts leading to the recommendation of one measure concept for maternal mortality measurement.

Each framework is designed to organize the measurement of maternal morbidity and maternal mortality, respectively. The frameworks can be used by stakeholders to prioritize the development of measures and to prompt research into specific areas of maternal morbidity and mortality measurement. Using the influencing factors identified in the environmental scan, both frameworks capture the multifaceted impacts of social, interpersonal, and systemic realities on an individual's maternal morbidity and mortality. The **maternal morbidity framework** encompasses four domains for maternity care during an individual's life course: (1) Preconception/Well Woman Care, (2) Prenatal Care, (3) Intrapartum Care, and (4) Postpartum Care. The final three also compose the **maternal mortality framework** domains: (1) Prenatal Care, (2) Intrapartum Care, and (3) Postpartum Care. The mortality framework domains also align with the time periods identified by CDC during which maternal mortalities occur.¹⁰ The domains of each framework are further categorized into 16 subdomains, which are critical areas for measurement derived from influencing factors in the environmental scan. The subdomains capture areas of opportunity for improving maternal care within a population and community through enhanced measurement. The same 16 subdomains apply across every domain in each framework to inform measurement and represent aspects of a woman's life that can influence health outcomes across an individual's life course. Graphic representations of the frameworks begin on page [12](#).

The Committee used the environmental scan, pre-existing frameworks in the literature, and the newly developed frameworks to make recommendations for measuring maternal morbidity and maternal mortality. These recommendations include clear approaches and tangible steps to guide future maternal morbidity and mortality measurement. The Committee divided the recommendations into measurement topics (i.e., categories that group the highest priorities for measurement by desired outcome or achievement), which span the maternal life cycle. The recommendations for measurement were divided into short- and long-term time frames based on the Committee's expertise on perceived feasibility and intended impact. Short-term recommendations for measurement can be implemented within one to four years, while long-term recommendations can be implemented in five or more years. However, each implementing organization can analyze all recommendations within the context of their system and adjust the short- and long-term approaches to maximize equity and impact. Highlights from the short-term recommendations for measurement include the following:

- Develop clear evidence-based screening protocols and monitor protocol compliance for conditions that contribute to worse outcomes and deaths
- Stratify measure approaches focused on the patient experience by race and ethnicity, including measures of time and/or distance to care and adequacy of pain management
- Measure timing of receipt of key services, such as initiation of prenatal care and completion of referrals for subsequent specialty care¹¹
- Use of universal risk assessment for comorbidities during prenatal care¹²
- Ensure that all states establish Maternal Mortality Review Committees (MMRCs) that review pregnancy-related and pregnancy-associated deaths

Highlights from the long-term approaches in the report include the following:

- Develop a quality dashboard to share data and report family experiences in a transparent manner
- Improve tracking of access to and availability of safe and reliable contraception
- Build an evidence base to inform guidelines and measurement concepts outlining best practices surrounding psychosocial interventions and trauma-informed care
- Improve documentation of conversations with patients about risks and options provided for care/treatment, coupled with data from eventual outcomes
- Track mortality outcomes of uninsured populations and the impact of Medicaid expansion on outcomes

The report closes with discussion of three potential, actionable measure concepts for maternal mortality, with the Committee recommending the first measure concept. A *measure concept* is an idea for a measure that includes a description of the proposed measure, ideally one that includes a planned target and population. The Committee-recommended measure concept, which is the first of the three concepts, is a ratio of the number of women with pregnancy-related deaths **AND** the number of women with pregnancy-associated deaths by suicide, overdose, and violence per 100,000 live births. This concept is widely supported by the Committee and captures elements that are featured prominently in Committee discussions, namely the impacts of mental and behavioral health, substance use disorders (SUDs), and intimate partner violence on maternal mortality. This measure uses elements that are already captured and reported at the state level (e.g., pregnancy-related death and pregnancy-associated death) but requires work to standardize the categorization of pregnancy-associated deaths from accidental drug overdose, suicide, or violence, as these data vary across states. The second and third measure concepts capture important elements but contain challenges that prevented the Committee from fully recommending them. The Committee urged these concepts be included in the report due to their potential for future development to improve maternal mortality measurement. The second concept is a ratio of the number of pregnancy-related deaths in relation to the number of cases of SMM, and the third offers suggestions to expand upon the existing ratio of pregnancy-related mortality per 100,000 live births.

Introduction

The U.S. has been struggling to improve maternal health outcomes for years and has seen maternal mortality rates rise since 2000.^{13,14} In 2018, there were 17.4 maternal deaths per 100,000 live births in the U.S., which is more than two times the ratio of other developed nations, such as France, the United Kingdom (U.K.), and the Netherlands.¹⁵ Researchers and the U.S. government have prioritized the identification of actionable improvements in maternal care in order to reduce maternal mortality.¹⁶

SMM, which is defined by CDC as consisting of 21 health indicators, is also steadily increasing in the U.S.¹⁷ and contributes to the high maternal mortality rate. SMM affects more than 60,000 women annually in the U.S., with similarly rising trends over the last two decades.^{1,18,19}

The risk of maternal morbidity and mortality is not shared equally among U.S. women. Non-Hispanic Black women experience a higher rate of maternal mortality (37.3 maternal deaths per 100,000 live births) than the population as a whole.²⁰ Women living in rural areas are also at greater risk for maternal

mortality and SMM.^{21–23} Researchers have pointed to the use of quality measurement to address these inequities and identify opportunities for care improvement.

Since 2003, there have been improvements in the measurement and provision of maternal healthcare in the U.S.²⁴ The introduction of the maternal checkbox to some states in 2003 and its increasingly uniform utilization through 2017 has led to improvements in reporting maternal mortality.¹⁴ The checkbox refers to the addition of a common pregnancy status checkbox item on death certificates in order to improve the identification of maternal mortality.²⁵ Some of the rise in maternal mortality has been attributed to the implementation of the checkbox since this facilitates documentation that had not previously taken place. Inconsistent and improper use of the checkbox is also considered responsible for incorrectly categorizing some deaths as maternal.¹⁴ The introduction of the patient safety bundles from the Health Resources and Services Administration (HRSA)-funded Alliance for Innovation on Maternal Health (AIM) and the Council on Patient Safety in Women's Health Care²⁶ in 2011 has expanded the tools and resources available to hospitals to improve the quality of patient care. Similarly, state Perinatal Quality Collaboratives (PQCs) have been instrumental in helping to develop and implement AIM patient safety bundles. CDC funds 13 state PQCs as well as the National Network of Perinatal Quality Collaboratives (NNPQC) to identify and improve healthcare processes that directly affect the quality of the care that women and infants receive.²⁷ Other innovations in maternal care are detailed in the Maternal Morbidity and Mortality environmental scan.

In fall 2019, NQF, with funding from CMS, convened the Committee to assess the current state of maternal morbidity and mortality measurement; to provide recommendations for specific short- and long-term, innovative, and actionable approaches to improve maternal morbidity and mortality measurement; and to use that measurement to improve maternal health outcomes. More specifically, this project seeks to provide recommendations to help monitor and track maternal morbidity and mortality, reduce preventable causes of these outcomes, and eliminate disparities in maternal health outcomes.

The terms *woman* and *women* and pronouns *she/her/hers* are used throughout this report to refer to individuals experiencing maternal care, morbidity, and mortality; nonetheless, NQF and the Committee acknowledge gender diversity and intend these terms to be inclusive of all sex and gender identities to whom this report may be applicable.

Project Background and Objectives

For this project, NQF conducted an environmental scan that included the research, review, and synthesis of information about maternal morbidity and mortality measurement. The environmental scan documents the incidence and prevalence of maternal morbidities and mortalities, as well as disparities in outcomes. It also includes a wide array of influencing clinical and nonclinical risk factors (henceforth referred to as *influencing factors*) that directly and indirectly affect these outcomes. The environmental scan findings are summarized in the [section below](#). The scan comprises several important aspects of maternal morbidity and mortality measurement:

- Prevalence and incidence of outcomes related to maternal morbidity and mortality (e.g., postpartum readmissions, infections, injuries, and other pregnancy complications, as well as mortality)

- Disparities in morbidity and mortality outcomes
- Influencing factors on each outcome and/or health disparity
- Standard processes for maternal care delivery
- Innovations in measurement methodologies
- Measure concepts, fully developed measures, and measures in use

Once the [Maternal Morbidity and Mortality environmental scan](#) was completed, the Committee was charged with developing measurement frameworks for maternal morbidity and maternal mortality, identifying innovative and actionable recommendations for measurement to improve maternal morbidity and maternal mortality, and discussing maternal mortality measure concepts.

In this Recommendations Report, NQF addresses the need for concrete and innovative approaches to improve measurement of maternal morbidity and mortality. Over a series of web meetings, the Committee discussed the necessary components for two separate frameworks: one for maternal morbidity and one for mortality measurement. The separate frameworks ensure that influencing factors specific to maternal morbidity and maternal mortality will be captured appropriately. For instance, the creation of a separate framework for maternal morbidity helps to address upstream factors that increase the risk for morbidity. The frameworks can be used by multiple stakeholders to prioritize the development of measures and to prompt research into specific areas of maternal morbidity and mortality measurement. The Committee identified measurement gaps to encourage additional research and development in these areas. These frameworks are used to organize the Committee's recommendations for measurement to improve maternal health outcomes across various healthcare settings, systems, and stakeholders.

Within the report, unless a fact or recommendation is explicitly attributed to a specific source, information was gathered from the Committee and synthesized by NQF.

Environmental Scan Findings

As part of the environmental scan, NQF reviewed influencing factors, protocols, and programs related to maternal morbidity and mortality measurement. In the scan, NQF identified varying definitions of maternal mortality and maternal morbidity used by different organizations, such as CDC and WHO, illustrating that definitions can differ across organizations. CDC uses the concept of SMM, which includes unexpected outcomes of labor and delivery that result in significant short- or long-term consequences to a woman's health.² In contrast, WHO champions the concept of *near-miss morbidity*, defined as conditions or events that would have resulted in a maternal mortality during pregnancy, childbirth, or within 42 days after delivery if not for significant medical intervention.²⁸ CDC maintains two data systems, the NVSS and the PMSS, for tracking data and measures of maternal mortality. Both WHO and the NVSS follow the definition for *maternal death*.^{5,20} The PMSS, meanwhile, follows the criteria for *pregnancy-related death*.⁶

Common influencing factors on maternal mortality that have an impact at the hospital and system levels were identified, including cardiovascular disease (CVD), infection, hemorrhage, thromboembolic events, hypertension, cerebrovascular accidents, and accidental and incidental causes (e.g., suicide, overdose, and intimate partner violence). These influencing factors were identified and highlighted due to their high or increasing prevalence in the U.S., which contributes to the U.S. having a significantly higher

maternal mortality rate compared with other economically developed countries. For example, cardiovascular conditions consisting of cardiomyopathy, cerebrovascular accidents, and other cardiovascular conditions combined represent the leading cause of pregnancy-related deaths in the U.S.⁶ While medical advances have enabled women with cardiovascular conditions to survive longer and support a pregnancy at a more advanced age, the clinical risk associated with these comorbid conditions leads to maternal mortality more frequently than for those without cardiac conditions. This risk is exacerbated when accompanied by provider- and hospital-level issues, such as failure to provide referral to risk-appropriate care or delayed recognition of clinical decline.²⁹

Influencing factors that lead to maternal morbidity and mortality, including SMM, include a number of conditions related to end-organ dysfunction (e.g., cardiovascular and acute respiratory distress syndrome), severe disease manifestations (e.g., eclampsia, sepsis, and shock), and critical interventions (e.g., transfusion, hysterectomy). Aspects of maternal morbidity are described extensively in the environmental scan, considering that the potential scope of maternal morbidity throughout an individual's life course is broad. Maternal morbidity is also affected by nonmedical influencing factors, such as racism, implicit bias, discrimination, segregation, literacy and language barriers, geographic barriers, and related social determinants of health (SDOH). Measures regarding maternal mental health, maternal substance use, provider education and competencies, screening for domestic violence, and other measures beyond the hospital are also lacking and would have an impact on addressing and potentially reducing these maternal morbidities. For accidental and incidental causes, some state-based analyses show that pregnancy-associated deaths due to suicide or overdose were more common than any other type of pregnancy-associated death between 43 days and one year postpartum.^{30,31} More detailed information is included in the Maternal Morbidity and Mortality environmental scan.

The state of measurement as identified in the scan varies greatly by the elements measured. Prior to the pregnancy checkbox, some deaths were not connected to a pregnancy; therefore, mortality rates were considerably underestimated. The revision of the U.S. death certificate in 2003 and the introduction of the pregnancy checkbox led to an increase in reported maternal mortalities, largely due to the change in mechanism of measurement and expansion in the capture of maternal mortalities to one-year postpartum.¹³ PMSS reviews and analyzes death records and links birth and fetal records when applicable in order to calculate the pregnancy-related mortality ratio. Measurement of maternal mortality has been greatly enhanced under CDC's Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) program, which supports the coordination and management of MMRCs. MMRCs are state and local multistakeholder committees that review deaths within one year of the end of pregnancy to determine whether the death was related to pregnancy, factors contributing to the death, underlying causes, preventability, and recommendations for future actions.³² MMRCs have contributed significantly to maternal mortality review; however, variations in processes between MMRCs make the use of data for national surveillance challenging.³³ The Maternal Mortality Review Information Application (MMRIA) tool was created by CDC to help address some of the standardization issues. It allows for collection and organization of mortality data and documentation of MMRC deliberations. In addition, since maternal mortality on the state level often produces very small numbers in a given year, states may wait and combine multiple years of mortality review into one report before releasing information. These types of delays are challenging when attempting to act quickly to address preventable causes of maternal mortality on a national level.

In order to take the life course perspective into account, the environmental scan identified influencing factors from multiple aspects of a woman's life. These include influencing factors at the individual level (e.g., urbanicity, housing security), hospital level (e.g., institutional readiness), and system level (e.g., financial, resource availability). In addition, the scan specifically includes discussion of the impacts of various forms of racism, implicit bias, health literacy, and social determinants on the health of women and mothers that also have an impact on maternal health outcomes. The work from the environmental scan allowed the Committee to develop recommendations that can be implemented immediately preceding pregnancy, after pregnancy, and throughout the entire life course.

The scan also contains an outline of standard processes of maternal care across the life course, such as WHO recommendations for prenatal care and AIM safety bundles for labor and delivery care and postpartum care. Since these standards are already well understood in the field of maternal health and have seen widespread adoption by health systems and practitioners, they represent an excellent basis for measuring performance. The scan also highlights federal initiatives to improve maternal morbidity and mortality measurement as well as a few examples of innovative methods for measuring maternal morbidity and mortality at the state level. Lastly, the scan provides a list of existing measures of maternal morbidity and mortality in either current or past use, as well as measures under development, and identifies additional measurement gaps uncovered by this search.

Maternal Morbidity and Mortality Measurement Frameworks

Introduction

NQF defines a *measurement framework* as a conceptual model for organizing ideas that are important to measure in a topic area and for describing how measurement should take place (i.e., whose performance should be measured, in which care settings, etc.). A framework also provides a structure for organizing currently available measures as well as highlighting measurement gaps.³⁴ A framework is composed of domains and subdomains:

- **Domains:** groupings of high-level themes or ideas that provide categories for organizing the measurement framework
- **Subdomains:** smaller groupings within a domain to help stakeholders identify critical areas for measurement within the larger categorizations

The purpose of the two frameworks created by the Committee and detailed in this report is twofold: First, the frameworks are for stakeholders to use when reviewing and considering existing measures; second, the frameworks identify measurement gaps in which new or improved measures are needed to reduce maternal morbidity and mortality. The creation and improvement of recommended measures in these areas should lead to improved data collection and related interventions, which would lead to better care and improved maternal health outcomes. The frameworks developed by the Committee consider areas of the maternal experience that currently contribute to maternal morbidity and mortality in ways that should be improved upon, altered, or eliminated altogether. When considering maternal morbidity and mortality measurement, a focus on the Committee's chosen subdomains should yield the greatest change in preventable morbidity and mortality outcomes over time.

The Committee reviewed existing frameworks as both a reference and starting point and reflected on which aspects of current conceptual models were aligned with the scope of this project. Early in the

Committee’s review of existing frameworks, NQF consulted with CDC on defining maternal morbidity and mortality events and outcomes as well as the importance of focusing on how pregnancy affects a woman across her lifespan when determining how to categorize topics. The Committee also discussed at length CDC’s differentiation between pregnancy-related death and pregnancy-associated death. Although the application of pregnancy-related death and pregnancy-associated death to measure and categorize instances of maternal mortality is not standardized across jurisdictions, the Committee acknowledged the different elements captured by each definition and the importance of considering both categories for measurement.

One framework discussed by the Committee was described in the *Clinical Obstetrics and Gynecology* article titled “Reducing Disparities in Severe Maternal Morbidity and Mortality”, as seen below in Figure A.¹⁸ The model depicts how various existing social, biologic, and healthcare-related inequities can lead to a woman’s experience of SMM and mortality from preconception to the postpartum period. This conceptual model resonated with the Committee, who specifically noted the emphasis on how racism and discrimination affect the patient, community, clinician, and healthcare system levels. Certain comorbidities, including hypertension, diabetes mellitus, obesity, and depression, are specified as well, indicating another layer of the pathways to racial and ethnic disparities in SMM and mortality.

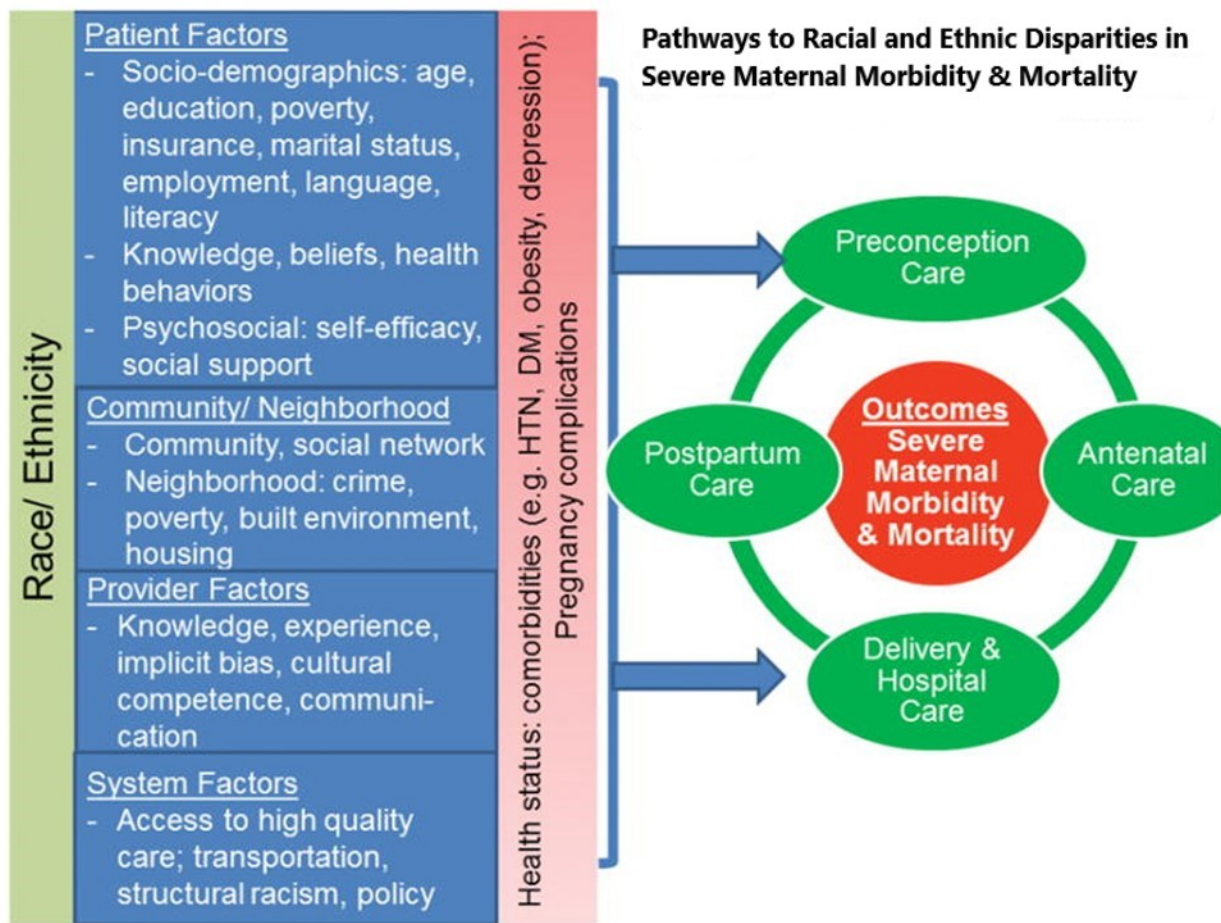


Figure A. Conceptual model demonstrating pathways to racial and ethnic disparities in severe maternal morbidity and mortality¹⁸

During the review of existing maternal morbidity and mortality frameworks,^{18,35,36} the Committee evaluated their strengths and inadequacies. Certain aspects of existing frameworks were viewed as appropriate for addressing the current state of maternal morbidity and mortality measurement (e.g., the focus on the cyclical nature of how a woman experiences risks and care associated with pregnancy). However, the Committee determined that these frameworks did not address important gaps. For example, these frameworks presented components such as racism and comorbidities as blanket issues that affect everything else in the framework, whereas the Committee was adamant that these concepts must be equally prioritized with all other contributors to maternal morbidity and mortality. The Committee determined that if these concepts were to be included as “overarching concepts,” they would not be seen as issues that should be readily measured but rather as ideas to be considered in tandem with the measurement of other items. The Committee determined that these overarching concepts, especially racism, were too critically connected to preventable outcomes of maternal morbidity and mortality to not be measured independently.

These gaps led the Committee to create two new distinct frameworks: one for maternal morbidity measurement and one for maternal mortality measurement. Development of new frameworks would allow future measure development to focus on areas of measurement that the Committee viewed as critical and underrepresented, such as race and racism, implicit bias and discrimination, the patient experience, and unique care settings. Furthermore, development of separate frameworks would allow measurement to focus on a wide variety of influencing factors that differentially affect maternal morbidity and maternal mortality.

The Committee used the findings of the [environmental scan](#) to provide input and direction for the two new conceptual frameworks that will guide measure development to improve the quality of maternal healthcare. Specifically, elements of the cyclical nature of the maternal life cycle were adopted and revised to create the new framework domains, while the influencing factors described within the environmental scan strongly shaped the development of subdomains in both content and nomenclature. The influencing factors included both medical and nonmedical components across the continuum of care: individual-level (e.g., age, education, knowledge, beliefs, and behaviors), societal/community-level (e.g., social network, built environment, and housing), hospital-level (e.g., implicit bias, cultural competence, and communication), and system-level components (e.g., access, structural racism, and policy). Influencing factors previously identified in the environmental scan evolved into some of the subdomains through further research and Committee discussion, specifically health equity, racism, discrimination, mental health disorders, person-centered care, and provider education and bias. Other influencing factors from the environmental scan that shaped the framework development include a detailing of maternal morbidity and mortality prevalence, incidence, risk, existing measure concepts, fully developed measures, measures in use, processes for maternal care delivery, language barriers, health literacy, rurality versus urbanicity, SDOH, and health disparities.

Framework for Maternal Morbidity Measurement

The style of graphic used for the maternal morbidity measurement framework (Figure B) is meant to reflect the continuous maternal life cycle, phases which can occur numerous times throughout a woman’s life. The graphic also recognizes that maternal morbidity can occur at any time before, after, or within the maternal care phases. The color-coordinated bottom axis of the framework represents a general timeline of a woman’s life, with the understanding that the maternal phases may be visited

several times. The woman at the center of the circle in Figure B shows how the domains and subdomains surrounding her influence her care and affect her experiences and health outcomes before, during, and after childbirth.

The Committee provided ample feedback to create several iterations of the framework graphic. Criteria for developing the final framework visual included an emphasis on the subdomains applying across all domains. In addition, placement of the subdomains is purposefully removed from the circular graphic to allow the woman herself to be depicted as central to the domains that surround her and the subdomains that affect her. This emphasizes that each of the subdomains can have an impact on her at any time within her lifespan. The arrangement of the subdomains is purposeful in that it is not intended to connote a hierarchy among the subdomains; rather, the Committee chose these subdomains precisely because they are all measurement priorities for maternal morbidity measurement.

Maternal Morbidity Measurement Framework

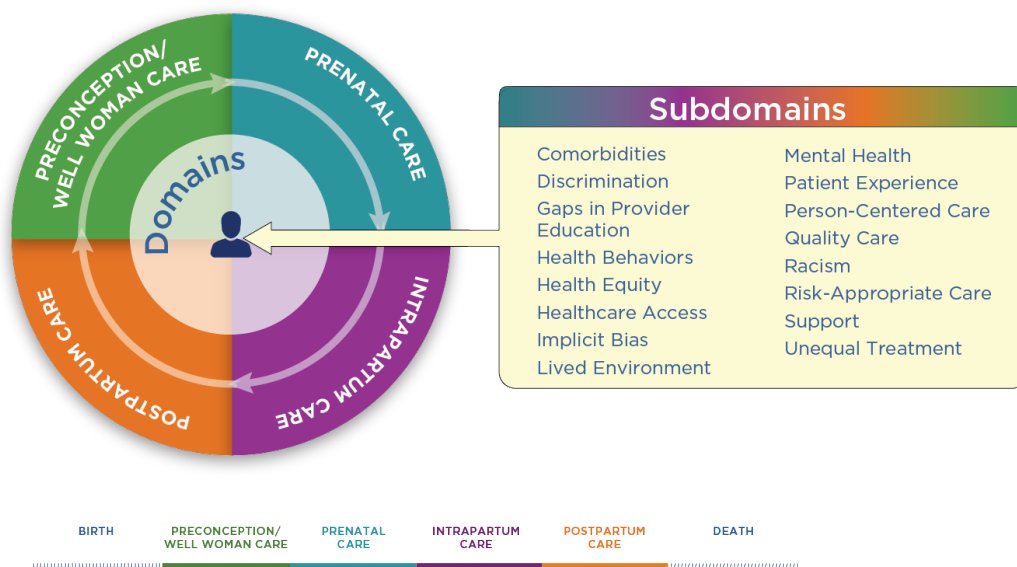
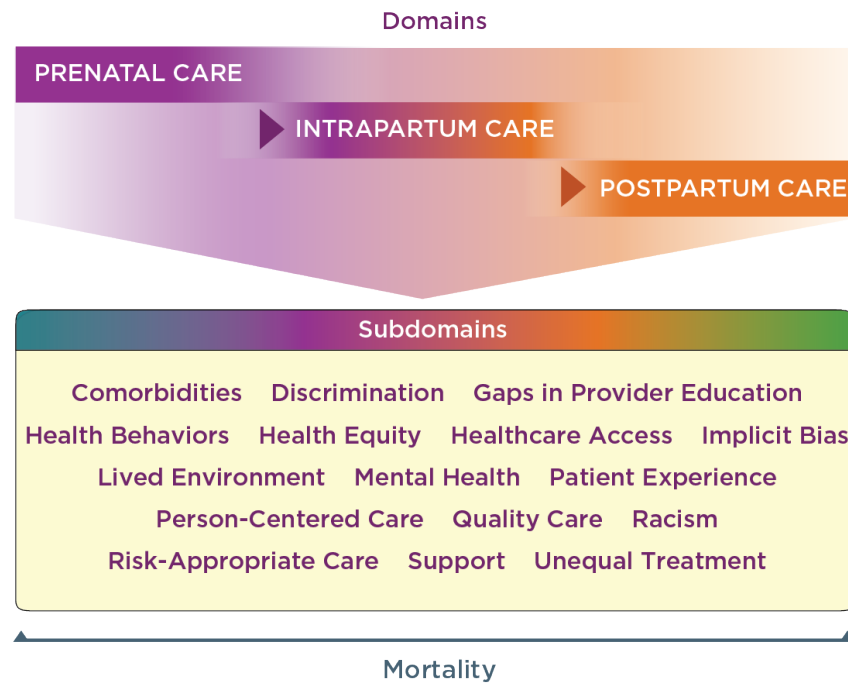


Figure B. Maternal Morbidity Measurement Framework

Framework for Maternal Mortality Measurement

In contrast to the cyclical nature of the maternal morbidity measurement framework visual featured above, the framework graphic for maternal mortality measurement is represented in a linear fashion (Figure C). The phases of the maternal life cycle, or linear steps in the case of maternal mortality, in conjunction with the mortality label presented across the continuum, show that death can occur within any step in this process. Similar to the maternal morbidity framework figure, the arrangement of the subdomains here demonstrates a lack of hierarchy. Instead, all subdomains are measurement priorities for maternal mortality measurement.

Maternal Mortality Measurement Framework



○ Figure C. Maternal Mortality Measurement Framework

Domains That Influence Both Maternal Morbidity and Maternal Mortality Measurement

A *framework domain* is a grouping of high-level themes or ideas that provide categories for organizing the measurement framework. The environmental scan identified several common descriptors of the phases of the maternal life cycle: Future Reproductive Life Cycle, Preconception and Prenatal, Labor and Delivery, and Postpartum. After discussing the merits of using these phases, the Committee decided to adjust them slightly to create domains for the new frameworks. The domains for the morbidity framework are Preconception/Well Woman Care, Prenatal Care, Intrapartum Care, and Postpartum Care. The domains for the mortality framework are Prenatal Care, Intrapartum Care, and Postpartum Care.

The Committee decided to describe the phase commonly referred to as *Preconception* as the domain of Preconception/Well Woman Care,³⁷ considering that a woman is likely to have better maternal outcomes if her health is well attended to before she reaches preconception and pregnancy. Following the Preconception/Well Woman Care domain in the maternal morbidity framework is Prenatal Care,³⁸ which refers to the healthcare a woman receives while pregnant. The focus of this care is to keep both the mother and the baby healthy. Intrapartum Care³⁹ refers to maternity care that a woman receives during labor and immediately after birth, including the care of the newborn baby. Postpartum Care is often referred to as the fourth trimester and includes medical care for a woman until 12 weeks after childbirth.⁴⁰ This care includes an assessment of the woman's physical, social, and psychological well-

being. Although postpartum care typically subsides after 12 weeks following birth, the postpartum period extends for one full year after birth, and measurement recommendations for improved care and outcomes will be made with both time periods in mind.

The Preconception/Well Woman Care domain is defined as preventive medical care and counseling that is received before pregnancy and is focused on maintaining a healthy lifestyle and minimizing health risks. The timing of preconception/well woman care is vital to preventing maternal mortality and is often used by MMRCs during their review. However, the Committee did not include Preconception/Well Woman Care as a domain within the maternal mortality framework in order to prioritize measurement and care reform in the phases of maternal care that see the greatest maternal mortalities (i.e., prenatal, intrapartum, and postpartum care).⁴¹ Approximately one-third of maternal mortalities occur within each of these three phases, all of which align with the mortality framework domains. The Committee reviewed several existing frameworks that include a Future Reproductive Life Cycle domain; however, they opted not to include it in the maternal mortality framework because it does not apply to maternal mortality (i.e., there are no future reproductive cycles after a death). For the morbidity framework, the Committee agreed that Future Reproductive Life Cycle overlaps with the Preconception/Well Woman Care domain; therefore, it was removed from the morbidity framework since any prioritized topics and their associated measurement approaches could be directed under the Preconception/Well Woman Care domain instead. The Committee made these choices so that the frameworks would help stakeholders to align measures with the appropriate care phases.

Subdomains That Influence Both Maternal Mortality and Maternal Morbidity Measurement

A *framework subdomain* is a smaller grouping within a domain to help stakeholders identify critical areas for measurement within the larger categorizations. Early proposals for subdomains reflected a more healthcare-centric approach to maternal mortality and morbidity, identifying areas of opportunity within the medical community on which to focus measurement efforts. These included healthcare access, quality, health behaviors, comorbidities, recognition, response, and support. However, the Committee was not satisfied with this healthcare-centric lens for the frameworks and decided to incorporate the influencing factors that were originally identified in the environmental scan. The Committee emphasized that including additional variables in the influencing factors, such as availability of resources, geography, and community structures, would better capture the impact those can have on a woman's health outcomes and would better reflect the importance of both clinical and nonclinical areas that affect the maternal care experience. The influencing factors of health equity, racism, discrimination, mental health, person-centered care, and provider education and bias were included in the frameworks to display aspects of a woman's life that can potentially influence health outcomes.

After combining healthcare-centric subdomains and influencing factors, the Committee revised the list of proposed subdomains and the concepts of quality, provider education and bias, and mental health disorders. Quality was further expanded to include care (i.e., quality care), referring to the need to comprehensively measure the care received throughout the process. Provider education and bias were separated into gaps in provider education and implicit bias to reflect possible unconscious biases and acknowledge the gaps in education as an opportunity to provide specific education related to the topic. The Committee advocated to change the term *mental health disorders* to *mental health* to remove any stigma or negative association with the term *disorders*.

Further Committee review of these proposed subdomains revealed additional gaps that were now more evident. Subdomains that were added as a result include Lived Environment, Patient Experience, and Unequal Treatment. Lived Environment was added to capture the full atmosphere surrounding a woman. Patient Experience was viewed as distinct from Person-Centered Care and was included to accurately reflect the patient’s perspective of their care and the individualization of care, which are both important to health outcomes. Unequal Treatment indicates whether care is provided equitably.

The final list of measure subdomains includes Comorbidities, Discrimination, Gaps in Provider Education, Health Behaviors, Health Equity, Healthcare Access, Implicit Bias, Lived Environment, Mental Health, Patient Experience, Person-Centered Care, Quality Care, Racism, Risk-Appropriate Care, Support, and Unequal Treatment. The Committee asserted that, in many ways, maternal mortality is on the extreme end of potential morbidity outcomes, even though they must be considered and measured separately. As a result, the final list of subdomains is fully applicable to both the maternal morbidity and mortality frameworks and represents key focus areas for measurement that have an impact on the entire maternal experience. The subdomains are presented in alphabetical order, as the Committee did not assign a hierarchy and instead determined that they are all areas of priority for maternal morbidity and mortality measurement.

Unless otherwise noted, the subdomain descriptions presented below were created and iterated by the Committee and reflect how these subdomains are used within the scope and lens of this project.

Table 1. Framework Subdomains With Descriptions From the Committee

Framework Subdomain	Subdomain Description
Comorbidities	<i>Refers to the simultaneous presence of medical, mental, or physical health conditions and/or diseases in a patient</i>
Discrimination	<i>Refers to the classification, marginalization, and placement of people into groups that further feed into the uneven distribution of power, privilege, and superiority within a society</i>
Gaps in Provider Education	<i>Refers to the gap in education that providers receive on cultural competency; principles of anti-racist care; implicit bias; addressing the needs of the lesbian, gay, bisexual, transgender, and queer or questioning (LGBTQ) community; and perinatal mood and anxiety disorders, including peripartum mental health and post-traumatic stress disorder (PTSD)</i>
Health Behaviors	<i>Refers to actions or inactions to maintain, attain, and regain good health and to prevent illness, which may be limited by other considerations, such as access and lived environment</i>
Health Equity	<i>Refers to a fair opportunity for individuals to attain their full health potential and that no one should be disadvantaged from achieving this potential</i>
Healthcare Access	<i>Refers to care that is affordable, accessible, available, and acceptable</i>

Framework Subdomain	Subdomain Description
Implicit Bias	<i>Refers to the unknowing influence of unconscious prejudice and bias and the contribution to outcomes and disparities through one's own cultural stereotypes about individuals. It can affect one's understanding and actions in an unconscious manner and lead to unintended biases in decision making</i>
Lived Environment	<i>Refers to the physical, geographical, and social spaces, and other infrastructures where people live, work, and play. It has a direct or indirect influence on behaviors and transmission of disease</i>
Mental Health	<i>Refers to mental conditions that affect one's mood, thinking, or behaviors, and can arise before pregnancy, during pregnancy, and/or following childbirth</i>
Patient Experience	<i>Refers to the range of interactions that patients have with the healthcare system, including their care via health plans, as well as care from doctors, nurses, and staff in hospitals, physician practices, and other healthcare facilities</i>
Person-Centered Care	<i>Refers to provision of care that is respectful of, responsive to, and guided by individual patient preferences, needs, and values</i>
Quality Care	<i>Refers to the effectiveness, efficiency, equity, patient centeredness, safety, and timeliness in delivery of care⁴²</i>
Racism	<i>Refers to all forms of racial bias, including systemic, structural, interpersonal, and internalized. It includes attitudes, beliefs, or world ideologies that cause avoidable and unfair inequalities in power, resources, capacities, advancement, and opportunities across racialized or ethnic groups that lead to marginalization or disadvantage</i>
Risk-Appropriate Care	<i>Refers to providing care in both hospitals and the outpatient setting according to the level of risk for adverse outcomes (e.g., American College of Obstetrics and Gynecology [ACOG] levels of maternal care)</i>
Support	<i>Refers to resources, resiliency, and personal, interpersonal, and protective factors that promote healthy outcomes and help throughout the maternal experience (e.g., community, financial). It encompasses both practical support and emotional support</i>
Unequal Treatment	<i>Refers to unequal use of evidence-based guidelines and practices in health treatment of minorities when compared to Whites, even when access to healthcare is comparable⁴³</i>

Applying Measurement Frameworks to Enhance Measurement

As mentioned previously, frameworks present a structure for organizing ideas about measurement, existing measures, and measurement gaps that are important within a topic area. Frameworks also describe how measurement should take place (i.e., whose performance should be measured, in which care settings, etc.). This section of the Recommendations Report links the organizational structure of the frameworks to the descriptions of how measurement should occur. This sets the stage for the [Recommendations for Measurement to Improve Maternal Health Outcomes](#) section, in which the Committee's recommendations for measurement are described.

In order to utilize the frameworks as organizational structures for the Committee's recommendations, the authors use the following terms throughout the remainder of this report. These terms are listed in hierarchical order, from the highest, or broadest, level (framework domains) to the most specific, or narrow, level (recommendations for measurement from the Committee):

- **Domains:** groupings of high-level themes or ideas that provide categories for organizing the measurement framework. The domains align with the phases of the maternal life cycle:
 - Preconception/Well Woman Care (maternal morbidity framework only)
 - Prenatal Care
 - Intrapartum Care
 - Postpartum Care
- **Subdomains:** smaller groupings within a domain to help stakeholders identify critical areas for measurement within the larger categorizations. The 16 subdomains identified by the Committee apply to every domain of each framework.
- **Measurement Topics:** Since each subdomain is a critical area for measurement, the Committee identified the measurement topics as a way to categorize the highest priorities for measurement by desired outcome or achievement. Each measurement topic aligns with one or more subdomains, as shown in Table 2 (maternal morbidity) and Table 3 (maternal mortality). Measurement topics are not part of the frameworks but are used to organize the recommendations for measurement.
- **Recommendations for Measurement:** Recommendations consist of specific short-term (1-4 years) or long-term (5 or more years) recommendations for innovative and actionable approaches to improve maternal health outcomes through measurement. Recommendations for measurement are grouped within measurement topics. The recommendations for measurement are not as detailed as a measure concept but could potentially become measure concepts with additional expert analysis and discussion.

Applying the Maternal Morbidity Framework

To apply the maternal morbidity framework, stakeholders can select a domain of interest, examine how a subdomain interacts with it, and consider appropriate measurement options. Because every subdomain represents a critical area of measurement, each domain/subdomain pairing in the morbidity framework represents a different opportunity for high-priority measurement. For example, a morbidity measure tracking risk-appropriate care would look different in the Preconception/Well Woman Care domain than it would in the Intrapartum Care domain. Preconception/Well Woman care is typically ambulatory, while intrapartum care is likely occurring in a hospital, birth center, or the home; the care teams assessing risk and referral would likely differ in each situation. Preconception/well woman care is

as likely to be governed by primary care providers and gynecologists as it is by obstetricians, although the latter often leads care in intrapartum situations.

The Committee's recommendations for measurement are described in the [Recommendations for Measuring Maternal Morbidity Outcomes](#) section below. Many of these recommendations should be considered within more than one domain to capture differential care and risk depending on the life cycle phase a woman is in. Recommendations from the Committee include a primary focus on developing and using maternal morbidity measures to prevent severe morbidity or even mortality in areas in which change seems more attainable; nonetheless, all subdomains indicate measurement areas of need. Because every subdomain is a critical area of measurement, the Committee's recommendations are grouped by measurement topics to address the most urgent measurement priorities within maternal morbidity. The measurement topics for morbidity are identified in Table 2.

One way to increase the attention paid to maternal morbidity measurement is to increase the use of morbidity measures in federal programs. There are limited measures specific to maternal morbidity that are currently active in federal programs. A listing can be found in [Appendix B](#). These measures tend to revolve around the Intrapartum Care domain (e.g., elective delivery or early induction without medical indication at less than 39 weeks, postpartum follow-up and care coordination, and measuring cesarean birth rates), the Prenatal Care domain (e.g., ultrasound determination of pregnancy location for pregnant patients with abdominal pain), and a few measures related to prevention that would be associated with the Preconception/Well Woman Care domain (e.g., contraception measures, depression screening, and hypertension screening and control).

Applying the Maternal Mortality Framework

Similar to applying the maternal morbidity framework, stakeholders can select a domain and then examine the associated subdomains of the maternal mortality framework. Consideration of how the subdomain interacts with the domain will guide stakeholders in reviewing current measures or proposing measure concepts. Because every subdomain is a critical area of measurement, the Committee's recommendations for measurement are grouped by measurement topics to address the most urgent priorities within maternal mortality measurement.

As described above, the domains for the maternal mortality framework were narrowed to only include Prenatal Care, Intrapartum Care, and Postpartum Care. The 16 subdomains are critical areas of measurement that apply to each of these three domains. Although a stakeholder may propose a measure concept based on a specific domain/subdomain combination, the concept may also be relevant to other domains and/or subdomains and may need additional specificity—if not an entirely different set of specifications—in order to be relevant to additional domains.

Mortality measures that aim to prevent death in a specific domain by addressing one or more of the related subdomains have the potential to drive change. While these metrics are important on a large scale, the Committee pointed out that they may not be directly actionable on an institutional, state, or even regional scale due to the relatively small number of maternal mortalities at individual hospitals, in states, or regions, thus creating a gap in accountability and the ability to enact change on preventable deaths. For example, the Maternal Mortality Rate (MMR) from the NVSS tracks maternal deaths while pregnant or within 42 days of the termination of pregnancy (per 100,000 live births), and the Pregnancy-Related Mortality Ratio from the PMSS tracks maternal mortality while pregnant or within a year of the

end of pregnancy (per 100,000 live births).^{6,20,44} In 2018, state-level MMR data were suppressed for 26 states due to these states having less than 10 maternal deaths, which are considered potentially identifiable. Numbers this small on a state level make measurement and accountability at local levels challenging.

The mortality framework can also help to improve maternal mortality by providing categories to guide adjustment or application of existing measures not specific to maternal health. Although it is not maternal-specific, a measure such as NQF #0347 *Death Rate in Low-Mortality Diagnosis-Related Groups*, which already includes obstetric patients, can help to enhance maternal mortality measurement and improve outcomes. This measure, stewarded by the Agency for Healthcare Research and Quality (AHRQ), is a current patient safety indicator (PSI) and captures in-hospital deaths per 1,000 discharges for low mortality (< 0.5 percent) Diagnosis-Related Groups (DRGs) among patients ages 18 or older or obstetric patients. Utilizing this already proven and NQF-endorsed metric as a way to capture aspects of maternal mortality on a smaller scale would be a low-resource way to help focus on facilities or areas in which maternal mortality may be occurring at a higher rate.

The Committee's recommendations for measurement of maternal mortality are detailed under the [Recommendations for Measuring Maternal Mortality Outcomes](#) section below and can be applied to three domains. However, the recommendations must be applied according to which domain, subdomain, and measurement topic is being examined. The measurement topics for mortality are identified in Table 3.

Addressing Measurement Gaps

The Committee used the frameworks for maternal morbidity and maternal mortality to identify and discuss measurement gaps. Using the morbidity framework, the Committee identified several current morbidity-related measurement gaps that apply to all four domains: Preconception/Well Woman Care, Prenatal Care, Intrapartum Care, and Postpartum Care. Descriptions of the identified measurement gaps follow below.

Of significant concern is the dearth of patient experience measures throughout the maternal care experience. The Committee expressed a desire for patient experience measures to be applied to nearly every subdomain within the framework to better understand the experience of care an individual received. While a number of patient surveys assess quality of care, patient experience measures are specifically lacking in the subdomains of racism, discrimination, unequal treatment, and implicit bias.

Measures of both overutilization and underutilization as well as measures of social support were also noted as important for continuing development. For example, while the initiation of prenatal care is typically measured, the total provision of care throughout the duration of pregnancy is not cumulatively measured, thus leading to both overuse and underuse by different populations.^{45,46}

Measurement beyond the hospital level was also discussed as critical in order to capture other significant encounters at the system level and in other care settings. Birth outside of a traditional hospital setting is not as easily monitored; therefore, an array of patient experiences, care delivery, and less acute morbid conditions may not be readily captured by existing data.

Measurement in the postpartum period—especially the late postpartum period between 42 days and one year after birth—remains a challenge for both morbidity and mortality measurement because it is difficult to adequately obtain information on related health outcomes that are far removed from birth and to correctly link them to birth or pregnancy. Readmissions data may be useful for measurement but only within the same system or facility. While not currently in use for maternal morbidity measurement, hospital emergency department (ED) data on maternal and infant cases could provide insights across the continuum, including miscarriages and stillbirths, substance use, mental health, violence, accidents, and a variety of conditions, such as hemorrhage and sepsis. For morbidity measurement, SMM in the postpartum period may be identified using healthcare encounter data; however, there is neither a specific mechanism for connecting a pregnancy-related morbidity captured several months post-birth to the pregnancy nor is there a standard means of recording and reporting it as such.

For mortality measurement, gaps remain in the standardization of measures. While MMRCs play a crucial role in identifying and categorizing maternal mortality, their use is limited by lags in data availability and reporting as well as lack of standardization of categorization. Although MMRCs have several pathways by which they can communicate time-sensitive information, such as briefs and “urgent communications,” Committee members recalled instances in which MMRC data were released three years after the collection year. Due to relatively small numbers of maternal mortality on a state-wide basis, some states do not release full reports on an annual basis.⁴⁷ The ERASE MM Program focuses on addressing this issue, and since almost all states currently use the MMRIA, it is anticipated that improvement in timely reviews will occur since the MMRIA uses common data language to aid in standardization.³² However, gaps remain in measurement standardization, especially for defining pregnancy-associated deaths, and for developing a mortality measurement recommendation that captures more detail at the state level. The Committee also recommended improved data sharing and collaboration between state agencies and Medicaid or Managed Care Organizations (MCOs) in order to better measure coverage and services available to women.

One way to increase the attention paid to maternal mortality measurement is to increase the use of mortality prevention measures in payment programs. Measures encouraging the prevention of maternal mortality are not specifically captured in any federal Alternative Payment Models (APMs) or Value-Based Purchasing (VBP) programs. Filling these gaps in actionable maternal mortality measures within VBP programs or APMs could place more focus on preventing maternal mortality by incentivizing providers to track and be proactive in learning from past deaths and near-miss events.

The Committee’s set of recommended measurement approaches (described in the following section) provides a starting point for improving maternal morbidity and mortality measurement and addressing gaps in measurement. These Committee recommendations can help to direct the measure development process by prioritizing specific approaches and topics to improve measurement. Any resulting measures can then be tested further and potentially submitted for consideration for state- or federal-level quality improvement, public reporting, or payment programs.

Recommendations for Measurement to Improve Maternal Health Outcomes

The Committee developed recommendations for measurement based upon the measurement topics, as well as the 16 subdomains within the maternal morbidity and maternal mortality frameworks. The Committee did not prioritize any subdomain above another because they are all areas of measurement

priority. Instead, the recommendations for measurement detailed below focus on the subdomains in which the Committee saw the greatest potential for immediate change.

NQF distinguishes between a measure and a measure concept. A *measure* is defined as a fully developed metric that includes detailed specifications and may have undergone scientific testing.⁴⁸ A fully developed measure identifies what should happen (i.e., what is being measured), who should be measured (i.e., population), where measurement should happen (i.e., setting), when it should happen (i.e., time), and how it should occur. It is important to note that the Committee is not recommending specific measures for immediate implementation and use. A *measure concept* is an idea for a measure that includes a description of the measure, ideally one that includes a planned target and population. Measure concepts for maternal mortality are discussed in a later section of the report titled [Mortality Measure Concept](#).

This report also includes *recommendations for measurement*. These recommendations are specific, short- or long-term, innovative, and actionable approaches to improve maternal health outcomes through measurement and can lead to the development of measure concepts. This section of the report describes the Committee's recommendations for measurement of maternal morbidity and maternal mortality. CMS requested that the recommendations be divided into either short-term (1-4 years) or long-term (5 or more years) time frames. The Committee classified each recommendation based on perceived feasibility and intended impact, generally categorizing those that lack a robust evidence base, process, and/or clear path of equitable implementation as long-term. However, each implementing organization can analyze all recommendations within the context of their system and adjust the short- and long-term time frames to maximize equity and impact.

Recommendations for Measuring Maternal Morbidity Outcomes

Building on the environmental scan and the two new measurement frameworks, the Committee discussed a set of measurement topics by which the final recommendations and priorities for maternal morbidity should be categorized:

- **Inequitable/equitable treatment**, including the standardization of data collection efforts for measurement
- **Timely access to treatment and receipt of services**, including implementing measures that identify access to treatment within a specific time frame
- **Risk-appropriate care**, including the implementation of measures to assess site appropriateness based on maternal comorbidities
- **Follow-up and coordination of care**, including interoperability of record sharing
- **Protocols and guidelines**, including measures of and promoting adherence to screening and follow-up practices
- **Substance use disorders, mental health, and behavioral health**, including adoption of measures which track referral services and closing the referral loop
- **Access to pain management and labor support**
- **Patient- and family-reported outcomes and experiences of care**

Given the overlaps between the subdomains (e.g., the subdomains of discrimination, health equity, implicit bias, and racism all share overlapping characteristics but are not redundant), the Committee described how the measurement topics related to the subdomains across the four maternal morbidity

domains: (1) Preconception/Well Woman Care, (2) Prenatal Care, (3) Intrapartum Care, and (4) Postpartum Care. Unless otherwise noted, the measurement topics apply to all four domains. The Committee discussed the following measurement topics under each subdomain:

Table 2. Maternal Morbidity Measurement Topics Prioritized Under Each Subdomain

Subdomain	Measurement Topics Discussed
Comorbidities	<ul style="list-style-type: none"> • Timely access to treatment and receipt of services • Risk-appropriate care • Follow-up and coordination of care • Protocols and guidelines • SUDs, mental health, and behavioral health • Access to pain management and labor support (Intrapartum Care domain) • Patient- and family-reported outcomes and experiences of care
Discrimination	<ul style="list-style-type: none"> • Inequitable/equitable treatment • Timely access to treatment and receipt of services • Risk-appropriate care • Access to pain management and labor support (Intrapartum Care domain) • Patient- and family-reported outcomes and experiences of care
Gaps in Provider Education	<ul style="list-style-type: none"> • Timely access to treatment and receipt of services • Risk-appropriate care • Follow-up and coordination of care • Protocols and guidelines • SUDs, mental health, and behavioral health • Access to pain management and labor support (Intrapartum Care domain) • Patient- and family-reported outcomes and experiences of care
Health Behaviors	<ul style="list-style-type: none"> • Inequitable/equitable treatment • Risk-appropriate care • Follow-up and coordination of care • Protocols and guidelines • SUDs, mental health, and behavioral health
Health Equity	<ul style="list-style-type: none"> • Inequitable/equitable treatment • Timely access to treatment and receipt of services • Risk-appropriate care • Access to pain management and labor support (Intrapartum Care domain) • Patient- and family-reported outcomes and experiences of care
Healthcare Access	<ul style="list-style-type: none"> • Timely access to treatment and receipt of services • Patient- and family-reported outcomes and experiences of care

Subdomain	Measurement Topics Discussed
Implicit Bias	<ul style="list-style-type: none"> • Inequitable/equitable treatment • Timely access to treatment and receipt of services • Risk-appropriate care • Access to pain management and labor support (Intrapartum Care domain) • Patient- and family-reported outcomes and experiences of care
Lived Environment	<ul style="list-style-type: none"> • Inequitable/equitable treatment • Timely access to treatment and receipt of services • Risk-appropriate care • Follow-up and coordination of care • Access to pain management and labor support (Intrapartum Care domain) • Patient- and family-reported outcomes and experiences of care
Mental Health	<ul style="list-style-type: none"> • Risk-appropriate care • Follow-up and coordination of care • Protocols and guidelines • SUDs, mental health, and behavioral health • Access to pain management and labor support (Intrapartum Care domain) • Patient- and family-reported outcomes and experiences of care
Patient Experience	<ul style="list-style-type: none"> • Risk-appropriate care • Follow-up and coordination of care • Protocols and guidelines • SUDs, mental health, and behavioral health • Access to pain management and labor support (Intrapartum Care domain) • Patient- and family-reported outcomes and experiences of care
Person-Centered Care	<ul style="list-style-type: none"> • Risk-appropriate care • Follow-up and coordination of care • Protocols and guidelines • SUDs, mental health, and behavioral health • Access to pain management and labor support (Intrapartum Care domain) • Patient- and family-reported outcomes and experiences of care
Quality Care	<ul style="list-style-type: none"> • Timely access to treatment and receipt of services • Patient- and family-reported outcomes and experiences of care
Racism	<ul style="list-style-type: none"> • Inequitable/equitable treatment • Timely access to treatment and receipt of services • Risk-appropriate care • Access to pain management and labor support (Intrapartum Care domain) • Patient- and family-reported outcomes and experiences of care
Risk-Appropriate Care	<ul style="list-style-type: none"> • Timely access to treatment and receipt of services • Patient- and family-reported outcomes and experiences of care

Subdomain	Measurement Topics Discussed
Support	<ul style="list-style-type: none"> • Follow-up and coordination of care • Protocols and guidelines • SUDs, mental health, and behavioral health • Access to pain management and labor support (Intrapartum Care domain) • Patient- and family-reported outcomes and experiences of care • Risk-appropriate care
Unequal Treatment	<ul style="list-style-type: none"> • Timely access to treatment and receipt of services • Patient- and family-reported outcomes and experiences of care

The Committee also discussed additional considerations for measurement of maternal morbidity. Regarding patient experiences of care, the Committee discussed incorporating the use of qualitative data from focus groups, individual interviews, or narratives to help gather the relevant information needed for this approach. The Committee noted that this can help to bridge the gap between researchers, patients, and families. Other measurement topics for exploration were inequitable care and treatment, pain management, and care coordination. Overall, the Committee advocated focusing on system-level measures for a stronger and wider implementation, with more uniform care from all providers across stakeholders.

The recommendations for measurement are listed in the sections below, categorized by the measurement topics listed above, and separated into the short (1-4 years) and long term (5 or more years). Descriptive information about each measurement topic and its specific recommendations for measurement is included in each section.

Inequitable/Equitable Treatment

Examining unfair and unjust practices among historically marginalized populations compared with White populations (even when access is comparable) is pivotal in determining whether evidence-based guidelines and practices used during treatment were inequitable or equitable.^{18,49,50} The recommendations for measurement below aim to determine how situations of inequitable treatment are being addressed and rectified through measurement and accountability initiatives. The Committee emphasized the importance of stratification of all quality metrics by race, ethnicity, geography, insurance type, and other SDOH to retrospectively identify areas of greatest disparity. This type of stratified analysis will inform evidence-based practices to reduce disparities across care settings and care delivery and may uncover areas that are vulnerable to racism and unequal treatment that warrant prioritization.

Racism and implicit bias contribute to racial inequities in care; however, measuring racism and its contribution to adverse outcomes is challenging. The Committee prioritized measures of patient experience and provider reflection as strategies to address the role of racism and bias in disparate care and outcomes. The Committee discussed recommendations that are focused on existing survey methods, such as the Pregnancy Risk Assessment Monitoring System (PRAMS), to address subdomains of racism, health equity, discrimination, implicit bias, and lived environment until dedicated surveys or direct measures of these concepts are available. The Committee posed recommendations for

measurement that examine the provider recollection of care delivery in comparison to an independent review of objective data that documents the actual delivery of care as having the potential to address racism and implicit bias through the lens of quality improvement. Additionally, the Committee recognized the importance of creating measurable opportunities for providers and staff to report instances of disrespect, racism, and other issues without fear of retribution. Stratification of outcomes by race and ethnicity, the consistent implementation of existing guidelines to address disparities in care, and the inclusion of novel measurement approaches may be important strategies to address unequal treatment until validated direct measures are available.

Short-term recommendations for measurement include the following:

- Use of structured data fields to collect information on race, ethnicity, SDOH, and time and/or distance to care to allow for stratified reporting of outcomes
- Alignment with the AIM Reduction of Peripartum Racial/Ethnic Disparities bundle⁵¹ to promote the use of enhanced reviews of SMM cases that measure and address the role of racism, implicit bias, and SDOH in the poor health outcomes
- Development of a survey to capture patient- and family-reported experiences of care and satisfaction with care
- Presence of a mechanism for patients, families, and staff to report disrespect, racism, and other issues⁵¹
- Presence of policies and procedures to address reports of disrespect, racism, and other issues at the hospital or health system level without risk of reprisal
- Measures that encourage widespread, equitable access to and use of less invasive interventions, such as incorporating doula or labor support, which are commonly unavailable to marginalized and low-income populations
- Identification of potential areas of disparities in care by capturing the provider experience through self-reflection, coupled with objective measurement of care delivery
- Measures that address differences in timing of interventions or referral for culturally congruent services, such as mental health treatment, social support, labor support, and continuity of nursing and obstetric care
- Stratification of measure approaches focused on the patient experience by race and ethnicity, including measures of time and/or distance to care and adequacy of pain management
- Monitoring of rates of performance in any of the subsequent measurement approaches at the provider and practice levels stratified by race and ethnicity

Long-term recommendations for measurement include the following:

- Monitoring treatment of patients through consistent tracking of quality improvement dashboards that display maternal health outcomes stratified by race, ethnicity, and SDOH
- Development and implementation of a validated measure for determining levels of racism

Timely Access to Treatment and Receipt of Services

Timely access to treatment is a critical aspect of preventing morbidity, curtailing the consequences of SMM, and limiting the progression of SMM to mortality within maternal care.⁵² This measurement topic examines the availability and accessibility of services, receipt of those services, and provision of care. Currently, the Committee feels there may be a tendency for providers to focus on care during the prenatal and intrapartum period; however, a lack of focus on care for mental health and SUDs remains, especially during the postpartum period. Some services may not be available for patients in certain

populations, such as those living in rural areas or with unstable insurance. These same barriers, alongside racism, health literacy issues, and other SDOH, may limit a patient's ability to access available services in a timely manner.

The Committee discussed recommendations for measurement focused on the overprovision, underprovision, and misuse of care, as well as the capture of the differences in timeliness of treatment and receipt of services. Stratification by patient demographics is important for comparisons in all these situations to determine whether there is a pattern to the type and timeliness of care administered and received. For example, extracting data from the electronic medical record (EMR) and stratifying by race/ethnicity and other social risk factors (as applicable) to assess timeliness of treatment for pain and hemorrhage is pertinent to the future development of measure content in these areas. Measurement must focus on provision of appropriate care but also consider culture, risk level, and prioritization of patient care. Examining insurance coverage and utilization by race, ethnicity, and payer type while also assessing the timing of the initiation of prenatal care (i.e., if the initiation occurs after the first trimester) can help assess whether care is being delivered and received equitably.

Short-term recommendations for measurement include the following:

- Measure timing of receipt of key services, such as initiation of prenatal care and completion of referrals for subsequent specialty care¹¹
- Measure time from diagnosis to initiation of disease-specific treatment for the leading causes of maternal morbidity and mortality, including sepsis, hemorrhage, severe hypertension, and mood disorders. Measurement should capture disease-specific interventions deemed best practice in existing patient safety bundles⁵³ and should be stratified by race and ethnicity.
- Availability of treatment and referrals to services that are culturally congruent and address patient-specific needs related to race, ethnicity, and language barriers
- Receipt of screening and preventive services prior to or early in pregnancy for all patients with an emphasis on those with medical comorbidities⁵⁴
- Evidence of implementation of AIM patient safety bundles to address diseases on the pathway to morbidity and mortality, including hemorrhage, sepsis, hypertension, venous thromboembolism (VTE), cesarean delivery, mental health, and cardiac disease
- Availability and receipt of interventions that maximize the likelihood of vaginal birth, including obstetric procedures, pharmacologic and nonpharmacologic pain management, and labor support, such as doulas, stratified by race and ethnicity
- Use of measurement to increase the use of the existing AIM Support After a Severe Maternal Event patient safety bundle⁵⁵
- Availability of subspecialists, including maternal-fetal medicine subspecialists, endocrinologists, cardiologists, mental and behavioral health providers, and prescribers for medication-assisted treatment, including wait time and distance to access these services in underserved areas
- Monitoring screening for and treatment of mental health conditions and SUDs separately to better ascertain prevalence and target areas of need in a timely manner^{56,57}

Long-term recommendations for measurement include the following:

- Measuring availability of treatment by measuring whether facilities exist in needed areas, distance to treatment, and availability of specialists to increase access to all. A stratified composite measure may address this cross-section of the impacts of availability on quality.

- Improved tracking of access to and availability of safe and reliable contraception
- Ability to extract time-to-event data from the EMR and stratify by common aspects of inequity

Risk-Appropriate Care

This measure topic refers to ensuring that a patient has access to the resources and clinicians needed to meet her specific anticipated needs. Risk-appropriate care has significant implications for maternal health outcomes. It is not only care within a facility, but also care within a network (e.g., well-coordinated screenings, referrals, transfers, and transports across appropriate care settings). All birthing facilities must be equipped and prepared to manage obstetric emergencies. Provision of risk-appropriate care is critical for women with high-risk medical or obstetric comorbidities, which can lead to SMM or mortality. Current screening requirements from departments of health focus on infectious diseases (e.g., human immunodeficiency virus [HIV] and syphilis screening or Group B Strep [GBS] screening) that target neonatal morbidity but are not major causes of maternal morbidity. Increased screening for high-risk maternal states is necessary to decrease maternal morbidity, but it must be balanced with avoiding unwarranted overmedicalization of birth. Physiologic birth—a birth that is characterized by spontaneous onset and progression of labor, including biological and psychological conditions that promote effective labor and the vaginal birth of the infant and placenta—has the potential to reduce the overuse of interventions.⁵⁸ The Committee discussed recommendations for measurement that include creating a comprehensive risk assessment to be administered during the prenatal period for maternal states that increase the risk of key adverse outcomes, such as hemorrhage or cardiovascular morbidity. There is also a need for uniform collection of immunization status during the preconception period, as well as a measure that assesses the appropriateness of delivery site based on maternal comorbidities, as outlined in the levels of maternal care guidelines. Additionally, providers should help patients understand urgent maternal warning signs and listen to the issues and concerns of patients.⁵⁹ Although it is rare, apparently benign symptoms can lead to SMMs (e.g., hyperemesis can lead to clinically significant impairment of oral nutrition, dehydration, and/or mental health issues).

Short-term recommendations for measurement include the following:

- Documentation of screening protocols and monitoring of adherence to those protocols at the practice level. Measurements of this type should prioritize compliance for conditions that contribute to worse outcomes and deaths.
- Use of universal risk assessment for comorbidities during prenatal care¹²
- Documentation of referral/treatment pathways and tracking of referral rates to subspecialty consultations for patients with high-risk comorbidities in pregnancy (e.g., diabetes, cardiovascular disease, and lupus)^{60,61}
- Measurement of timely involvement of maternal-fetal medicine subspecialists for high-risk women⁶²
- Coordination and measurement of availability of nonmedical supportive care (e.g., doula care, social workers) and medical supportive care (e.g., nutritionists) to ensure risk-appropriate care, availability, and coverage for women^{63,64}
- Implementation and tracking of hospital self-designation of level of care or participation in local or regional efforts to designate levels of maternal care
- Standardization and monitoring of comorbidities warranting additional oversight or consideration of transfer at the hospital or practice level

- Stratification of analyses to ensure equal receipt of risk-appropriate services according to race, ethnicity, payer status, and geographic location

Long-term recommendations for measurement include the following:

- Coordinated designation of levels of maternal care within each state or regional care network to ensure risk-appropriate care and appropriate utilization of specialists. Encouragement of national implementation of the CDC Levels of Care Assessment Tool (LOCATe) or other state-developed resources to achieve these ends⁶⁵
- Measurement of appropriateness of maternal care settings at the time of delivery in accordance with national guidelines and accepted best practices, including tracking delivery at risk-appropriate centers for high-risk women⁶⁶

Follow-Up and Coordination of Care

Coordination of care that encompasses follow-up is considered a critical measurement topic because the medical complexity of the patient population demands multidisciplinary input from providers beyond the obstetric care provider. Receiving appropriate care may require transfer of care at the time of delivery for high-risk patients or co-management of prenatal care for patients expected to deliver at another hospital or at home. Coordinated care between specialists or hospitals is necessary to optimize outcomes, but it requires a great deal of effort and proactive organization on behalf of both patients and providers. This type of coordinated care is particularly important for populations who may need emergency care outside of their usual practice or provider and for populations who see different providers each visit. Once a patient receives access to risk-appropriate care, it is of paramount importance to ensure their care is optimized within a regional referral network.⁶² Although a comorbidity index exists,^{67–69} a well-defined index for pregnant patients in the hospital setting does not. In addition, the next steps after a patient is discharged from the hospital should be proactively aligned to allow for continuity of care. The Committee discussed recommendations for measurement, such as requiring hospitals to identify comorbidities commonly warranting referral, with the objective of state health departments designating the levels of care. The use of risk assessment tools, such as the obstetric comorbidity index (until 30 days postpartum),⁶⁸ could be promoted and measured to identify women at risk of morbidity due to compounding of risk factors. Documentation of conversations with patients that incorporate individualized risk assessment and available delivery options to improve informed care is also needed. Following this addition, care should be provided by subspecialists for those who need it (e.g., involvement of cardiologists for women with cardiac disease, care by the accreta team for those with concern for placenta accreta, and care by endocrinologists for women with pre-existing diabetes or thyroid conditions). In addition, more widespread use and interoperability of EMRs and health information exchanges could lead to universal access to patient information across hospital systems. Encouraging states or hospital systems to promote interoperability and establish programs for coordinating records is key.

Short-term recommendations for measurement include the following:

- Implementation of comprehensive maternal risk assessment during prenatal care with appropriate follow-up for high-risk patients
- Measurement of referrals to appropriate collaborators for patients with existing comorbidities or issues requiring specialist intervention (i.e., patient-centered approach to risk assessment)⁷⁰

- Measurement of interoperability capabilities through sharing of records between providers and facilities providing care—regardless of differences in hospital network or state
- Measurement of referrals of high-risk patients for appropriate subspecialty consultations within a given hospital network⁷¹
- Standardization and monitoring of practice-specific or hospital-specific lists of comorbidities that may warrant involvement of other specialists or hospitals, respectively
- Adherence to best practices as outlined within these recommendations at the level of the referring and receiving hospitals

Long-term recommendation(s) for measurement include the following:

- Implementation and monitoring of interoperability, allowing the sharing of medical records between hospitals, care pathways, and states to optimize outcomes for patients vulnerable to adverse outcomes due to lack of coordinated care (i.e., those being co-managed between sites)⁷²

Protocols and Guidelines Adherence

Adhering to standard protocols and guidelines helps to prevent overuse, underuse, and misuse of care, and to minimize variation between practices and providers. Protocols necessitating follow-up in high-risk pregnancies are often dedicated to neonatal outcomes and limited to interventions such as ultrasounds. The corresponding interventions for addressing maternal risk are less clear and are not linked to any billable procedures, which provides limited incentive to prioritize implementation. Although disease-specific guidelines exist, little monitoring of adherence occurs within these guidelines. The burden of implementation of screening practices and protocols must fall on the hospital or practice, which will be most effective within an integrated system. This approach ensures that screening for maternal morbidity becomes ingrained in prenatal care culture at the same level of fetal screening procedures, such as aneuploidy screening or screening for group B strep. Guidelines and protocols drive clinical actions, and measurement helps to mandate adherence and can provide financial incentives, each playing an important role in ensuring consistent treatment. A procedural approach also minimizes unequal treatment so that a privately insured English-speaking patient with high health literacy receives the same standard of care as the publicly insured non-English speaking patient who is less comfortable addressing her concerns with her provider.

The Committee discussed guidelines that focus on outpatient and inpatient management to address this concern. The Committee recognized the role that The Joint Commission plays in ensuring adherence to existing guidelines. Hospitals that are accredited by The Joint Commission are required to stock easily accessible hemorrhage supply kits; develop written, evidence-based procedures to identify and treat hemorrhage and severe hypertension; provide role-specific training at least every two years to staff and providers who treat inpatient pregnant and postpartum patients; conduct response procedure drills on at least an annual basis; and educate patients on the signs and symptoms that warrant care during hospitalization and after discharge.⁷³ The Committee also noted that this approach is limited to specific diseases in the inpatient setting and that not all facilities are accredited by The Joint Commission. For example, The Joint Commission's standards to address prevention, early recognition, and timely treatment of hemorrhage, severe hypertension, and preeclampsia may reduce transfusion-associated morbidity in the setting of hemorrhage at the time of delivery but do little to reduce preventable transfusion-associated morbidity from iron deficiency anemia.⁷⁴ In addition, maternal care specialists

who do not work in hospital inpatient settings are not currently affected by this type of Joint Commission mandate, such as outpatient obstetric care providers responsible for prenatal care or postpartum care, specialists in the outpatient setting, and birthing centers. The Committee discussed recommendations for measurement focused on outpatient screening protocols, which should be associated with follow-up and repeated at multiple touch points throughout pregnancy and the postpartum period.

Level of measurement is important and should be considered at the hospital (i.e., between health systems and within integrated health systems), practice, and provider levels. The Committee agreed that existing hospital-level measures provide a good starting point for the development of measures at the state and/or practice level, or for seeking national comparison.

Short-term recommendations for measurement include the following:

- Documentation of and adherence to screening practices and recommended follow-up for conditions that contribute to maternal morbidity and mortality at the practice and hospital levels
- Universal screening for previously undiagnosed comorbid conditions at initial prenatal visit (i.e., diabetes, unhealthy weight, hypertension, and depression)^{54,57,75}
- Documentation of monitoring plan for significant comorbidities and receipt of appropriate risk-reduction techniques (e.g., hypertension, substance use, CVD, diabetes, history of preterm birth, and history of cesarean delivery)
- Screening and appropriate counseling or referral to address tobacco, alcohol, and substance use⁷⁶
- Screening and appropriate counseling or referral for intimate partner violence⁷⁷⁻⁷⁹
- Risk-appropriate screening practices, compliance measurement, and appropriate actions for women with high-risk comorbidities
- Monitoring of interventions or modifications in prenatal care provided to mitigate risks associated with high-risk medical, obstetric, or psychosocial states, including tracking of timing of implementation relative to timing of diagnosis, and stratification according to race and ethnicity¹¹
- Adherence to guideline best practices set forth in existing AIM patient safety bundles to reduce preventable morbidity⁸⁰
 - Tracking receipt of low-dose aspirin in women 12-14 weeks following the U.S. Preventive Services Task Force (USPSTF) guidelines
 - Facilitation and tracking of early identification of hypertension, including tracking receipt of blood pressure cuff in women with chronic hypertension at initial visit
 - Documentation of counseling and/or referrals to address unhealthy weight
 - Measurement of dedicated placental assessments for women at risk for placenta accreta
 - Measurement of appropriate referrals to cardiology and completion of recent echocardiogram for women with CVD
 - Compliance with completing a blood pressure check one week after discharge for women with hypertension complicating pregnancy or delivery
 - Screening for and management of iron-deficiency anemia

- Adherence to guideline best practices set forth in existing patient safety bundle on hemorrhage associated morbidity (e.g., active management of the third stage of labor as measured by how many receive routine oxytocin, thus avoiding severe sustained hypertension)
 - Adherence to ACOG guidelines adopted for accreditation by The Joint Commission for treating severe sustained hypertension
 - Receipt of risk-based pharmacologic VTE prophylaxis in admitted patients in accordance with hospital guidelines⁸¹
- Completion and documentation of appropriate next steps in response to all screenings performed

Substance Use Disorders, Mental Health, and Behavioral Health

There are significant measurement gaps in areas of care for SUDs, mental health, and behavioral health. The treatments for SUDs and other perinatal mental health conditions are distinct; nonetheless, they are similar in that they have significant overlap in terms of the mental health providers providing this care and the pathways to ensure treatment implementation. Therefore, the implementation of recommendations for measuring SUDs may strengthen the measurement of mental and behavioral health, and vice versa. Culturally appropriate screenings and care will help to encourage historically marginalized populations to seek care and discourage providers from continuing to marginalize these patients. The Committee discussed recommendations that prioritize vulnerable populations; address subdomains of racism, health equity, discrimination, implicit bias, and lived environment; and focus on EMR data and surveys that can be used to apply universal screening. The measurement of the absolute number of providers who are trained to work with SUD and mental and behavioral health in pregnant women is needed. Measures of referral and engagement (including follow-up for patients who are referred to but do not access care) will help to prioritize the next steps following screening to promote better outcomes and access to mental health services.⁸² More research is needed to understand why gaps exist in screening and referrals and whether providers feel there are insufficient resources for referral or that the screening standard is inappropriate for all populations.

Short-term recommendations for measurement include the following:

- Documentation of access to behavioral health services for women who screen positive for mental health conditions and SUD as a regular part of prenatal and postpartum care
- Documented screening for SDOH and psychosocial stressors^{83,84}
- Measurement of availability and documentation of provision of appropriate services for patients with socioeconomic barriers to care (e.g., childcare, stable housing, transportation, food security, and internet access)⁸⁵
- Measure implementation of trauma-informed care, including implementation of best practices at the level of the practice or hospital coupled with provider training⁸⁶
- Measurement of inpatient and outpatient prevalence of SUD and mental health conditions as well as the impact on outcomes across the continuum, including the ED
- Tracking of screening completion rates as outlined by best practices and monitoring of referral and receipt of care rates for patients screening positive for mental health conditions, SUDs, or socially vulnerable states⁵⁷

Long-term recommendations for measurement include the following:

- Systematic assessment of barriers to accessing care for those who are referred to but do not engage in care
- Building an evidence base to inform guidelines and measurement concepts outlining best practices surrounding culturally appropriate, psychosocial interventions and trauma-informed care
- Triangulation of diagnosis information with referral and follow-up information for specific, clinically significant diagnoses associated with stigma. Consideration of the Health Effectiveness Data and Information Set (HEDIS) measure for follow-up after hospitalization for mental illness as an approach to define this measure.

Access to Pain Management and Labor Support

The intersection of medical care and psychosocial care within labor and delivery is challenging, especially as it relates to having access to labor support and pain management. Patients bring a wealth of lived experience, hopes, and expectations to their deliveries; however, this outlook may not translate into their birth experience. The priorities of the provider may not always align with the perceived needs of the patient, as providers weigh a variety of clinical signals and risks throughout labor in determining the next steps to take or recommend to a patient. Patients have varying levels of medical knowledge or comfort with their care team, which can affect their ability or willingness to advocate for their own goals. Misalignment in these goals can lead to adverse outcomes and further underscore distrust in the medical system—particularly for historically marginalized populations.⁸⁷ This may have serious implications during the immediate postpartum period and may have downstream impact on a patient's future pregnancies or health outcomes. Building systems to prioritize the patient experience in labor and delivery can mitigate morbidity in the moment but can also assist in supporting common issues, such as the lack of patient self-advocacy often displayed during delivery.

Variability in the definition of continuous labor support and which components of this intervention improve outcomes creates an ongoing challenge for both the patient and provider. Available evidence suggests that access to a doula can decrease rates of preterm birth and cesarean delivery and lead to cost savings for the healthcare system;⁸⁸ however, epidemiologic studies cannot ascertain whether these improved outcomes are due to the intervention of a doula or a practice that prioritizes continuous labor support. In addition to labor support, the Committee discussed recommendations for measurement that focus on ensuring pain relief in labor matches a patient's care goals. Appropriate use of anesthesia consults during the prenatal period can improve care delivery for patients whose medical comorbidities may limit access to timely and effective intrapartum and postpartum pain control, such as those with SUD, high body mass index (BMI), or a need for anticoagulation. Recognizing nonmedical barriers to timely and effective neuraxial analgesia (i.e., local anesthesia delivered through the central nervous system, such as epidural anesthesia), including limited health literacy or English proficiency, is also a priority. The utilization of surveys to convey patient experiences that place emphasis on those with medical comorbidities (including SUDs) or social vulnerabilities that ultimately affect the patient's ability to self-advocate will provide insight and valuable data for any future measurements. In addition to surveying, establishing dedicated pathways and protocols for those seeking unmedicated birth would optimize coordination of care between certified birth centers, home birth transfers, or midwife-led care and other levels of care when the need arises.

Short-term recommendations for measurement include the following:

- Documentation of a clear birth plan acknowledging patient hopes for delivery
- Availability and use of adjunct intrapartum support personnel (e.g., doulas, social workers, or family members) during labor, stratified by patients' race, ethnicity, and payer status⁸⁹
- Use of interdisciplinary collaboration and accountability of care and support for patients at high-risk medically or socially
- Measurement of timely access to pain management strategies aligned with patient goals of care⁹⁰
- Survey of patient experiences to inform best practices, address perceived themes related to the labor experience, and reveal areas for improvement at the hospital level
- Analysis of existing data from pain management and labor support measures stratified by race and ethnicity, payer status, and medical comorbidity to better recognize barriers to care
- Use of anesthesia consults during the prenatal period for medical/obstetrical comorbidities and education and goal setting/expectations⁹¹

Long-term recommendations for measurement include the following:

- Establishment of evidence-based guidelines outlining best practices surrounding labor support interventions and patients who may benefit most from this intervention
- Provision of equitable access to culturally appropriate labor support interventions independent of payer status⁶⁴
- Access to care for pregnant women in any setting (e.g., hospital, birth center, or home) with appropriate risk assessment, and ensuring that these services are covered by insurance
- Implementation and tracking of protocols dedicated to providing safe care for and support of patients seeking to minimize interventions at birth⁹²
- Development and documentation of anesthesia protocols that do not delay progression of labor or prevent active participation in delivery due to overuse⁹³
- Development and monitoring of targeted anesthesia quality metrics, such as the need to replace an epidural, timeliness of doing so, overall pain and satisfaction with the epidural, and need for general anesthesia for epidural failure, to serve as foundational guidance for attentive labor support stratified by race/ethnicity and insurance status

Patient- and Family-Reported Outcomes and Experiences of Care

Patient and family experiences of care represent critical data that will facilitate better understanding of delivered care (or care *not* delivered) in order to improve outcomes and reduce morbidity. Feedback from the family should be coupled with patient-reported experiences of care. During delivery, patients may not always be aware of all the care they receive, but family members are often present as well. This collateral history can be an important source of information for patients experiencing SMM who may be sedated and intubated or too ill to actively participate in their care. Monitoring the patient and family experience for differential treatment, such as differing levels of communication of care or enforcement of rules, may be an important mechanism to detect instances of systemic racism or implicit bias. Further recommendations on surveys suggest the focus should be on discrete questions to create scorable measures or a collection of patient experiences. There is a CDC-developed [informant interview guide](#) from the MMRC Review to Action website⁹⁴ that could be applied to morbidity and could measure differential treatment of family members during the labor and delivery experience. Families also experience differential treatment during intrapartum and postpartum care that must be captured to

ensure interdisciplinary responsibility so that all care providers are held accountable and responsible for patient progress and outcomes, as appropriate, throughout the course of a pregnancy.

The Committee discussed recommendations for measurement that focus on the development and use of surveys for collecting data on both patient and family experience. Surveys of those receiving direct care and those who are also affected by care, such as family members, can supply measure users with helpful information. The development of such recommendations for measurement into quality measures should consider planned use at the hospital or system level as well as at the provider level. Stratification should be implemented to address subdomains of racism, health equity, discrimination, and implicit bias. Survey design and implementation must also balance the burden on the patient with the burden on providers since surveys can be cumbersome and often have low response rates. Survey questions should also reflect a range of sites and actors, including individual providers, practices, hospitals, and health systems. Survey results have the potential to address subdomains of support, patient experience, person-centered care, and mental health.

Short-term recommendations for measurement include the following:

- Measurement of care team responsiveness to patient needs during a maternal event and evaluation of patient feedback on maternal care delivered (e.g., treatment of visitors and family)
- Use of surveys as a critical tool of measurement focusing on several concepts:
 - Support after traumatic birth to determine whether the patient and family were treated equitably and fairly
 - Was the patient screened for mental health conditions during pregnancy, and was she referred to needed and appropriate services?
 - What was the patient or family's perception of the quality and consistency of prenatal care received?
 - What was the patient or family's perception of the quality of labor and delivery care received?
- Adaptation of existing patient experience surveys to include more targeted questions to aid the measurement of care delivered and outcomes experienced
- Improved documentation of conversations with patients about risks and options provided for care/treatment, coupled with data from eventual outcomes
- Improved documentation of resources needed during prenatal and intrapartum care

Long-term recommendations for measurement include the following:

- Improvements to informed decision making practices (e.g., actively identify hospitals and care teams specific to patient needs)

Recommendations for Measuring Maternal Mortality Outcomes

The Committee reviewed and discussed applicable measurement topics for the maternal mortality framework across three domains: (1) Prenatal Care, (2) Intrapartum Care, and (3) Postpartum Care. The 16 supporting subdomains apply to each of these three domains. As in the morbidity recommendations section, the final recommendations for maternal mortality measurement were categorized by measurement topic due to significant overlap among subdomains. Recommendations for maternal mortality measurement are subsequently categorized by the following measurement topics:

- **Maternal mortality prevention**
- **Substance use disorders, mental health, and behavioral health**
- **Continuity of coverage and care**
- **Systematic approaches for alleviating inequities in maternal mortality**
- **Family-reported outcomes and experiences to care**
- **Improvements to maternal mortality measurement at the hospital level**
- **Improvements to maternal mortality measurement at the state level**

The measurement topics represent the highest priorities for maternal mortality measure development that can be applied to the domains and subdomains. The measurement topics apply across all domains, and Table 3 identifies which measurement topics the Committee applied to which subdomains. The Committee also highlighted several subdomains as high priority for measurement based on the potential for enacting change; these are denoted with an asterisk in Table 3 below. The Committee discussed the following measurement topics under each subdomain.

Table 3. Maternal Mortality Measurement Topics Prioritized Under Each Subdomain

Subdomain	Measurement Topic
All 16 subdomains	<ul style="list-style-type: none"> • Maternal mortality prevention
*Health Equity	<ul style="list-style-type: none"> • Systematic approaches for alleviating inequities in maternal mortality
*Healthcare Access	<ul style="list-style-type: none"> • Continuity of coverage and care
*Quality Care	<ul style="list-style-type: none"> • Improvements to maternal mortality measurement at the hospital level • Improvements to maternal mortality measurement at the state level
*Patient Experience	<ul style="list-style-type: none"> • Family-reported outcomes and experiences of care
*Mental Health	<ul style="list-style-type: none"> • Substance use disorders (SUDs), mental health, and behavioral health

**Denotes prioritized subdomain*

The recommendations for measurement are listed in the sections below, categorized by the measurement topics, and separated into short-term (1-4 years) and long-term (5 or more years). Descriptive information about each measurement topic and its specific recommendations for measurement is included in each section.

Maternal Mortality Prevention

Prevention of maternal mortality remains a top priority; the total number of women who die annually due to pregnancy or delivery complications within a year of the end of pregnancy across the U.S. is approximately 700, and nearly three in five of these deaths are considered preventable.¹⁰ It is vital to recognize high-risk factors and the series of events that can ultimately lead to death. Postpartum care is

critical during the first hours after birth, but it is equally important throughout the first month and the full year post-delivery.⁴⁰ In addition, healthcare systems must be able to rapidly identify and treat complications when they occur. Although there are many clinical issues that can contribute to maternal mortality, additional nonclinical issues may include higher or lower hospital volume, negligence, communication failures, and lower nurse staffing.^{95–97} The Committee discussed recommendations for measurement that are focused on identifying the number of states that participate in AIM and have adopted the bundles, along with the adoption rate.⁸⁰

Recommendations for actionable measurement that address maternal mortality prevention include establishing a defined postnatal care package, including timeliness of postpartum referral or postpartum follow up visits; improving high-yield screening practices as outlined in the morbidity framework above (particularly regarding risk-appropriate care for high-risk groups or conditions); and using AIM bundles to guide measurement of standard practices. Measuring standard practices will help to focus measures on conditions that are the most preventable. Additionally, the Committee advocates for increased participation in PQCs²⁷ as another way to aid measurement because PQCs serve as the infrastructure that supports hospitals and outpatient settings in the uptake of AIM bundles and other quality improvement efforts, such as risk-appropriate care.

Short-term recommendations for measurement include the following:

- Measurement of time to treatment of an identified severe morbidity based on the immediate ability to track clinical risk
- Documentation of postnatal referral to appropriate critical care following discharge^{98,99}
- Improved use and documentation of patient education about prevention, timely recognition of severe morbidities, and treatment of infection

Long-term recommendations for measurement include the following:

- Improved documentation of adherence to specific protocols and guidelines outlined in AIM bundles, including obstetric care for women with opioid use disorder, obstetric hemorrhage, safe reduction of primary cesarean birth, and severe hypertension in pregnancy⁵³

Substance Use Disorders, Mental Health, and Behavioral Health

There are significant gaps in mental health care and measurement that require additional scrutiny. Death by suicide may be prevented with increased screenings for perinatal mood and anxiety disorders (e.g., Edinburgh postnatal depression scale, suicide severity rating scale), intimate partner violence, adverse childhood experiences, and SUD; however, such screenings must be equitable and systematic.^{77,83,100–103} In a recent California review, most women who died by suicide had a history of untreated or poorly treated mental health conditions.¹⁰⁴ Overdose is the leading cause of death during the postpartum period.^{104–106} Recommendations for measurement that address SUDs may also support mental health and vice versa. Culturally relevant screenings and care will help to encourage historically marginalized patients to seek care and will encourage providers not to continue marginalizing patients.¹⁰⁷ Recommendations for measurement to address SUDs, mental health, and behavioral health include accentuating measures that emphasize improved care for women with mental and behavioral health conditions during pregnancy and the postpartum period.

Short-term recommendations for measurement include the following:

- Establishment of provider education measures to improve the understanding of the effects of medication on women during pregnancy, thus improving the number of women who remain on medication during this period of time, in addition to addressing worries about unknown effects on the fetus^{108,109}
- Establishment of a pain management plan that is opioid limiting (postpartum)
- Measurement of depression screenings, as well as intimate partner violence screening during touch points throughout pregnancy^{57,79}
- Documentation of referral to mental health providers, therapists, and support groups when screening indicates need
- Documentation of referral to treatment programs when SUD is identified^{110,111}
- Establishment of a clear plan for patients in high-risk categories (e.g., Counseling on Access to Lethal Means [CALM] for suicide prevention)
- Improved availability of resources to reach needed services (e.g., childcare, transportation, and internet access)⁸⁴
- Improved patient and family education and awareness of symptoms that could lead to maternal mortality (e.g., the CDC HEAR HER Campaign⁵⁹ to recognize urgent warning signs in pregnant and postpartum women)
- Improved screening in the postpartum period for mental health/mood disorders and substance use¹¹²

Long-term recommendations for measurement include the following:

- Tracking of referral and follow-up for women who screen positive for any of the conditions listed above
- Tracking of medication adherence if on medication⁵⁹
- Tracking of referral to alternative therapies (e.g., medication, cognitive behavioral therapy (CBT), or other behavioral treatments) by race/ethnicity to ascertain whether referral policies are equitable
- Monitoring of the number of regional care networks that employ mental health providers who are willing to provide culturally appropriate care for pregnant and lactating women through coordination of referrals
- Building of an evidence base to inform guidelines and measurement concepts outlining best practices surrounding psychosocial interventions and trauma-informed care

Continuity of Coverage and Care

Continuity of coverage and care should be thought of more broadly than in terms of insurance status. This includes access to support services and providers, such as doulas; examining care processes before disparities are identified; applying the concept of the medical home to maternal care before and after pregnancy; and monitoring the frequency and location of a patient's interactions with the healthcare system. The Committee has observed in practice that frequency and location of a patient's interactions with the healthcare system is connected to maternal death.

Short-term recommendations for measurement include the following:

- Provision of coordinated service delivery from pregnancy to the postnatal period
- Consideration of retrospective measurement using payment or a form of coverage to track care for maternal patients (e.g., seeking different care from different EDs or providers)
- Improved tracking in maternal patient visits (i.e., frequency and settings) prior to mortality, including tracking by payment

- Consideration of concurrent measurement and improvement in tracking maternal patient visits (i.e., frequency and settings) during the postpartum period
- Creation of a trigger for utilization review concurrently by payers to capture data and intervene via care/case management
- Better documentation of access to care, linkage to community resources (such as case management), and appropriate referral services with referral loop closed across care settings
- Tracking situations of developing clinical risk immediately and use of preventative actions in response to those risks

Long-term recommendations for measurement include the following:

- Tracking processes of care that could lead to mortality by provider, hospital, and health systems in order to initiate better case management
- Identification and tracking of “triggers” that could lead to maternal mortality by condition to identify opportunities for developing protocols, best practices, and patient education tools
- Tracking of maternal mortality outcomes of uninsured populations and the impact of Medicaid expansion on outcomes
- Measurement of adherence to best practices for emergent SMM by identifying cases of SMM in which mortality was avoided due to appropriate preventative care and comparing to cases that resulted in maternal mortality

Systematic Approaches for Alleviating Inequities in Maternal Mortality

Systematic inequities and an unequally shared risk of maternal mortality lead to a need for methodical approaches, such as integrated service delivery throughout the maternal life cycle.^{21–23} Maternal mortality itself can be a rarity, which makes measurement difficult; however, systematic changes to alleviate inequities can help to reduce a large portion of preventable deaths.¹¹³ Recommendations for measurement that address systematic changes for maternal mortality include measuring MMRC recommendations that have been translated into hospital-level practices and can be used toward continuous quality improvement and measuring outcomes of patients who are identified as having the highest risk of progressing to maternal mortality based on factors existing at admission, as well as emergent clinical risks. The Committee also recognized the importance of creating measurable opportunities for providers and staff to report instances of disrespect, racism, and other issues without fear of retribution.

Short-term recommendations for measurement include the following:

- Measurement of outcomes of small hospitals compared with small hospitals that partner with larger hospitals or nearby academic medical centers for assistance with maternal mortality quality reviews or seek neutral third-party input from organizations, such as the MMRC or ACOG, with the intent of revising standards according to evidence
- Monitoring of participation in PQCs and AIM bundles for under-resourced facilities and the impact on equitable outcomes
- Revision of care team composition to include quality obstetric oversight (i.e., quality team lead or obstetric safety nurse) and regular documentation of the care team present during delivery
- Presence of policies and procedures to address reports of disrespect, racism, and other issues at the hospital or health system level without risk of reprisal

Long-term recommendations for measurement include the following:

- Development of a registry and requirement of certain information to be abstracted and entered into a maternal mortality database, similar to what is used for cardiac care or transplants, to contribute to regional and national quality improvement work

Family-Reported Outcomes and Experiences of Care

Appropriately capturing a family's experience of care as it relates to a maternal mortality is critical in improving outcomes and reducing mortality overall. As described in the morbidity section on family-reported outcomes, patients may not always be aware of all the care they experience, and in the case of death, they are no longer able to provide this information; nonetheless, families are often also present. The Committee discussed measure concepts that focus on using personal narratives, interviews, or focus groups as a modality for measurement, for improving quality, and to better understand what the family experienced and observed.

Short-term recommendations for measurement include the following:

- System changes to incorporate better protocols for visitation and treatment and ensure support is provided to family in the event of a woman dying
- Measurement of family involvement within the hospital's root cause analysis process, incentivizing high involvement in some capacity
- Use of the CDC-developed MMRIA informant interview guide from the MMRC Review to Action website to allow the uniform collection of family-reported experiences of care across states. This measures differential treatment of family members during the labor and delivery experience as well as prenatal and postpartum care.
- Measurement of turnaround time for reporting case reviews and data (with consistent shorter turnaround times being ideal)

Long-term recommendations for measurement include the following:

- Development of a quality dashboard to share data and report family experiences in a transparent manner
- Development of an "experience of care" tool and implementation of adequate training for MMRCs to be able to conduct interviews with family members and identify resources for family referrals (e.g., grief support)

Improvements to Maternal Mortality Measurement at the Hospital Level

Improvements to maternal mortality measurement at the hospital level begin with a root cause analysis, which is a technique that helps to answer the question of why a mortality occurs. This strategy seeks to determine the primary cause of the mortality using the following steps: (1) determine what happened, (2) determine why it happened, and (3) figure out what to do to reduce the likelihood of it happening again.^{114,115} The premise of the root cause analysis—to determine the primary cause of mortality—was considered by the Committee when discussing recommendations for measurement. Root cause analyses can be used by healthcare facilities as an opportunity to improve quality and future outcomes. Recommendations for measurement that address improvement to maternal mortality measurement at the hospital level include examining gaps and flaws in the healthcare system during the maternal encounter and focusing on measurement strategies that address these gaps and problems to improve health outcomes. Examining the root causes should consider physical, human, and organizational

factors.¹¹⁴ The Committee discussed recommendations focused on hospital level review, analysis of maternal mortality, and obtaining the perspective of the family, which is often excluded from official review but could provide valuable insight into cause. No short-term recommendations for measurement were identified to improve maternal mortality measurement at the hospital level because the Committee identified that this area had been routinely reviewed at the hospital level.

Long-term recommendations for measurement include the following:

- Translation of the MMRC recommendations into measurable practices at the hospital level that can then be used toward continuous quality improvement and interhospital comparison

Improvements to Maternal Mortality Measurement at the State Level

There can be considerable lag time when reporting, analyzing, and acting upon maternal mortality data at the state level because this information must be first reported by all hospitals, birthing centers, and providers, and then aggregated by the state.^{33,116} This, coupled with how different entities access and share data, affects the ability to perform case reviews and strategize on improvement activities at the hospital or state level in a timely manner. Improvements in state level measurement are vital and contingent on establishing MMRCs to complete comprehensive reviews of maternal mortalities, although the frequency at which MMRCs meet varies greatly by state and city and is driven by caseload, with some meeting only three to four times per year. While this may be sufficient to discuss what is a relatively rare event on a facility or city level, it presents a continual challenge for timely aggregate review at a state level and higher. The Committee discussed recommendations for measurement that are focused on separating maternal mortality measurement into discrete elements and ensuring that all categories of maternal mortality, such as deaths due to overdose and suicide, are counted and uniquely identified as such. Identifying maternal mortality by primary causes (e.g., cardiovascular conditions, hemorrhage, and sepsis) and secondary nonobstetric causes (e.g., suicide and substance use/abuse) ensures these cases are appropriately counted toward maternal mortality data. The Committee also discussed that any short-term recommendations for measurement at the state level must begin by establishing better data capture from family members in the event of a maternal mortality. When a patient dies outside of the facility where she gave birth, gathering data on the circumstances and details of death can be difficult during the facility-based review process and is further exacerbated if permission from the deceased's family cannot be obtained.

Short-term approaches for measurement include the following:

- Establishment of MMRCs in all states that review pregnancy-related and pregnancy-associated deaths³²
- Measurement of whether MMRCs have a multidisciplinary membership with experts in public health, obstetrics and gynecology, maternal fetal medicine, nursing, midwifery, mental and behavioral health, SUDs, forensic pathology, and representation from communities disproportionately affected by maternal mortality (e.g., tribal organizations)³²
- Improved accessibility and speed of data sharing at the hospital, state, and regional levels
- Measurement of time to reporting case reviews and data to encourage timely and consistent turnaround of findings and information³²

Long-term approaches for measurement include the following:

- Development of infrastructure to facilitate data sharing between hospitals and states in order to examine common causes in a timely manner
- Measurement of state-level coverage and services available to women and encouragement of collaboration between state agencies and Medicaid/MCOs to enhance available options
- Collection and triangulation of root cause analysis data and summarization of themes that can be used to develop tool kits to enact system-wide changes

Mortality Measure Concept

The Committee was tasked with recommending at least one innovative and actionable maternal mortality measure concept that may be used across disparate state systems, with attention to clinical and socioeconomic risk adjustment for national comparison. With input from the NQF Project Team, the Committee provided feedback and suggestions on three measure concepts:

1. Ratio of the number of women with pregnancy-related deaths **AND** number of women with pregnancy-associated deaths by suicide, overdose, and violence, per 100,000 live births
2. Ratio of the number of women with pregnancy-related deaths over the number of women experiencing SMM
3. Ratio of the number of women with pregnancy-related deaths per 100,000 live births

The Committee encountered challenges reaching consensus on one mortality measure concept because of issues related to data availability, feasibility, measurement burden, risk adjustment, and the ability to compare state-level data on a national scale. Despite these challenges, the Committee reached consensus on recommending that the first measure concept, *the ratio of the number of women with pregnancy-related deaths AND number of women with pregnancy-associated deaths by suicide, overdose, and violence, per 100,000 live births*, is the most appropriate for development into a maternal mortality measure. The Committee determined that the other two concepts warrant additional consideration by CMS and the broader community of measure developers and measurement experts because the concepts hold potential to provide significant improvements to maternal mortality measurement if they are thoughtfully modified.

Measure Concept Identification and Review Process

During the Committee's exploration of mortality measure concepts, they revisited a few examples identified by the environmental scan, including the maternal near-miss mortality ratio, case fatality rate, case fatality rate – all complications, institutional maternal mortality ratio (per 100,000 deliveries), and intrahospital mortality index.¹¹⁷ The aforementioned challenges of capturing rare events were incompletely addressed by the concept of case fatality rate—even when limiting the denominator to cases that suffered complications. About 17 percent of maternal deaths occur at the time of delivery, which limits any measure concept relying on traditionally defined complications and fails to account for the lack of preventive interventions that could have contributed to a death event. The Committee highlighted an example from the California Maternal Quality Care Collaborative, which conducted a review in 2018. The review found five deaths from VTE at 10 weeks gestation.¹¹⁸ The mortality review results revealed possible contributing factors, including delays in recognition, referral for diagnosis, or access to timely treatment that may have contributed to death. In addition, a first trimester VTE

unassociated with surgery would be unlikely to be detected as a complication in current tracking systems, such as the PMSS. When reviewing the intrahospital mortality index, the Committee once again noted the limitations of existing data tracking systems to capture the two-thirds of pregnancy-associated deaths that occur independent of delivery hospitalization. Not only do these metrics potentially ignore deaths occurring independent of hospitalization, but their restriction to inpatient settings only may also negate the contribution of clinical action (or inaction) prior to the hospitalization for those deaths. The Committee felt it was equally important to consider measures that include patient populations beyond the inpatient clinical setting.

Using the Committee's comments from the web meetings as its foundation, the NQF Project Team convened a subset of measurement experts from within the Committee to review and discuss three measure concepts. NQF then sent the measure concepts to the full Committee and administered a survey to gain consensus on the strengths and limitations of each concept and determine whether the Committee supported the recommendation of some or all concepts (see Table 4 below). The survey posed the following questions about each concept to the Committee members:

1. Do you agree with the inclusion of this measure concept as part of the Committee's recommendations?
2. Do data sources already exist to sufficiently develop this measure concept?
3. Could this measure concept be risk-adjusted?
4. Is this measure concept reasonable for state-level comparisons?

Table 4. Mortality Measure Concept Options

Measure Concept Number	Measure Concept Description
1	Ratio of the number of women with pregnancy-related deaths AND number of women with pregnancy-associated deaths by suicide, overdose, and violence, per 100,000 live births
2	Ratio of the number of women with pregnancy-related deaths over the number of women experiencing SMM
3	Ratio of the number of women with pregnancy-related deaths per 100,000 live births

The Committee was generally supportive of measure concepts #1 and #2, with some noted concerns and recommendations. Although measure concept #3 was recognized by the Committee as a relevant measurement of maternal deaths, the Committee determined it would not meet the requirements of being innovative. Measure concept #2 is flawed in that any improvement in SMM will result in an increased ratio, even if there is a modest improvement in mortality. The Committee did not identify specific details of the measure concepts (e.g., time frames of measurement, exclusion criteria) beyond what is addressed below.

Measure Concept #1: Ratio of the number of women with pregnancy-related deaths AND number of women with pregnancy-associated deaths by suicide, overdose, and violence per 100,000 live births

Numerator: Number of women with pregnancy-related deaths **AND** number of women with pregnancy-associated deaths by suicide, overdose, and violence

Denominator: Live births (per 100,000)

The Committee coalesced around this measure concept and recommended it for measure development. This measure concept uses existing data and measures to provide a more expansive view of maternal mortality. This measure concept is proposed as a ratio to be measured per 100,000 live births for consistency with existing mortality measures, specifically the pregnancy-related mortality ratio.⁶ It is built on the widely used measure of pregnancy-related death (defined as the death of a woman while pregnant or within one year of termination of pregnancy—regardless of the 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)⁶; it also expands to include pregnancy-associated deaths of suicide, overdose, and violence during pregnancy or within one year of termination of pregnancy.⁹ This concept provides a more expansive view into counting maternal mortalities and also allows for stratification of the numerator where numbers allow.

For inclusion in the numerator, pregnancy-related death follows the standard CDC definition, which is the death of a woman while pregnant or within one year of the end of pregnancy from any cause that is related to or affected by being pregnant. Pregnancy-related deaths are captured by states using vital records, specifically death certificates linked with birth records and fetal death records when available, and reported at the federal level via the PMSS.⁶ Although these data point to ascertaining pregnancy-related deaths at the state level, they have been prone to both overreporting and underreporting depending on a state's ability to appropriately notate pregnancy on a death certificate and to match vital records accurately. These data would benefit from improved standardization; however, the mechanism to consistently and accurately collect these data does exist, and materials for standardization can be referenced.^{94,119}

Pregnancy-associated death, or the death of a woman while pregnant or within one year of the end of a pregnancy regardless of cause, captures a wider array of causes of death into the numerator than the pregnancy-related definition. Some pregnancy-associated deaths are captured by the NVSS,⁴ which utilizes WHO definitions to capture maternal deaths (i.e., the death of a woman while pregnant or within 42 days of termination 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). The NVSS identifies maternal mortality using death records captured by the National Center for Health Statistics combined with the International Classification of Diseases 10th Edition (ICD-10) billing codes. The U.S. reports deaths for international comparison using this definition from NVSS data. The U.S.' standard death certificate was revised in 2003 to include a pregnancy checkbox, but the revision was not widely adopted until 2017. This introduces great variability in how and when data are retrieved. Despite the creation of a more standardized version of the checkbox, implementation is varied.¹⁴ It is essential for measure developers, maternal mortality experts, and federal and state offices

to create clear standards on which deaths by overdose, suicide, and violence are to be considered pregnancy-associated for inclusion in this concept's numerator and which are not.

Education campaigns based on these standards must be developed and shared with each state in order to improve these data variabilities. Federal bodies and state offices should continue working together in advance of measure development and testing to distribute toolkits and educational materials to improve the classification of pregnancy-associated deaths across states in order for accurate national comparison to occur.¹²⁰ State MMRCs also play a vital role in identifying maternal deaths. However, a common concern with the collection of pregnancy-associated deaths is that a death becomes more difficult to link to a pregnancy the further removed it is from a hospital or delivery care setting. Pregnancy is often overlooked as a related cause of certain types of death. For example, state MMRCs may utilize additional data sources during their review, such as media reports and obituaries,¹¹⁶ to help determine whether a death is pregnancy-related or pregnancy-associated; however, in doing so, they add variability into their data capture. Toolkits and educational materials that address the classification of pregnancy-associated deaths are not directly related to the identification of this measure concept; however, the Committee suggested that these items include guidance to assist MMRCs with the review of maternal deaths to standardize data capture and improve the accuracy of this concept's numerator for national comparison.

NQF facilitated an in-depth discussion of risk adjustment for this measure. The Committee felt strongly that this measure concept should not be risk-adjusted for several reasons:

- The Committee agreed that this concept lends itself best to a population health measure, and so, it considered risk adjustment through that lens. For these types of measures, the measured entity is typically a state or region. Policies or funding streams that are used to improve associated patient risk factors in the population prior to their arrival at a care site are within the control of states and regions; therefore, the Committee does not advise risk adjustment. In contrast, facility-level measures can be adjusted to account for the risks patients bring into the care setting prior to receiving care (also known as case-mix) since a provider's realm of control cannot always address the impact these risks have on a patient's health outcomes, and risk adjustment can help achieve fair comparisons.
- Because the concept was viewed as best suited to population health measurement, the Committee agreed that using it in a payment model would be problematic. The Committee recommended this concept not be considered for reimbursement purposes, which makes risk adjustment less necessary. Although the concept may be used in other accountability settings, such as public reporting or accreditation, risk adjustment is also not appropriate for those settings per the points above regarding the region's locus of control.
- The Committee also agreed that further research is needed to gather information about risk factors, predictors, and associations between the outcomes of death by suicide, overdose, and violence. Until more targeted research is done, risk adjustment is not warranted.
- This measure concept will use data from both the NVSS and PMSS, which are solely collected by states via death certificates. These vital records rarely contain data¹²¹ that predict or are associated with risk of death due to overdose, suicide, or violence. Because these data sources would also be used to capture patient-level characteristics for risk adjustment purposes, the lack of these patient characteristics within the data sources makes gathering data for risk adjustment challenging.

- The patient populations that meet the suicide, overdose, and violence definitions for inclusion in the numerator are quite low. For example, a review of maternal deaths in the state of Colorado from 2004–2012 found a pregnancy-associated death ratio of 4.6 suicides per 100,000 live births.³⁰ The Committee noted that risk adjusting so few deaths in a year makes risk adjustment mathematically untenable (i.e., adjustment for states that typically have either zero or one deaths is not recommended).

The Committee turned to stratification by known risk factors and predictors to help denote disparities in a population. Stratification of a measure can identify and focus attention on subpopulations that need additional care, support, or analysis. The Committee did not reach consensus on whether access to care was significantly associated with deaths by overdose, suicide, and violence; nevertheless, it could be applicable for pregnancy-related deaths. Therefore, stratification by insurance status, payer, race, age, or number of outpatient visits could be valuable. As mentioned above, the Committee noted that studies of the factors that underlie these categories of death would help to identify additional associated factors that are useful for analysis and comparison.

Stratification by the categories contained within the numerator's definition of pregnancy-associated mortality (i.e., deaths by overdose, suicide, and violence) would create a great learning opportunity regarding the impact on maternal death rates. Committee members discussed that different states may have significantly different settings or policy landscapes, which could lead to increased risk of a maternal mortality by either overdose, suicide, or violence but not necessarily all three. For example, gun laws differ widely from state to state, and risk of death by violence follows some of these differences. Other states have greater access to medication-assisted treatment, and so, deaths by overdose may be less common in these areas. If the measure numerator can be separated into its four constituent categories (pregnancy-related death, deaths by overdose, deaths by suicide, and deaths by violence), then states may have more opportunity to learn about how their laws and policies affect these specific groups of birthing individuals and their families.

There are limitations to this measure concept, some of which can be mitigated with advance planning and education. Key limitations noted by the Committee include the following:

- This measure would require significant analysis and training to standardize measurement of pregnancy-associated deaths. Although there is a risk that certain pregnancy-associated deaths might be overreported, clear and consistent standards about which deaths by overdose, suicide, and violence warrant inclusion in the measure should normalize the data. For example, if it is determined that all suicides during pregnancy or within one year of the end of pregnancy should be counted as pregnancy-associated deaths, this will inevitably capture at least one or more suicides that have no connection to the pregnancy itself; however, if all states are trained and held accountable to consistent reporting standards, the data will be comparable across states even if the deaths are overreported.
- There is likely an underestimation of pregnancy-associated homicides, particularly for women who are in the first trimester or the postpartum period.¹²²
- Timeliness of data collection and availability presents obstacles to the concept and would require standardization in reporting frequency. Given the need to rely on MMRCs for review of maternal deaths up to a year postpartum, states may not have the ability to release aggregate mortality data to be used in such a measure concept for nearly two years. In addition, since

maternal mortality at the state level often produces very small numerators in a given year, states may prefer to wait and combine multiple years of mortality review results into one report before releasing information.^{116,123,124} These types of time lags in reporting maternal death outcomes are challenging when attempting to address preventable causes of maternal mortality on a national level and should be eliminated where possible. Quarterly reporting requirements, such as those used for CDC's National Healthcare Safety Network (NHSN), may help to mitigate this limitation.¹²⁵

- Since this measure is reliant on individual state MMRCs having the resources to complete timely reviews, MMRC resources are also a potential limitation.

Future considerations for this measure concept include expanding the denominator beyond live births. The Committee discussed the opportunity for the measure to include pregnancies that do not end in live birth (e.g., ectopic pregnancies and stillbirths), which are associated with significant morbidities and mortalities. These populations are not included in any measures that the Committee identified in the environmental scan. Future iterations of this measure should consider expanding the population included in the denominator to render these deaths measurable and expand the measurement enterprise to these impacted populations.

Measure Concept #2: Ratio of the number of women with pregnancy-related deaths over the number of women experiencing SMM

Numerator: Number of women with pregnancy-related deaths

Denominator: Number of women experiencing SMM

This measure concept builds on existing measures and current data collection efforts for maternal deaths and is tailored to address opportunities in the measuring and reporting of maternal death, which is considered a rare event. The numerator contains all pregnancy-related deaths (defined as the death of a woman while pregnant or within one year of termination of pregnancy—regardless of the 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), and the denominator contains all cases of SMM (defined as one or more of the 21 indicators identified by the ICD-9 and ICD-10 codes and identified as SMM by CDC²) at the measured entity. The Committee envisioned this measure as a hospital- or facility-level measure that serves as a type of hospital maternal mortality index. Importantly, the measure concept also incorporates both SMM and maternal mortality into one measure in an effort to emphasize prevention, as cases of SMM not identified early on can escalate to maternal mortality. Moreover, SMM often, but not always, precedes maternal mortalities. Combining populations that experience maternal mortality with those experiencing maternal morbidity into a single measure is a novel method in this topic area for identifying opportunities for prevention.

This measure is inspired by the maternal near-miss mortality ratio, which is an obstetric extension of the concept of failure to rescue—a widely adopted metric in other surgical specialties. *Failure to rescue* is loosely defined as the inability to prevent death after a major operative complication.¹²⁶ This metric has become a proxy for hospital quality in the general surgical literature. An intraoperative complication may reflect the quality of the surgeon but fails to account for the complexity of the individual or the influence of surrounding resources and care processes during the patient's clinical course. Whether it be the maternal near-miss mortality ratio or the failure to rescue metric, the appeal of these types of

measurement is their attempt to capture the complex interaction between a patient, their comorbidities, and their obstetric care team. Placing SMM in the denominator captures a range of unanticipated outcomes of pregnancy and is not limited to surgical complications. Using existing standardized definitions for SMM, such as those championed by CDC and the AIM initiative, focuses the measure on maternal morbidity prevention efforts without burdening the hospital with additional data collection.

This type of measure concept captures the complexity of improving maternal death rates but does so through the lens of prevention. If SMM is important because of its causal role on the pathway to mortality, this type of ratio captures both the number of women truly at risk for the outcome of death and the ability of an accountable entity to intervene prior to a potential death. Although SMM is convenient, mathematically practical, and a biologically plausible denominator, choosing the numerator is not as straightforward. The Committee favors the use of pregnancy-related death⁶ as a numerator to encourage comparable results, although a need remains for better standardization of pregnancy-related death reporting, as indicated in measure concept #1 above. In the interim, using available resources to focus on other actionable measurement approaches targeting morbidity and mortality encountered beyond the traditional six-week postpartum period and up to one year postpartum may prove more beneficial in the ongoing efforts to prevent these outcomes.

This measure includes a comparatively small numerator for maternal mortality. Coupled with wide variations in hospital delivery volume, this case presents challenges to providing meaningful and actionable information that can be utilized for improvement and movement toward decreasing maternal mortality. A hospital-level measure of mortality will undoubtedly bias against low-volume hospitals because of the inherently unstable nature of the data. For example, if a critical access hospital performing 500 annual deliveries suffers from one maternal death that same year, probabilistically, it may be another 10 years before that event occurs again, which limits the utility of this measurement for quality improvement. However, 59 percent of birth hospitals perform fewer than 1,000 deliveries annually,¹²⁷ which represents only 20 percent of deliveries in hospitals nationally. Capturing the perspective of smaller volume facilities is also critical to reducing maternal mortality. In contrast, a high-volume delivery hospital performing 5,000 annual deliveries may experience maternal mortality with more frequency, thus making a hospital-level mortality index more feasible to calculate and determine variability in care processes over time.

Again, the Committee envisioned this measure as a hospital- or facility-level measure. Ultimately, they proposed a set of maternal mortality measure concepts that incorporate a measure of maternal mortality already in use in the numerator with a current measure of SMM in the denominator divided into specific disease categories. For example, a measure could include deaths from severe preeclampsia per cases of severe preeclampsia, or as another example, deaths from hemorrhage in pregnant patients over cases of hemorrhage in pregnant patients. These types of measures have been used for quality improvement projects at hospitals with some success but need further examination as quality measures. The Committee felt that coding incentives are extremely important for this measure concept due to known issues with the reliability and validity of SMM coding. Currently, there is undercoding of SMMs, mostly related to transfusions. However, if education campaigns of any sort (e.g., implementation of an AIM bundle) focus on a certain outcome, such as hemorrhage coding, SMM may improve and therefore increase the utility of this type of measure.

Without risk adjustment, this measure does not account for the role of many large-volume, regional referral centers with a higher-risk patient population and that often accept transferred patients with comorbidities, thereby increasing the hospital's risk for higher mortality rates. As mentioned above, risk adjustment is applied to quality measures to reduce bias in quality measure results unattributable to true differences in quality care. Without risk adjustment, the measure may disincentivize hospitals from caring for patients who bring greater risk with them into the hospital or care center, which is unrelated to the hospital's quality. With risk adjustment, the measure will more likely show fair comparisons in results between measured entities and incentivize caring for riskier patients. The Committee discussed options for risk adjustment for hospital-level mortality measurement. Committee members did not raise any objections to exploration of risk adjustment for medical and obstetric comorbidities (unrelated to the outcome of interest), parity, hospital/care system characteristics, socioeconomic status (SES) risk indicators/social indicators, or race/racism. They focused on including age and access to care (using insurance status and/or Medicaid expansion as proxies) as adjusters, thus recognizing the data limitations that affect measurement and adjustment of the latter. Comparing providers who generally care for older maternal patients, who bring greater risk of complications into the care setting, with providers who generally care for younger patients without adjustment for this patient risk factor may obscure true differences in quality between these providers as opposed to simply a difference in their patient populations.

Research has indicated that limited access to care early in the pregnancy contributes to poor maternal health outcomes once a patient enters a hospital; therefore, adjustment for this risk factor may also be appropriate for similar reasons. With risk adjustment, the measure may help to provide fair comparisons between providers and incentivize care of underserved populations. As stated above, access to care may be measured by proxies such as payer, insurance status, or number of outpatient visits. Further research is needed to identify other appropriate factors for risk adjustment. These factors should be associated with or predictive of maternal mortality but also unassociated with care quality. Currently, there are not enough reliable data available in the maternal population for the Committee to make the recommendation to risk-adjust at this time. Nonetheless, by including an SMM measure within the mortality measure concept, the measurement inherently accounts for varying levels of maternal mortality risk in a patient population by counting only severe cases and acknowledges the complexity of the patients' comorbid conditions.

The proposed SMM concept embodies principles that the Committee prioritized for this measure concept. Limiting the denominator to cases of SMM makes the concept more tangible; however, this concept still has some inherent challenges:

- The numerator is challenged by the comparatively low prevalence of pregnancy-related death. If a population of interest experiences no maternal mortality, a zero in the numerator can possibly render the measurement insignificant. To address this limitation, the Committee proposes that the measure concept be applied at a level beyond the hospital. This measure could be meaningful for accountable care organizations (ACOs) or a hospital care network, and it is particularly relevant at the level of the regional perinatal network, as outlined in the Levels of Maternal Care¹²⁸ paradigm. Use of the measure concept at these higher levels is appealing because it reduces the likelihood of a zero numerator. From a practical standpoint, analyzing the measure within a regional referral network incorporates the clinical interactions and needed care coordination between a patient and the healthcare system across a pregnancy.

Applying the measure concept in a regional setting also incorporates the processes surrounding timely access to risk-appropriate care—key themes emphasized in the Levels of Maternal Care framework¹²⁸ and by the Committee. In future development of such a measure, it will be critical to select a standardized definition of SMM (e.g., CDC algorithm, HRSA Title V measures, and/or AIM) since it can be defined differently, which would limit the ability of such a measure to be used for apples-to-apples comparisons. This will afford hospitals of all sizes a varying range of resources dedicated to quality improvement and the opportunity to participate in reporting meaningful improvement of outcomes. This level of practicality is particularly appealing for small volume and critical access hospitals—stakeholders that the Committee wanted to incorporate and prioritize.

- Care improvements that result in lowering the number of cases of SMM at a measured entity that do not reduce the number of pregnancy-related deaths would create a ratio indicative of worse performance, considering that the numerator would be unchanged while the denominator became smaller. This could lead a measured entity to have a higher ratio of pregnancy-related death to SMM despite investing in improvements to reduce the amount of SMM in the entity's patient population, which is ultimately a positive outcome. An argument could be made that since the focus of this concept is pregnancy-related death, improvements in SMM care that do not affect the quantity of deaths experienced would not indicate improvement in the goal of the measure, which is to decrease pregnancy-related death outcomes; however, it would be important to account for the unintended consequences of using SMM in the denominator.

Measure Concept #3: Ratio of the number of women with pregnancy-related deaths per 100,000 live births

Numerator: Number of women with pregnancy-related death

Denominator: Live births (per 100,000)

This measure is currently in use in the Pregnancy Mortality Surveillance System and most MMRCs; therefore, this concept is not sufficiently innovative in advancing the prevention of maternal mortalities. However, the Committee offered considerations for improving this measure concept. Continuing to measure maternal mortalities in relation to live births alone ignores patients who experience stillbirth or ectopic pregnancy. These individuals are up to four times more likely to experience SMM than women with live birth deliveries.¹²⁹ SMMs are more closely linked to mortality than non-severe morbidities, thus increasing the relevance of this population to a maternal mortality measure. The Committee determined that there are significant data barriers to implementing this change to the denominator. Until funding is increased to reliably count vital events (e.g., stillbirths), implementing this measure will be difficult.¹³⁰ U.S. state laws require the reporting of fetal deaths, and federal law mandates national collection and publication of fetal death data. Fetal deaths later in pregnancy are often referred to as stillbirths. Most states report fetal deaths of 20 weeks of gestation or more and/or 350 grams birthweight; nonetheless, a few states report fetal deaths for all periods of gestation. However, it is valuable to make this change in order to articulate the importance of these individuals, who also experience pregnancy, and increase their visibility for maternal mortality prevention. As with the prior measure concepts, a need remains for better standardization of pregnancy-related death reporting as well.

Conclusion

To address the U.S.' concerning high rates of maternal morbidity, SMM, and maternal mortality compared with other developed countries, NQF worked with a Committee of expert stakeholders from the fields of maternal health and measurement to create two measurement frameworks: one for maternal morbidity and one for maternal mortality, as well as a list of recommendations to improve measurement. These recommendations for measurement provide guidance to stakeholders about gaps and pressing issues in maternal morbidity and mortality care and measurement.

Perinatal and postnatal measurement has often prioritized the well-being and health outcomes of the baby; however, the need to incorporate better-quality measurement into maternal care is critical, as maternal health outcomes have shown. This report lays the groundwork for the development of such measures at every level: provider, hospital/care setting, health system, population, and related education and social systems. As a vested partner in the field of healthcare quality measurement, NQF hopes that these recommendations lay a groundwork for furthering quality measurement in maternal morbidity and mortality in order to advance the goal of improved maternal health outcomes.

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Appendix B: Measure Inventory & Measure Concepts

These measure tables have been updated from those identified in the environmental scan to reflect the Maternal Morbidity and Mortality Committee’s recommendations as outlined in this report and to remove any measures that are no longer endorsed by NQF. There are recommendations in this report for measures that previously existed (e.g., related to ectopic pregnancy, initiation of prenatal care, and others) but have lost NQF endorsement and/or are no longer maintained by the measure stewards and developers. These are not listed in the appendices below because they do not meet NQF endorsement requirements and may no longer be in use. However, substantial work was done on them to develop and maintain those measures previously. Readers can check the status of measures and identify both endorsed and non-NQF-endorsed measures for a specific topic area in NQF’s [Quality Positioning System™ \(QPS\)](#).

*Table 5. Maternal Morbidity Measures
(Available measure information varied by database.)*

NQF ID or Measure Source	Measure Title	Measure Description	Domain
0024	Weight Assessment and Counseling for Nutrition and Physical Activity for Children/Adolescents (WCC-CH)	Percentage of patients 3-17 years of age who had an outpatient visit with a primary care physician (PCP) or an OB/GYN and who had evidence of the following during the measurement year: - Body mass index (BMI) percentile documentation - Counseling for nutrition - Counseling for physical activity	Preconception/Well Woman Care
2902	Contraceptive Care – Postpartum	Among women ages 15 through 44 who had a live birth, the percentage that is provided a most effective (i.e., sterilization, implants, intrauterine devices, or systems [IUD/IUS]) or moderately effective (i.e., injectables, oral pills, patch, or ring) method of contraception within 3 and 60 days of delivery. Also includes a sub-measure of the percentage that is provided long-acting reversible method of contraception (LARC) within 3 and 60 days of delivery.	Preconception/Well Woman Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
2903	Contraceptive Care – Most and Moderately Effective Methods	The percentage of women aged 15-44 years at risk of unintended pregnancy that is provided a most effective (i.e., sterilization, implants, intrauterine devices, or systems [IUD/IUS]) or moderately effective (i.e., injectables, oral pills, patch, ring, or diaphragm) method of contraception.	Preconception/Well Woman Care
2904	Contraceptive Care – Access to LARC	Percentage of women aged 15-44 years at risk of unintended pregnancy that is provided a long-acting reversible method of contraception (i.e., implants, intrauterine devices, or systems [IUD/IUS]).	Preconception/Well Woman Care
3543	Person-Centered Contraceptive Counseling (PCCC)	The PCCC is a four-item patient-reported outcome performance measure (PRO-PM) designed to assess the patient-centeredness of contraceptive counseling at the individual clinician/provider and facility levels of analysis.	Preconception/Well Woman Care
Behavioral Risk Factor Surveillance System	Well-Woman Visit	Percent of women, ages 18 through 44, with a preventive medical visit in the past year	Preconception/Well Woman Care
Medicaid	Adolescent Well-Care Visits (AWC-CH)	Intermediate Outcome	Preconception/Well Woman Care
Medicare Part C Star Rating, Marketplace Quality Rating System (QRS), Medicaid	Adult BMI Assessment	Process	Preconception/Well Woman Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
0032	Cervical Cancer Screening (CCS)	Percentage of women 21–64 years of age who were screened for cervical cancer using either of the following criteria: - Women ages 21–64 who had cervical cytology performed every 3 years. - Women ages 30–64 who had cervical cytology/human papillomavirus (HPV) co-testing performed every 5 years.	Preconception/Well Woman Care
0033	Chlamydia Screening in Women (CHL)	The percentage of women 16–24 years of age who were identified as sexually active and who had at least one test for chlamydia during the measurement year.	Preconception/Well Woman Care
0575	Comprehensive Diabetes Care: Hemoglobin A1c (HbA1c) Control (<8.0%)	The percentage of patients 18–75 years of age with diabetes (type 1 and type 2) whose most recent HbA1c level is <8.0% during the measurement year.	Preconception/Well Woman Care
0018	Controlling High Blood Pressure	The percentage of patients 18 to 85 years of age who had a diagnosis of hypertension (HTN) and whose blood pressure (BP) was adequately controlled (<140/90) during the measurement year.	Preconception/Well Woman Care
0059	Diabetes Care Blood Sugar Controlled	The percentage of patients 18–75 years of age with diabetes (type 1 and type 2) whose most recent HbA1c level during the measurement year was greater than 9.0% (poor control) or was missing a result, or if an HbA1c test was not done during the measurement year.	Preconception/Well Woman Care
2607	Diabetes Care for People With Serious Mental Illness: Hemoglobin A1c (HbA1c) Poor Control (>9.0%) (HPCMI-AD)	The percentage of patients 18–75 years of age with a serious mental illness and diabetes (type 1 and type 2) whose most recent HbA1c level during the measurement year is >9.0%.	Preconception/Well Woman Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
1659	Influenza Immunization	Inpatients ages 6 months and older discharged during October, November, December, January, February, or March who are screened for influenza vaccine status and vaccinated prior to discharge if indicated.	Preconception/Well Woman Care
0421/0421e	Preventive Care and Screening: Body Mass Index (BMI) Screening and Follow-Up Plan	Percentage of patients aged 18 years and older with a BMI documented during the current encounter or during the previous twelve months AND with a BMI outside of normal parameters, a follow-up plan is documented during the encounter or during the previous twelve months of the current encounter	Preconception/Well Woman Care
0041/0041e	Preventive Care and Screening: Influenza Immunization	Percentage of patients aged 6 months and older seen for a visit between October 1 and March 31 who received an influenza immunization OR who reported previous receipt of an influenza immunization	Preconception/Well Woman Care
Merit-Based Incentive Payment System (MIPS) Program	Preventive Care and Screening: Screening for High Blood Pressure and Follow-Up Documented	Process	Preconception/Well Woman Care
Medicaid Promoting Interoperability Program for Eligible Professionals, MIPS Program	Preventive Care and Screening: Screening for High Blood Pressure and Follow-Up Documented (eCQM)	Process	Preconception/Well Woman Care
MIPS Program	Non-Recommended Cervical Cancer Screening in Adolescent Females	Process	Preconception/Well Woman Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
MIPS Program	Epilepsy: Counseling for Women of Childbearing Potential with Epilepsy	All female patients of childbearing potential (12–44 years old) diagnosed with epilepsy who were counseled or referred for counseling for how epilepsy and its treatment may affect contraception OR pregnancy at least once a year.	Preconception/Well Woman Care
MIPS Program; HEDIS Quality Measure Rating System; Medicaid Promoting Interoperability Program for Eligible Professionals	Preventive Care and Screening: Screening for Depression and Follow-Up Plan	Percentage of patients aged 12 years and older screened for depression on the date of the encounter or 14 days prior to the date of the encounter using an age appropriate standardized depression screening tool AND if positive, a follow-up plan is documented on the date of the eligible encounter	Preconception/Well Woman Care
Medicaid	Behavioral Health Risk Assessment (for Pregnant Women) (BHRA-CH)- Maternal Care	Patient-Reported Outcome (PRO) of patients who received all behavioral health screening risk assessments at the first prenatal visit: depression, alcohol use, tobacco use, drug use, and intimate partner violence.	Prenatal Care
Centers for Disease Control and Prevention (CDC) National Vital Statistics System	Early Prenatal Care	Percentage of pregnant women who receive prenatal care beginning in the first trimester	Prenatal Care
Pregnancy Risk Assessment Monitoring System	Preventive Dental Visit – Pregnancy	Percent of women who had a preventive dental visit during pregnancy	Prenatal Care
CDC National Vital Statistics System	Smoking – Pregnancy	Percent of women who smoke during pregnancy	Prenatal Care
Medicare Part C Star Rating	Statin Therapy for Patients With Cardiovascular Disease	Process	Prenatal Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
Medicaid	PC-03 Antenatal Steroids	This measure assesses patients at risk of preterm delivery at ≥ 24 and < 34 weeks gestation receiving antenatal steroids prior to delivering preterm newborns. This measure is a part of a set of five nationally implemented measures that address perinatal care (PC-01: Elective Delivery, PC-02: Cesarean Birth, PC-04: Health Care-Associated Bloodstream Infections in Newborns, PC-05: Exclusive Breast Milk Feeding; Beginning 1/1/2019 PC-06 Unexpected Complications in Term Newborns will be added).	Prenatal
MIPS Program	Ultrasound determination of pregnancy location for pregnant patients with abdominal pain	Percentage of pregnant patients who present to the ED with a chief complaint of abdominal pain and or vaginal bleeding who receive a trans-abdominal or trans-vaginal ultrasound.	Prenatal
Medicaid	Frequency of Ongoing Prenatal Care (FPC)	The percentage of Medicaid deliveries that had the following number of expected prenatal visits: <ul style="list-style-type: none"> • less than 21 percent of expected visits. • 21 percent–40 percent of expected visits. • 41 percent–60 percent of expected visits. • 61 percent–80 percent of expected visits. • greater than or equal to 81 percent of expected visits. 	Prenatal

NQF ID or Measure Source	Measure Title	Measure Description	Domain
Healthcare Cost and Utilization Project (HCUP) – State Inpatient Databases	Severe Maternal Morbidity	Rate of severe maternal morbidity per 10,000 delivery hospitalizations	Intrapartum Care
CDC National Vital Statistics System	Low-Risk Cesarean Deliveries	Percent of cesarean deliveries among low-risk first births	Intrapartum Care
Centers for Medicare & Medicaid Services (CMS) Hospital Compare	Early Elective Delivery	Percent of non-medically indicated early elective deliveries	Intrapartum Care
0471	PC-02: Cesarean Birth (PC02-CH)	Percentage of nulliparous women with a term, singleton baby in a vertex position delivered by cesarean birth (C-section)	Intrapartum Care
0470	Incidence of Episiotomy	Percentage of vaginal deliveries (excluding those coded with shoulder dystocia) during which an episiotomy is performed.	Intrapartum Care
0469/0469e	PC-01: Elective Delivery (PC01-AD)	This measure assesses patients with elective vaginal deliveries or elective cesarean births at ≥ 37 and < 39 weeks of gestation completed.	Intrapartum Care
2726	Prevention of Central Venous Catheter (CVC)-Related Bloodstream Infections	Percentage of patients, regardless of age, who undergo central venous catheter (CVC) insertion for whom CVC was inserted with all elements of maximal sterile barrier technique, hand hygiene, skin preparation and, if ultrasound is used, sterile ultrasound techniques followed	Intrapartum Care
0500	Severe Sepsis and Septic Shock: Management Bundle (Composite Measure)	This measure focuses on adults 18 years and older with a diagnosis of severe sepsis or septic shock.	Intrapartum Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
0269	Timing of Prophylactic Antibiotics - Administering Physician	Percentage of surgical patients aged 18 years and older who receive an anesthetic when undergoing procedures with the indications for prophylactic parenteral antibiotics for whom administration of a prophylactic parenteral antibiotic ordered has been initiated within one hour (if fluoroquinolone or vancomycin, two hours) prior to the surgical incision (or start of procedure when no incision is required)	Intrapartum Care
0345	Unrecognized Abdominopelvic Accidental Puncture or Laceration Rate	Accidental punctures or lacerations (secondary diagnosis) during a procedure of the abdomen or pelvis per 1,000 discharges for patients ages 18 years and older that require a second abdominopelvic procedure one or more days after the index procedure	Intrapartum Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
0347	Death Rate in Low-Mortality Diagnosis Related Groups (PSI02)	<p>In-hospital deaths per 1,000 discharges for low mortality (< 0.5%) Diagnosis Related Groups (DRGs) among patients ages 18 years and older or obstetric patients. Excludes cases with trauma, cases with cancer, cases with an immunocompromised state, and transfers to an acute care facility.</p> <p>[NOTE: The software provides the rate per hospital discharge. However, common practice reports the measure as per 1,000 discharges. The user must multiply the rate obtained from the software by 1,000 to report in-hospital deaths per 1,000 hospital discharges.]</p>	Intrapartum Care
MIPS Program	Maternity Care: Elective Delivery or Early Induction Without Medical Indication at < 39 Weeks (Overuse)	Outcome	Intrapartum Care
0138	National Healthcare Safety Network (NHSN) Catheter-Associated Urinary Tract Infection (CAUTI) Outcome Measure	<p>Standardized Infection Ratio (SIR) of healthcare-associated, catheter-associated urinary tract infections (UTI) will be calculated among patients in bedded inpatient care locations, except level II or level III neonatal intensive care units (NICU).</p> <p>This includes acute care general hospitals, long-term acute care hospitals, rehabilitation hospitals, oncology hospitals, and behavior health hospitals.</p>	Intrapartum Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
0139	National Healthcare Safety Network (NHSN) Central Line-Associated Bloodstream Infection (CLABSI) Outcome Measure	Standardized Infection Ratio (SIR) and Adjusted Ranking Metric (ARM) of healthcare-associated, central line-associated bloodstream infections (CLABSI) will be calculated among patients in bedded inpatient care locations. This includes acute care general hospitals, long-term acute care hospitals, rehabilitation hospitals, oncology hospitals, and behavioral health hospitals.	Intrapartum Care
0450	Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate (PSI 12)	Perioperative pulmonary embolism or proximal deep vein thrombosis (secondary diagnosis) per 1,000 surgical discharges for patients ages 18 years and older.	Intrapartum Care
1523	Rate of Open Repair of Abdominal Aortic Aneurysms (AAA) Where Patients Are Discharged Alive	Percentage of asymptomatic patients undergoing open repair of abdominal aortic aneurysms (AAA) who are discharged alive. This measure is proposed for both hospitals and individual providers. At present, this measure is reported via the Vascular Quality Initiative (VQI) Registry.	Intrapartum Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
Hospital Inpatient Quality Reporting	Death Rate among Surgical Inpatients with Serious Treatable Complications (PSI 04)	In-hospital deaths per 1,000 surgical discharges, among patients ages 18 through 89 years or obstetric patients, with serious treatable complications (shock/cardiac arrest, sepsis, pneumonia, deep vein thrombosis/pulmonary embolism or gastrointestinal hemorrhage/acute ulcer). Includes metrics for the number of discharges for each type of complication. Excludes cases transferred to an acute care facility. A risk-adjusted rate is available. The risk-adjusted rate of PSI 04 relies on stratum-specific risk models. The stratum-specific models are combined to calculate an overall risk-adjusted rate.	Intrapartum Care
MIPS Program	Perioperative Temperature Management	Percentage of patients, regardless of age, who undergo surgical or therapeutic procedures under general or neuraxial anesthesia of 60 minutes duration or longer for whom at least one body temperature greater than or equal to 35.5 degrees Celsius (or 95.9 degrees Fahrenheit) was achieved within the 30 minutes immediately before or the 15 minutes immediately after anesthesia end time	Intrapartum Care
MIPS Program	Proportion of Patients Sustaining a Bowel Injury at the time of Any Pelvic Organ Prolapse Repair	Outcome	Postpartum Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
MIPS Program	Proportion of Patients Sustaining a Bladder Injury at the Time of any Pelvic Organ Prolapse Repair	Outcome	Postpartum Care
2902	Contraceptive Care – Postpartum Women Ages 15-44 (CCP-AD)	Among women ages 15 through 44 who had a live birth, the percentage that is provided: (1) A most effective (i.e., sterilization, implants, intrauterine devices, or systems [IUD/IUS]) or moderately (i.e., injectables, oral pills, patch, ring, or diaphragm) effective method of contraception within 3 and 60 days of delivery. (2) A long-acting reversible method of contraception (LARC) within 3 and 60 days of delivery.	Postpartum Care
MIPS Clinical Quality Measure (CQM)	Maternity Care: Post-Partum Follow-Up and Care Coordination	Percentage of patients, regardless of age, who gave birth during a 12-month period who were seen for post-partum care within 8 weeks of giving birth who received a breast feeding evaluation and education, post-partum depression screening, post-partum glucose screening for gestational diabetes patients, and family and contraceptive planning	Postpartum Care
MIPS CQM, Patient-Centered Medical Home (PCMH) 2017	Maternal Depression Screening	The percentage of children who turned 6 months of age during the measurement year, who had a face-to-face visit between the clinician and the child during child's first 6 months, and who had a maternal depression screening for the mother at least once between 0 and 6 months of life	Postpartum Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
Pregnancy Risk Assessment Monitoring System	Postpartum Depression	Percent of women who experience postpartum depressive symptoms following a recent live birth	Postpartum Care
0363	Retained Surgical Item or Unretrieved Device Fragment Count (PSI 05)	The number of hospital discharges with a retained surgical item or unretrieved device fragment (secondary diagnosis) among surgical and medical patients ages 18 years and older or obstetric patients. Excludes cases with principal diagnosis of retained surgical item or unretrieved device fragment and cases with a secondary diagnosis of retained surgical item or unretrieved device fragment present on admission.	Postpartum Care
1789	Risk-Standardized, All Condition Readmission	This measure estimates a hospital-level, risk-standardized readmission rate (RSRR) of unplanned, all-cause readmission within 30 days of discharge from an index admission with an eligible condition or procedure.	Postpartum Care
MIPS Program	Maternity Care: Postpartum Follow-Up and Care Coordination	Percentage of patients, regardless of age, who gave birth during a 12-month period who were seen for post-partum care within 8 weeks of giving birth who received a breast-feeding evaluation and education, post-partum depression screening, postpartum glucose screening for gestational diabetes patients, and family and contraceptive planning	Postpartum Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
0711	Depression Remission at Six Months	Adult patients ages 18 and older with major depression or dysthymia and an initial PHQ-9 score > 9 who demonstrate remission at six months defined as a PHQ-9 score less than 5. This measure applies to both patients with newly diagnosed and existing depression whose current PHQ-9 score indicates a need for treatment.	Postpartum Care
0710/0710e	Depression Remission at 12 Months	Adult patients ages 18 and older with major depression or dysthymia and an initial PHQ-9 score > 9 who demonstrate remission at twelve months defined as a PHQ-9 score less than 5. This measure applies to both patients with newly diagnosed and existing depression whose current PHQ-9 score indicates a need for treatment.	Postpartum Care
Hospital Compare	Alcohol & Other Drug Use Disorder Treatment Provided or Offered at Discharge and Alcohol & Other Drug Use Disorder Treatment at Discharge	Process	Postpartum Care
2483	Gains in Patient Activation (PAM) Scores at 12 Months	The Patient Activation Measure® (PAM®) is a 10 or 13 item questionnaire that assesses an individual's knowledge, skill, and confidence for managing their health and health care. The measure assesses individuals on a 0-100 scale. There are 4 levels of activation, from low (1) to high (4). The measure is not disease specific but has been successfully used with a wide variety of chronic conditions, as well as with people with no conditions.	Postpartum Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
2677	Preoperative Evaluation for Stress Urinary Incontinence Prior to Hysterectomy for Pelvic Organ Prolapse	Percentage of women undergoing hysterectomy for pelvic organ prolapse who have preoperative evaluation for stress urinary incontinence.	Postpartum Care
0166	Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)	HCAHPS is a 29-item survey instrument that produces 10 publicly reported measures: 6 multi-item measures (communication with doctors, communication with nurses, responsiveness of hospital staff, communication about medicines, discharge information and care transition); and 4 single-item measures (cleanliness of the hospital environment, quietness of the hospital environment, overall rating of the hospital, and recommendation of hospital).	Postpartum Care
HEDIS Quality Measure Rating System; Medicaid; Marketplace Quality Rating System	Plan All-Cause Readmissions (PCR-AD)	For patients 18 years of age and older, the number of acute inpatient stays during the measurement year that were followed by an unplanned acute readmission for any diagnosis within 30 days and the predicted probability of an acute readmission.	Postpartum Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
Hospital Compare; Inpatient Psychiatric Facility Quality Reporting	(SUB)-3 Alcohol & Other Drug Use Disorder Treatment Provided or Offered at Discharge and SUB-3a Alcohol & Other Drug Use Disorder Treatment at Discharge	The measure is reported as an overall rate which includes all hospitalized patients 18 years of age and older to whom alcohol or drug use disorder treatment was provided, or offered and refused, at the time of hospital discharge, and a second rate, a subset of the first, which includes only those patients who received alcohol or drug use disorder treatment at discharge.	Postpartum Care
MIPS Program	Appropriate work up prior to endometrial ablation procedure	To ensure that all women have endometrial sampling performed before undergoing an endometrial ablation.	Postpartum Care
0517	CAHPS Home Health Care Survey (Experience With Care)	Survey instrument and data collection methodology for measuring home health patients' perspectives on their home health care in Medicare-certified home health care agencies.	Preconception/Well Woman Care; Prenatal Care; Intrapartum Care; Postpartum Care

NQF ID or Measure Source	Measure Title	Measure Description	Domain
Medicaid; Marketplace Quality Rating System (QRS); HEDIS Quality Measure Rating System	Prenatal & Postpartum Care (PPC)	The percentage of deliveries of live births between November 6 of the year prior to the measurement year and November 5 of the measurement year. For these women, the measure assesses the following facets of prenatal and postpartum care: Rate 1: Timeliness of Prenatal Care. The percentage of deliveries that received a prenatal care visit as a member of the organization in the first trimester or within 42 days of enrollment in the organization. Rate 2: Postpartum Care. The percentage of deliveries that had a postpartum visit on or between 21 and 56 days after delivery.	Prenatal Care; Postpartum Care
0531	CMS Patient Safety and Adverse Events Composite	Weighted average of the reliability-adjusted, indirectly standardized, observed-to-expected ratios for the following component indicators: PSI 03 Pressure Ulcer Rate, PSI 06 Iatrogenic Pneumothorax Rate, PSI 08 In-Hospital Fall with Hip Fracture Rate, PSI 09 Perioperative Hemorrhage or Hematoma Rate, PSI 10 Post-Operative Acute Kidney Injury Requiring Dialysis Rate, PSI 11 Postoperative Respiratory Failure Rate, PSI 12 Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate, PSI 13 Postoperative Sepsis Rate, PSI 14 Postoperative Wound Dehiscence Rate, and PSI 15 Unrecognized Accidental Puncture or Laceration Rate	Intrapartum Care; Postpartum Care

Table 6. Maternal Mortality Measures

Measure Source	Measure Title	Measure Description	Domain
CDC National Vital Statistics System	Maternal Mortality Rate	The number of maternal deaths per 100,000 live births, defined as the death of a women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.	Intrapartum Care
CDC Pregnancy Mortality Surveillance System	Pregnancy-Related Mortality Ratio	The number of pregnancy-related deaths for every 100,000 live births, defined as the death of a woman while pregnant or within 1 year of the end of a pregnancy from any cause related to or aggravated by the pregnancy or its management.	Prenatal Care, Intrapartum Care, and Postpartum Care
CDC National Vital Statistics System	Late Maternal Mortality Rate	The number of late maternal deaths per 100,000 live births, defined as the death of a women from direct or indirect obstetric causes more than 42 days but less than 1 year after termination of pregnancy.	Postpartum Care