2025 Pennsylvania Maternal Mortality Review Annual Report

Deaths occurring in 2021

Pennsylvania Department of Health

August 2025

Pennsylvania Department of Health

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We dedicate this report to the memory of the 129 individuals who died, with deepest sympathy for their loved ones.

Acknowledgments

The Department of Health expresses its gratitude to the members of the Pennsylvania and Philadelphia Maternal Mortality Review Committees for their diligent work to advance the systems of care and improve the health of pregnant and postpartum individuals in Pennsylvania.

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Declaration

The language in this document is intended to be universal and inclusive. The Maternal Mortality Review Program (MMRP) uses terms such as “maternal health” throughout this report. To be as inclusive as possible, the terms “birthing individuals” and “pregnant/postpartum individuals” are also used. Not all individuals who are pregnant or postpartum identify as women. The terms used in this report are meant to include cisgender females, non-binary individuals, and transgender men.

The Pennsylvania MMRP, and the Pennsylvania and Philadelphia Maternal Mortality Review Committees, aim to avoid victim-blaming by ensuring that reviewers, staff, and others are aware that an individual is not to blame for their own death. There are many factors that influence the overall health of individuals including access to high-quality, risk-appropriate care, safe and supportive communities, and comprehensive education about health and pregnancy.

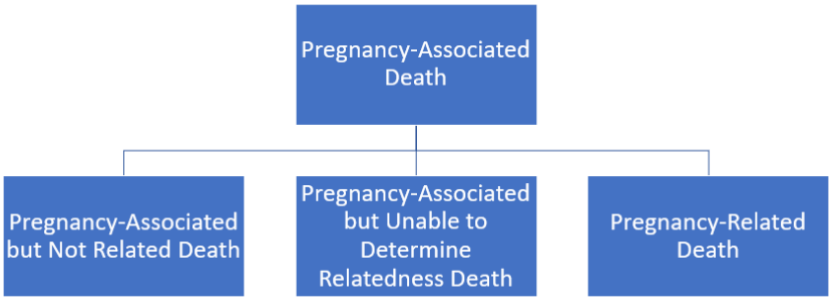
Executive Summary

The deaths of pregnant and postpartum Pennsylvanians is an indicator of the health of communities and spotlights serious public health challenges that persist in Pennsylvania. To prioritize the review of these fatalities, the Maternal Mortality Review Act, Act 24 of 2018, established the Pennsylvania Maternal Mortality Review Committee (PA MMRC).

In 2021, Pennsylvania residents experienced a pregnancy-associated mortality ratio of 97 deaths per 100,000 live births with large disparities identified. In total, 129 individuals lost their lives during pregnancy, delivery, or up to one year postpartum.

The data in this report are inclusive of all pregnancy-associated deaths in Pennsylvania, comprising all causes and manners of death, each contributing to devastating impacts on families, friends, and communities of the deceased individual. The Philadelphia MMRC independently reviews pregnancy-associated deaths of Philadelphia County residents. Reviewed information from both the PA and Philadelphia MMRCs is entered into the Centers for Disease Control and Prevention's (CDC) Maternal Mortality Review Information Application (MMRIA). Therefore, data in the report represent Pennsylvania as a whole. This report highlights factors related to 2021 pregnancy-associated deaths including demographics, pregnancy-relatedness, leading causes of deaths, and also reviews priority topic areas and recommendations for preventing future pregnancy-associated deaths.

As depicted in the chart below, pregnancy-associated deaths encompass all deaths of an individual while pregnant or up to one year after the end of pregnancy, regardless of the outcome, duration, or site of the pregnancy. After the review of a case, the MMRCs determine whether the death was pregnancy-associated but not related, pregnancy-associated but unable to determine relatedness, or pregnancy-related. A pregnancy-related death is the death of an individual while pregnant or within one year of the end of the pregnancy, regardless of the outcome, duration, or site of the pregnancy, that resulted from a complication of pregnancy or the aggravation of an unrelated condition from the physiological changes of pregnancy.



Understanding the factors that contribute to pregnancy-associated deaths is a first step in providing reasonable interventions for death prevention. In total, the MMRCs made 481 recommendations to improve the care of pregnant and postpartum individuals. The recommendations identify prevention opportunities grouped by strategies that mirror Pennsylvania's first-ever Maternal Health Strategic Plan, due to be released in 2025. The plan is a collaborative effort by the Pennsylvania Department of Human Services (DHS), Pennsylvania Department of Health (DOH), Pennsylvania Insurance Department (PID), and

the Pennsylvania Department of Drug and Alcohol Programs (DDAP), together with the Governor's Advisory Commission on Women and Pennsylvania's General Assembly. The priority areas of focus are 1) Improving Access to High-Quality Care, 2) Addressing Social Determinants of Health, 3) Improving Rural Health and Maternity Care Deserts, 4) Supporting Behavioral Health and Substance Use Disorder Needs, and 5) Expanding and Diversifying the Maternal Health Workforce.

MMRC members identified opportunities for improved health outcomes with recommendations that address the patient/family, provider, facility, system, and community as groups that interact with pregnant individuals. The recommendations presented are to advocate for necessary improvements to decrease pregnancy-associated morbidity and mortality and eliminate inequities in the medical and social care for this population in Pennsylvania.

Key Findings:

- Of the 129 identified cases of pregnancy-associated death, nearly 33% were deemed pregnancy-related and about 50% were deemed pregnancy-associated but not related.
- Mental health conditions, the leading cause of pregnancy-associated death, make up about 47% of cases. Within mental health conditions, overdose and substance use disorder (SUD) are the primary causes of death.
- Approximately 26% of cases had SUD identified as a contributing factor to the death.
- Pregnant individuals over the age of 35 accounted for 35% of pregnancy-related deaths.
- About half of pregnancy-related cases (48%) died 43 days to one year after the end of pregnancy, and 31% of the pregnancy-related cases died while pregnant.
- Approximately 25% of pregnancy-associated deaths occurred while pregnant.

Definitions

Behavioral health refers to mental health and SUD, life stressors and crises, and stress-related physical symptoms.

Behavioral health care refers to the prevention, diagnosis, and treatment of behavioral health conditions to ensure the wellbeing of the body, mind, and spirit.

Maternal morbidity is any health condition attributed to and/or aggravated by pregnancy and childbirth that has negative outcomes to the individual's wellbeing.

Pregnancy-associated is the death of an individual while pregnant or up to one year from the end of a pregnancy regardless of the outcome, duration, or site of the pregnancy[1] and includes pregnancy-related cases and pregnancy-associated but not related cases.

Pregnancy-related is the death of an individual while pregnant or within one year of the end of a pregnancy, regardless of the outcome, duration, or site of the pregnancy. These deaths result from complication(s) of pregnancy or the aggravation of an unrelated condition from the physiological changes of pregnancy. Pregnancy-related deaths may be caused by an existing health condition that worsens with pregnancy, a pregnancy complication, or intervention during the pregnancy. Deaths are pregnancy-related if the person's death would not have occurred at that time if the individual had not been pregnant.

Pregnancy-associated but not related is the death of an individual while pregnant or within one year of the end of pregnancy from any cause that is not related to pregnancy.[2] This can include a cause of death such as a car accident.

Pregnancy-associated but unable to determine relatedness is the death of an individual while pregnant or within one year of the end of pregnancy from any cause, where there is not enough evidence available on the case to determine if the death was pregnancy-related or pregnancy-associated but not related. An example of a pregnancy-associated but unable to determine relatedness death would be a pregnancy-associated death from suicide where there were no records available to see if the death was related to or aggravated by pregnancy or its management.

Pregnancy-associated mortality ratio (PAMR) is the number of pregnancy-associated deaths per 100,000 live births. It is a ratio, rather than a rate, because the denominator contains only live births and not all pregnancies regardless of outcome, duration, or site.

Pregnancy-related mortality ratio (PRMR) is the number of pregnancy-related deaths per 100,000 live births. It is a ratio, rather than a rate, because the denominator contains only live births and not all pregnancies regardless of outcome, duration, or site.

Preventability means there is at least some chance of the death being prevented by one or more reasonable changes to the patient, family, provider, facility, system, and/or community factors.[2]

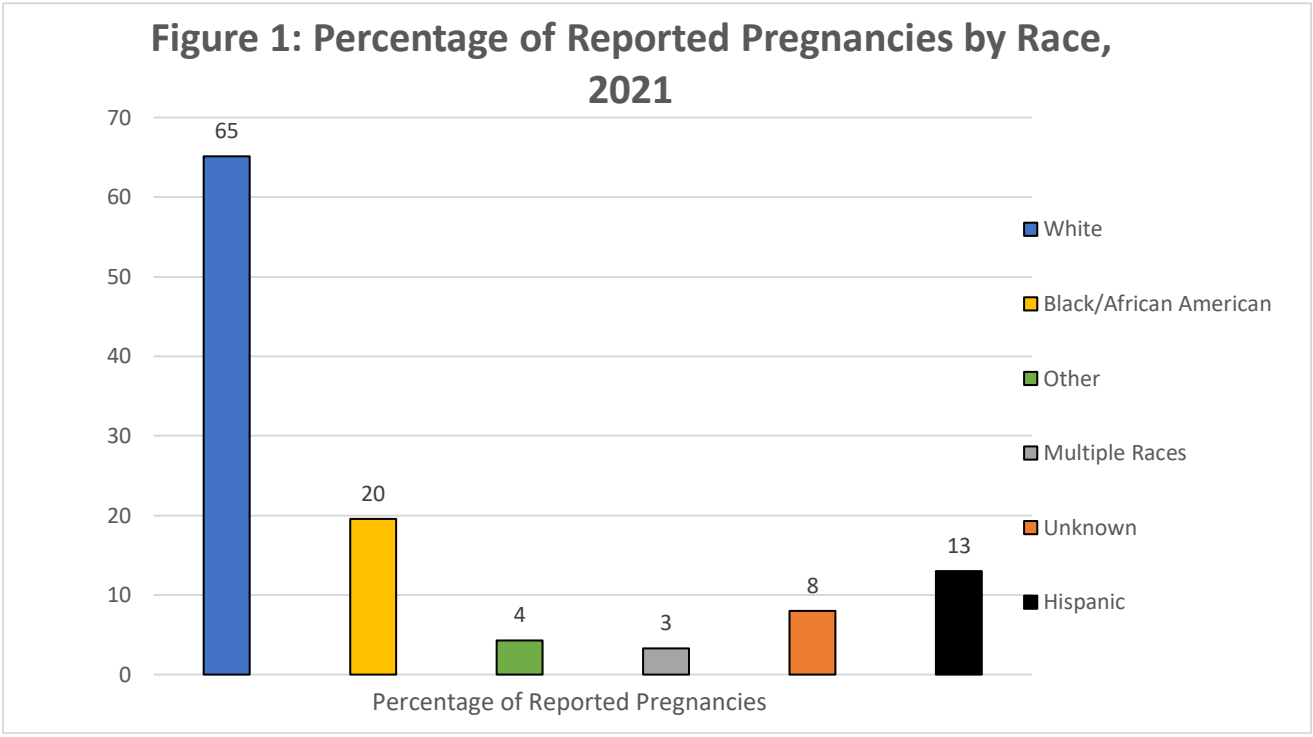
	Abbreviations Used Throughout This Report
ACOG	American College of Obstetricians and Gynecologists
BHSR	Pennsylvania Bureau of Health Statistics and Registries
CMS	Centers for Medicare and Medicaid Services
CYS	Pennsylvania Children and Youth Services
DHS	Pennsylvania Department of Human Services
DOH	Pennsylvania Department of Health
ED	Emergency Department
ERA	Epidemiology Research Associate
ERASE MM	Enhancing Reviews and Surveillance to Eliminate Maternal Mortality
IPV	Intimate partner violence
LARC	Long-acting reversible contraception
MFM	Maternal-fetal medicine
MMRC	Maternal Mortality Review Committee
MMRIA	Maternal Mortality Review Information Application
MMRP	Maternal Mortality Review Program
MRA	Medical Records Abstractor
OBGYN	Obstetrician-gynecologists
PA PQC	Pennsylvania Perinatal Quality Collaborative
PAMR	Pregnancy-Associated Mortality Ratio
PA-NEDSS	Pennsylvania National Electronic Disease Surveillance System
PCP	Primary care provider
PDMP	Prescription Drug Monitoring Program
PRMR	Pregnancy-Related Mortality Ratio
SDOH	Social determinants of health
SUD	Substance use disorder
VTE	Venous thromboembolism
WIC	Pennsylvania Special Supplemental Nutrition Program for Women, Infants, and Children

Pregnancy in Pennsylvania

Pennsylvania, currently the fifth most populous state,[3] had a population of approximately 13 million people in 2021. Individuals of reproductive age (10-60) assigned female at birth made up approximately 31% of the state's population.[4] There were 132,720 reported live births, 30,854 reported abortions, and 164,703 reported pregnancies in Pennsylvania.[5] Of these reported pregnancies, 129 resulted in a pregnancy-associated death.

Pennsylvania is racially and ethnically diverse; among live births in 2021, approximately 70% were white individuals, 14% were Black or African American individuals, and 8% were non-Hispanic individuals of other races. Race was not identified in 8% of live births. In addition, Hispanic individuals accounted for 13% of live births.[6] It is important to note that some individuals who identify as the ethnicity Hispanic are also included in their identified race, which is the reason the sum of these percentages will not be equal to 100%.

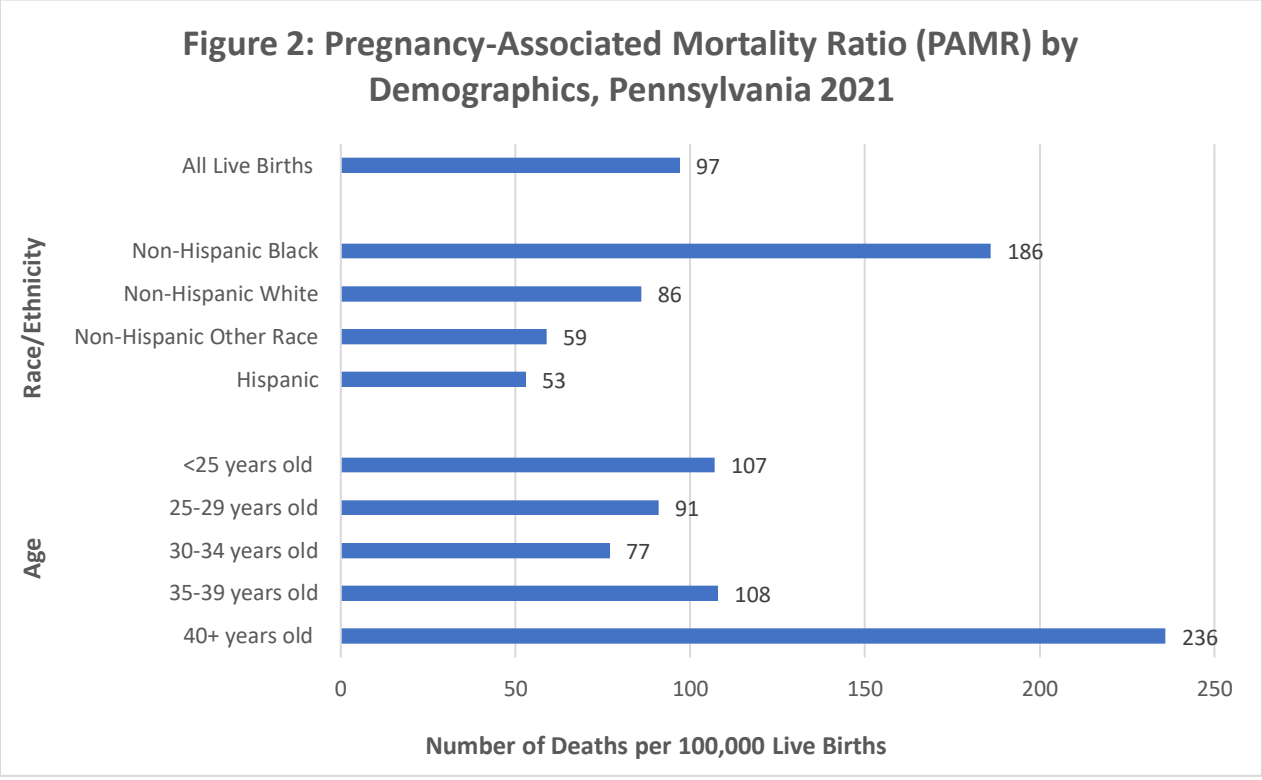
The figure below depicts 2021 reported pregnancies by race. Approximately 65% of reported pregnancies were from individuals who were white, about 20% were Black or African American, 4% identified as another race, and 3% identified as multiple races. Race was unknown in approximately 8% of reported pregnancies. Hispanic individuals accounted for 13% of reported pregnancies **(Figure 1: Percentage of Reported Pregnancies in Pennsylvania by Race, 2021)**.



Pregnancy-Associated Mortality Ratio and Pregnancy-Related Mortality Ratio

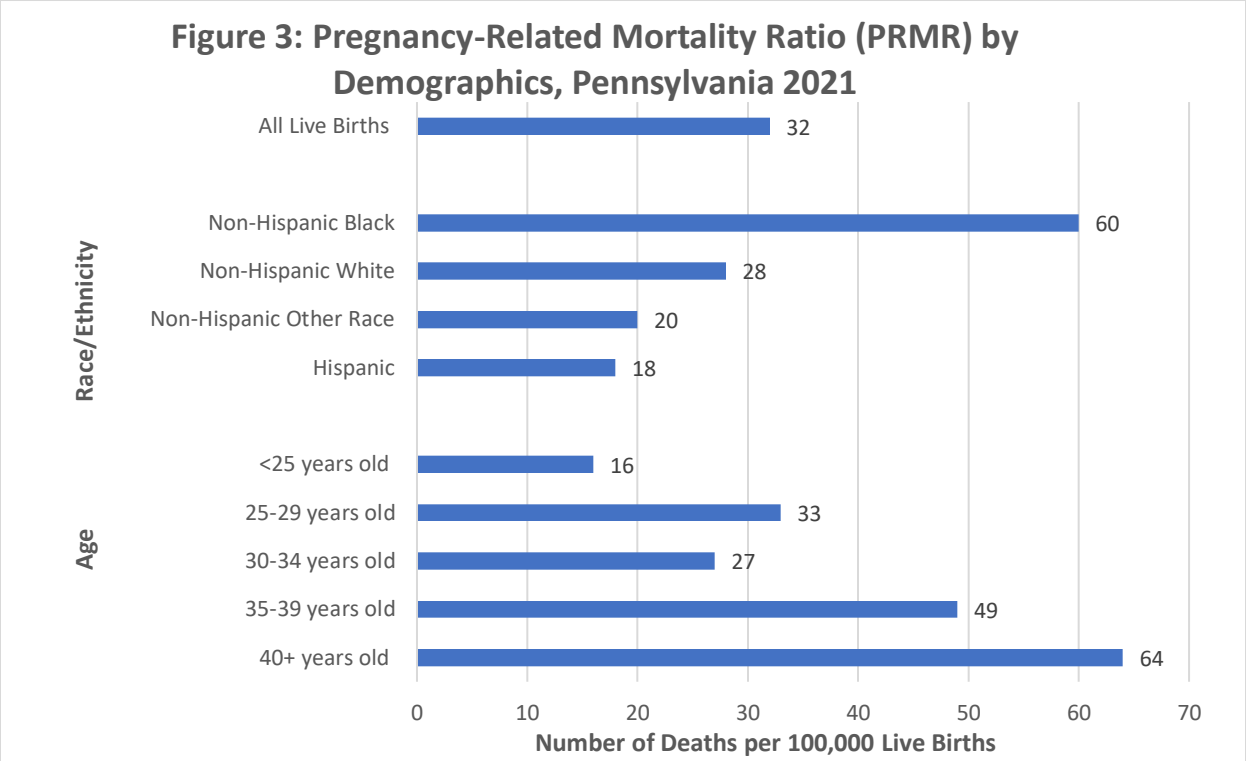
Pregnancy-associated mortality ratios (PAMR) estimate the number of pregnancy-associated deaths for every 100,000 live births. These ratios are often used as indicators to measure the health of the population at large since factors that affect the health of the entire population can also affect mortality among pregnant and postpartum individuals. Additionally, PAMRs depict how pregnancy-associated mortality affects different populations. In Pennsylvania, the PAMR for 2021 was 97 deaths per 100,000 live births. Pregnant and postpartum individuals over 40 years old had the highest PAMR (236 per 100,000 live births), which is considerably higher than the PAMR for the next highest age group of 35-39 years old (108 per 100,000 live births), highlighting the age disparity. Non-Hispanic Black individuals had the highest PAMR for race/ethnicity (186 per 100,000 live births), which is substantially higher than non-Hispanic white birthing individuals (86 per 100,000 live births), which highlights the racial disparity **(Figure 2: Pregnancy-Associated Mortality Ratio (PAMR) by Demographics, Pennsylvania 2021)**.

When compared to the PAMR in 2020, there was an increase in pregnancy-associated deaths in pregnant and postpartum individuals over 40 years old from 23 per 100,000 live births to 236 per 100,000 live births. Although this change in ratio from 2020 to 2021 is extremely large, the 2021 data align more closely with the national CDC data than the 2020 data. The MMRP will continue to monitor the case data in subsequent years to determine an appropriate baseline indicator. There was also an increase in pregnancy-associated deaths in non-Hispanic Black individuals from 148 per 100,000 live births to 186 per 100,000 live births. These increases further highlight the disparities seen in these groups.



Pregnancy-related mortality ratios (PRMR) estimate the number of pregnancy-related deaths for every 100,000 live births. These ratios are more specific in showing how different populations are affected by pregnancy and postpartum. Note that there are fewer cases that are pregnancy-related, so the numbers for the PRMR are small. It is important to interpret the PRMR cautiously when comparing it to the birthing population as a whole. For 2021, the PRMR in Pennsylvania was 32 deaths per 100,000 live births. Similar to the PAMR, the highest risk age group in the PRMR are people giving birth who are 40 years and older (64 per 100,000 live births) and non-Hispanic Black (60 per 100,000 live births). These findings reinforce that disparities in these populations are present during pregnancy and postpartum **(Figure 3: Pregnancy-Related Mortality Ratio (PRMR) by Demographics, Pennsylvania 2021)**.

When compared to the data in 2020, the overall PRMR increased from 24 to 32 per 100,000 live births. Like the PAMR comparison, there were similar increases among people who are non-Hispanic Black, from 55 to 60 per 100,000 live births.



Program Overview

The death of a person who is pregnant or postpartum is not just the loss of an individual; the death is a loss of a family member, a friend, and a member of the community. These deaths are a direct reflection of the quality of the health care system and the quality of care that is offered to the general population. Circumstances surrounding pregnancy-associated death highlight problems in community resources, health care, and the standard of care provided to individuals. The goal of a MMRC is to close gaps in physical, mental, and social health before, during, and after pregnancy by identifying disparities and creating actionable recommendations from both clinical and nonclinical perspectives.

This report, which is legislatively mandated to be published annually since 2023, aims to improve access to timely data and make recommendations to advance the care of people who are pregnant and postpartum. The DOH is also mandated to provide an annual report on Severe Maternal Morbidity which is released separately from this report. Severe Maternal Morbidity is the unexpected outcomes of labor and delivery that result in significant short-term or long-term consequences to a pregnant or postpartum individual's health[14].

The PA MMRC reviews pregnancy-associated deaths for all counties, except Philadelphia. Philadelphia County accounts for approximately 20% of all pregnancy-associated deaths in Pennsylvania and has had an active MMRC since 2010. PA MMRC and Philadelphia MMRC data are combined in this report to understand the collective impact on the death of people who are pregnant and postpartum in the Commonwealth.

The DOH was awarded funding from the CDC to support activities related to the MMRP and the PA and Philadelphia MMRCs. This funding and technical assistance is provided by the Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) grant. Initial funding was awarded from September 2019-2024. DOH was awarded funding for the new period of September 2024-2029. Additional funding for program activities and personnel is provided by the Health Resources and Services Administration's Title V Maternal and Child Health Services Block Grant and state funding.

In 2023, for the first time, the Shapiro Administration dedicated $2.3 million of the state budget to improve maternal health. The Administration included an additional $2.6 million in the budget in 2024. With this support, program capacity for maternal health initiatives increased allowing for more specialized roles, new programming focused on implementation of MMRC recommendations, and new funding opportunities to improve maternal health in the Commonwealth. With the 2025 budget, Governor Shapiro has also recommended the DOH to implement universal postpartum depression screenings and improved mental health referral processes for pregnant and postpartum individuals.

Methods

Case Identification Process

Pregnancy-associated deaths in Pennsylvania are identified through vital records data from the DOH, Bureau of Health Statistics and Registries (BHSR). Using death certificate information, deaths of Pennsylvania residents assigned female at birth and of reproductive age (10-60 years) are identified. From this information, the identified deaths are verified by linking fetal deaths and/or births within 365 days prior to death. Finally, any death identified by the death certificate's pregnancy checkbox are evaluated for individuals that were not linked by a fetal birth or death certificate. If a death certificate's checkbox was marked "unknown if pregnant within the past year" further confirmations are performed by BHSR and the MMRP.

Case Confirmation

In 2021, there were initially 150 cases identified by BHSR. After case identification and review of records, 21 cases were determined to be falsely identified as a pregnancy-associated death. False identification occurs when the pregnancy checkbox on a death certificate is erroneously marked, or other criteria are not met. The misidentification of a pregnancy-associated case results in additional time and effort from BHSR and MMRP to review medical records, outreach to coroner or medical examiner offices, or complete other verification methods. Considerations on how to reduce the identification of false cases continues.

Case Abstraction Process

Medical Records Abstractors (MRA) are responsible for creating de-identified case summaries for each confirmed case of pregnancy-associated death to present to MMRC members. The team is responsible for collecting records including death certificates, fetal birth or death certificates, hospitalization and outpatient facility records, behavioral health treatment center records, social service notes, coroner and medical examiner reports, law enforcement documents, court documents, medical transportation records, obituaries, and media searches. The PA MMRP also use the PA National Electronic Disease Surveillance System (PA-NEDSS) to identify COVID-19 and Hepatitis C diagnoses and PA Prescription Drug Monitoring Program (PDMP) to identify prescriptions for Schedule II to V drugs. MRAs review all available records and make additional requests for information as new sources are identified. If records are not received during the initial request, a second request is made. While the response rate for receiving records has improved, there were still instances where records were not received.

ACCESS TO AVAILABLE RECORDS IS ESSENTIAL FOR CREATING A CASE SUMMARY THAT HIGHLIGHTS THE LIFE EVENTS AND CIRCUMSTANCES SURROUNDING EACH INDIVIDUAL'S PREGNANCY AND DEATH IN AN UNBIASED MANNER.

Access to available records is essential for creating a case summary that highlights the life events and circumstances surrounding each individual's pregnancy and death in an unbiased manner. MRAs input available case data into the CDC's MMRIA.

This system collects many variables including decisions from committee review. Data are used for analyses at a state and national level.

Maternal Mortality Review Committees
MMRCs include both nonclinical and clinical professionals and community members who represent diverse fields related to the promotion of maternal health and prevention of pregnancy-associated deaths and/or have valuable lived experience. MMRC members are from backgrounds including maternal fetal medicine (MFM) and obstetrics/gynecology (OBGYN), midwifery and registered nurses, psychiatry and addiction medicine, emergency medicine, family medicine, anesthesiology, community health, social work, violence prevention, health statisticians, coroners and medical examiners, and government agencies such as the DOH and DHS and other specialties as identified.

Of the 129 cases in 2021, 24 were reviewed by the Philadelphia MMRC, 89 were reviewed by the PA MMRC and 16 were reviewed internally by the PA MMRC co-chairs. Cases are internally reviewed when the death is determined to be accidental with no intent of harm (e.g., individual is a restrained passenger in a motor vehicle accident) or when records were unavailable or not received, making committee determinations and recommendations difficult without speculation.

All cases are reviewed using the CDC's MMRIA Committee Decision Form to record key information on pregnancy-relatedness, completeness of records, circumstances surrounding the death, and manner of death. The committees make determinations on the following questions for each case:

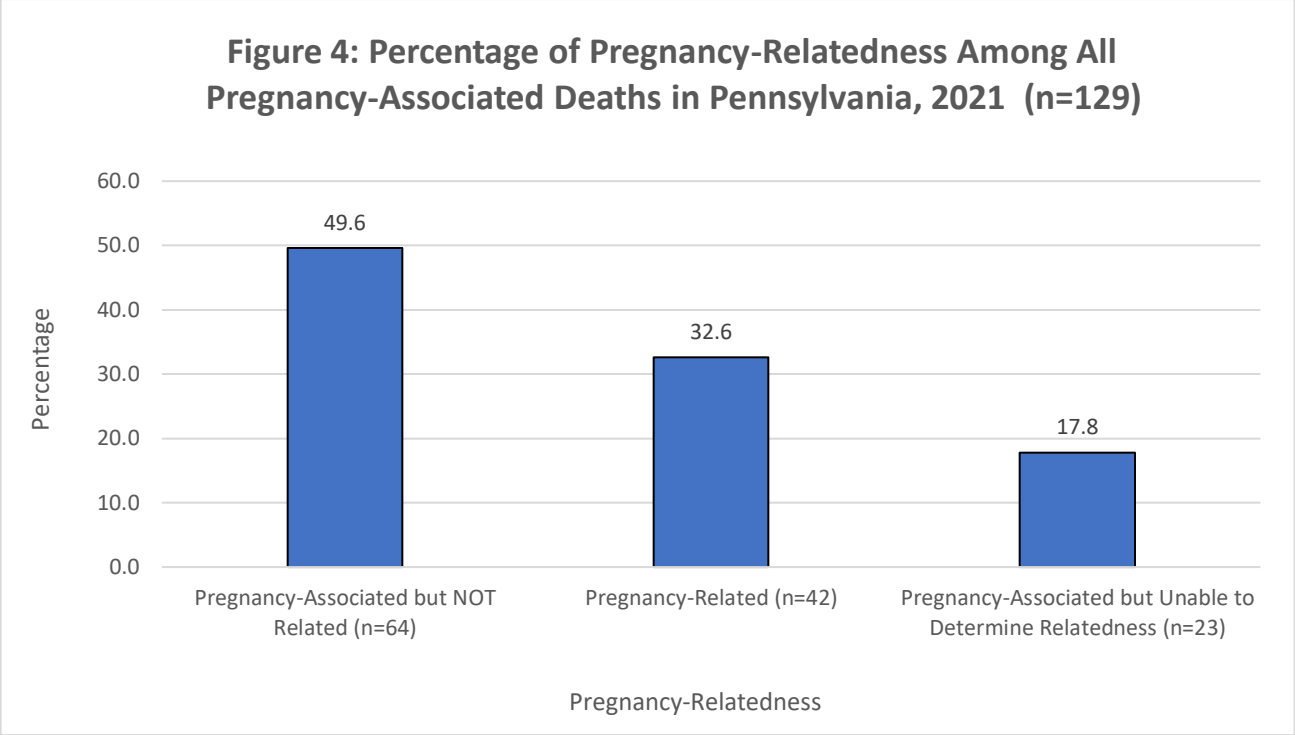
- Was the death pregnancy-related?
- What was the underlying cause of death?
- What factors contributed to the death?
- Was the death preventable?
- What recommendations may help prevent future deaths?

For the 2021 case year, the Pennsylvania and Philadelphia MMRCs provided a total of 481 recommendations for the 129 cases. Recommendations created by MMRCs aim to prevent future deaths and advance the health and wellbeing of pregnant and postpartum individuals.

Findings

Of the 129 cases reviewed, 32.6% were classified as pregnancy-related and 49.6% were classified as pregnancy-associated but not related. The committees were unable to determine pregnancy-relatedness in 17.8% of the cases reviewed **(Figure 4: Percentage of Pregnancy-Relatedness Among All Pregnancy-Associated Deaths in Pennsylvania, 2021 (n=129))**.

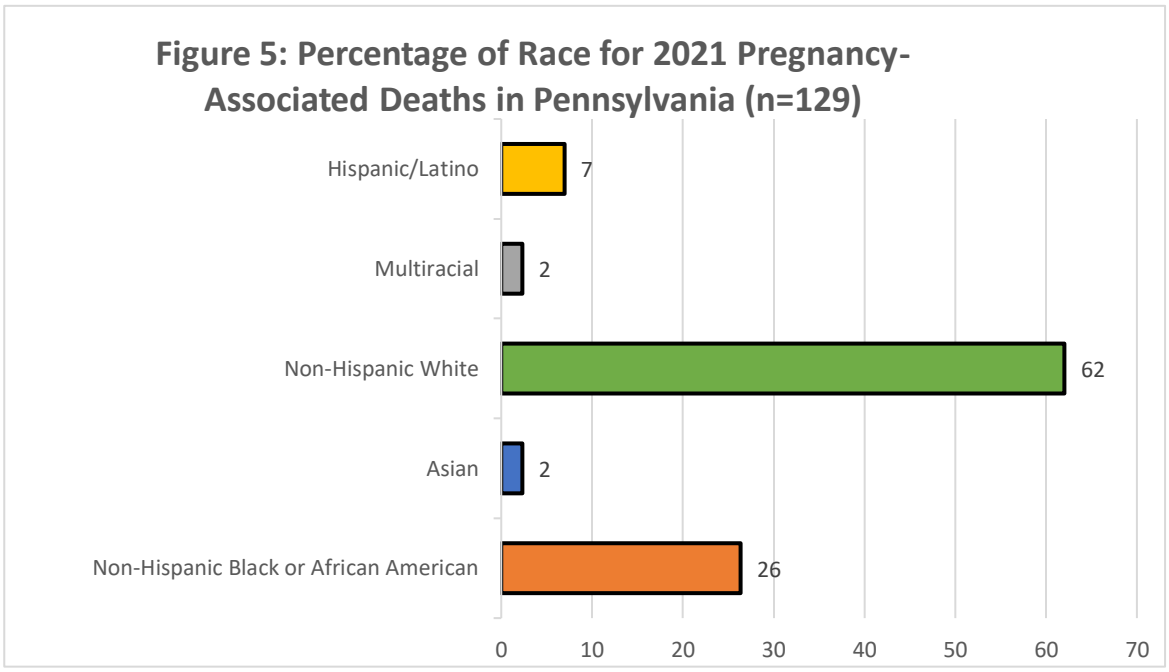
Often the reason for the inability to determine pregnancy-relatedness is due to a lack of information; for example, records do not exist because the individual was not in treatment or under the care of a provider, records were not received, or pertinent information was not documented in the available records.



Pregnancy-Associated Deaths
Pregnancy-associated deaths are the deaths of individuals while pregnant or up to one year from the end of a pregnancy regardless of the outcome, duration, or site of the pregnancy[1] and includes cases determined to be pregnancy-related, pregnancy-associated but not related and pregnancy-associated but unable to determine relatedness. The leading cause of death among pregnancy-associated death are mental health conditions, making up about 47% of cases. Within mental health conditions, overdose and SUD are the primary causes of death (90%). When combined with injury, which encompasses events like accidental deaths and homicides, these two causes of death make up 62% of all pregnancy-associated deaths **(Table 1: Categories of Leading Causes of Death for 2021 Pregnancy-Associated Deaths in Pennsylvania (n=129))**.

Table 1: Categories of Leading Causes of Death for 2021 Pregnancy-Associated Deaths in Pennsylvania (n=129)		
Category	**n**	**%**
Mental health condition	61	47.3
Injury	19	14.7
Cardiac and coronary condition	18	13.9
Hemorrhage	8	6.2
Infection	6	4.6
Metabolic/endocrine condition	5	3.9
Pulmonary condition	5	3.9
Cerebrovascular accident	3	2.3
Cancer	2	1.6
Embolism	1	0.8
Undetermined	1	0.8

In 2021, out of all pregnancy-associated deaths, 62% of individuals identified as white and 26% identified as Black or African American **(Figure 5: Percentage of Race for 2021 Pregnancy-Associated Deaths in Pennsylvania (n=129))**. While Pennsylvania's case percentages for 2021 alone do not identify large disparities among races, racial disparities in adverse maternal health outcomes persist in Pennsylvania as evidenced by the fact that non-Hispanic Black or African American individuals had a PAMR two times greater than the PAMR for non-Hispanic white individuals. Racial disparities in pregnancy-associated deaths may stem from the detrimental effects of institutional and interpersonal racism, implicit bias among providers, and social determinants of health.[13]



Pregnancy-Related Deaths

Pregnancy-related deaths are the deaths of an individual while pregnant or within one year of the end of pregnancy, regardless of the outcome of the pregnancy, duration, or site of the pregnancy, which result from complications of pregnancy or the aggravation of an unrelated condition from the physiological changes of pregnancy. Like the 2020 MMRC report findings, in 2021, again mental health conditions, which include drug-related overdose deaths and suicides, are the leading cause of pregnancy-related deaths, demonstrating the continuing need for more behavioral health care services for pregnant and postpartum individuals. Other top causes of pregnancy-related death were cardiac and coronary conditions and hemorrhage, in total making up 70% of pregnancy-related deaths **(Table 2: Categories of Leading Causes of Death for 2021 Pregnancy-Related Deaths in Pennsylvania (n=42))**.

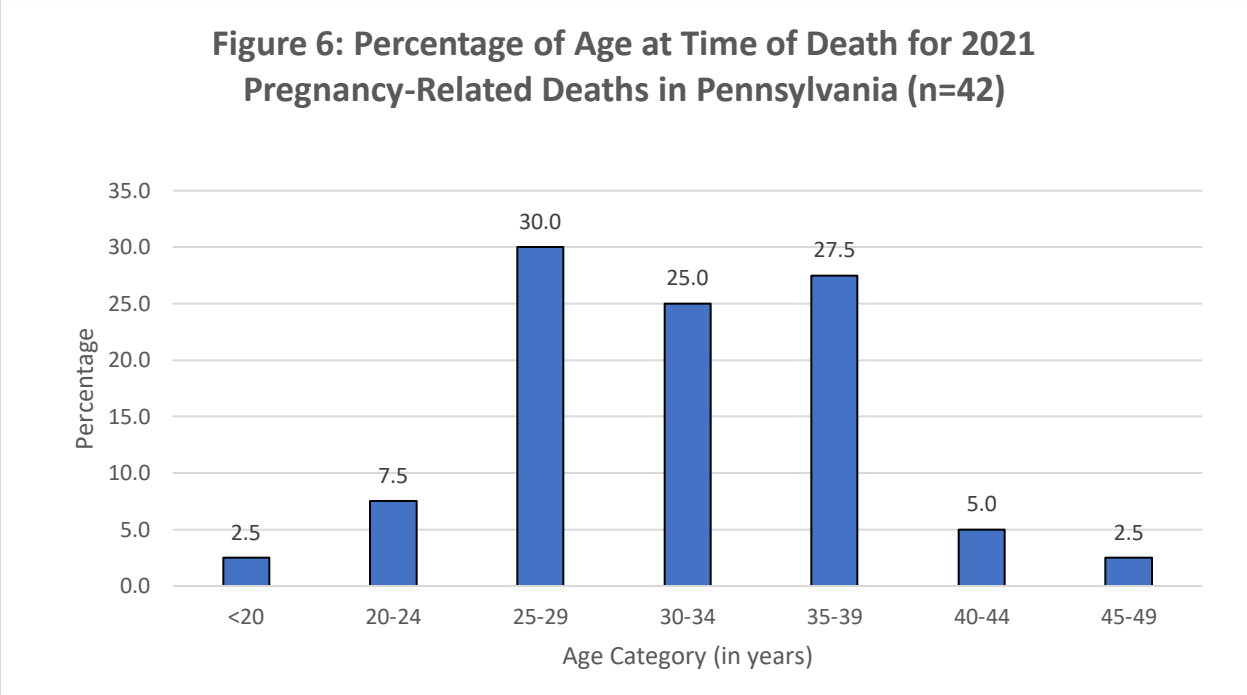
Table 2: Categories of Leading Causes of Death for 2021 Pregnancy-Related Deaths in Pennsylvania (n=42)

Category	n	%
Mental health condition	14	34
Cardiac and coronary condition	9	22
Hemorrhage	6	14
Injury	4	10
Infection	3	7
Metabolic/endocrine condition	3	7
Pulmonary condition	1	2
Embolism	1	2
Cerebrovascular accident	1	2

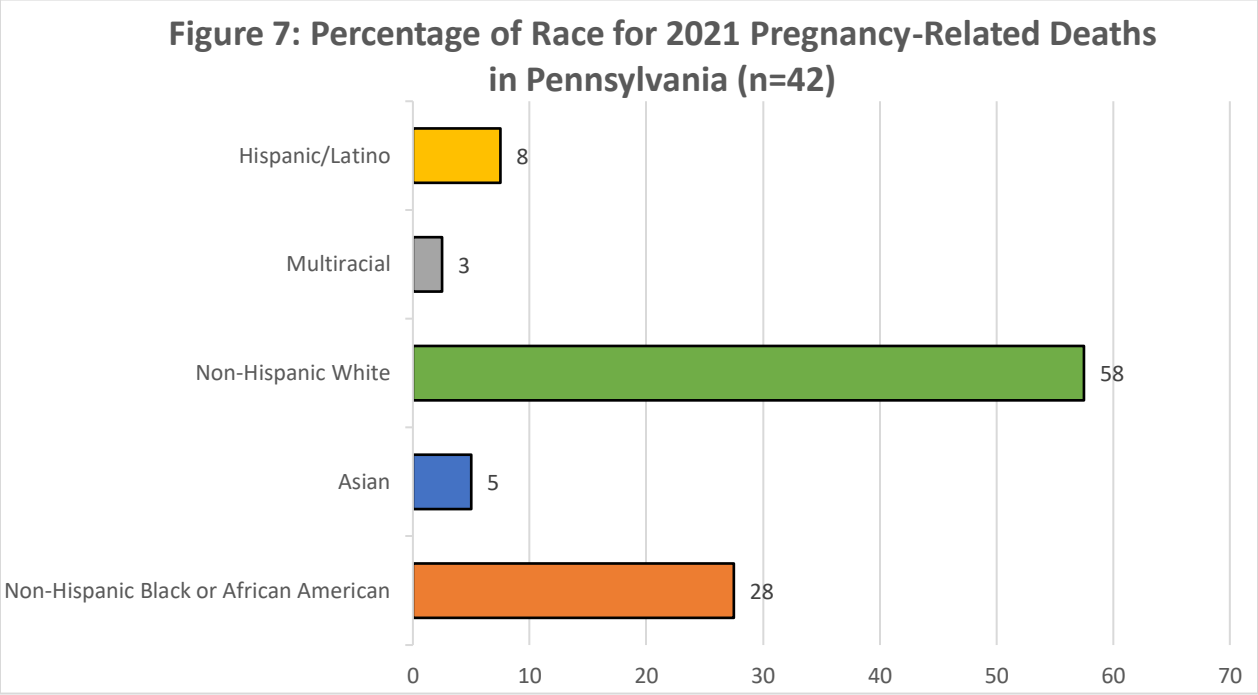
When evaluated by race, the leading causes of pregnancy-related death for white individuals were mental health conditions and cardiac and coronary conditions while for Black or African American individuals they were mental health conditions and injury, highlighting differing experiences among races **(Table 3: Percentage of Leading Causes of Death for 2021 Pregnancy-Related Deaths in Pennsylvania by Race (n=42)).**

Table 3: Percentage of Leading Causes of Death for 2021 Pregnancy-Related Deaths in Pennsylvania by Race (n=42)					
Cause of Death	Race (%)				
	White	Black or African American	Other Race	Multiracial	**Total**
Mental health condition	21.4	11.9	0	0	33.3
Cardiac and coronary condition	16.7	2.4	2.4	0	21.4
Hemorrhage	7.1	2.4	2.4	2.4	14.3
Injury	0	7.1	2.4	0	9.5
Infection	7.1	0	0	0	7.1
Metabolic/endocrine condition	2.4	2.4	2.4	0	7.2
Pulmonary condition	2.4	0	0	0	2.4
Embolism	2.4	0	0	0	2.4
Cerebrovascular accident	2.4	0	0	0	2.4
Total	61.9	26.2	9.5	2.4	100

Evaluating pregnancy-related death by age group, most (82.5%) were in individuals between ages 25 and 39 years **(Figure 6: Percentage of Age at Time of Death for 2021 Pregnancy-Related Deaths in Pennsylvania (n=42))**.

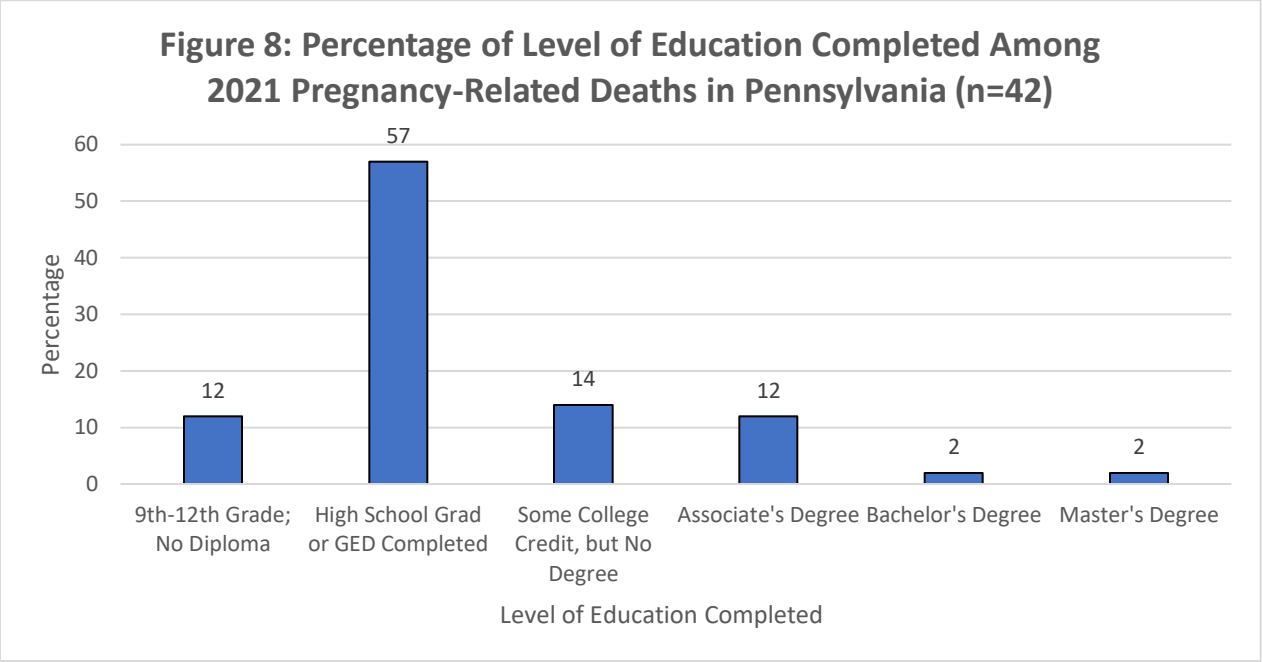


Of the 42 pregnancy-related deaths, 58% of individuals identified as non-Hispanic white, 28% identified as non-Hispanic Black or African American, 5% identified as Asian, and 3% identified as multiracial **(Figure 7: Percentage of Race and Ethnicity for 2021 Pregnancy-Related Deaths in Pennsylvania (n=42)).** Eight percent identified as Hispanic or Latino ethnicity. These deaths exemplify the continued discrepancy in equitable care and medical treatment for pregnant and postpartum individuals.



Education

More than half of the pregnancy-related cases (57%) completed high school or received a GED. About 16% of these cases completed higher level education **(Figure 8: Level of Education Completed Among 2021 Pregnancy-Related Deaths in Pennsylvania (n=42))**.



Regional Status

For regional status, 79% of cases were residing in urban counties, and 21% were residing in rural counties **(Figure 9: Percentage of Regional Status of County for 2021 Pregnancy-Related Deaths in Pennsylvania (n=42)).** The Center for Rural Pennsylvania classifies counties by regional status.[8] When looking at regional status and causes of death, cardiac and coronary conditions had the highest percentage among rural cases (10%), which differs from the leading cause of death for all pregnancy-related cases which are mental health conditions **(Table 4: Percentage of Leading Causes of Death for 2021 Pregnancy-Related Deaths in Pennsylvania by Regional Status (n=42)).**

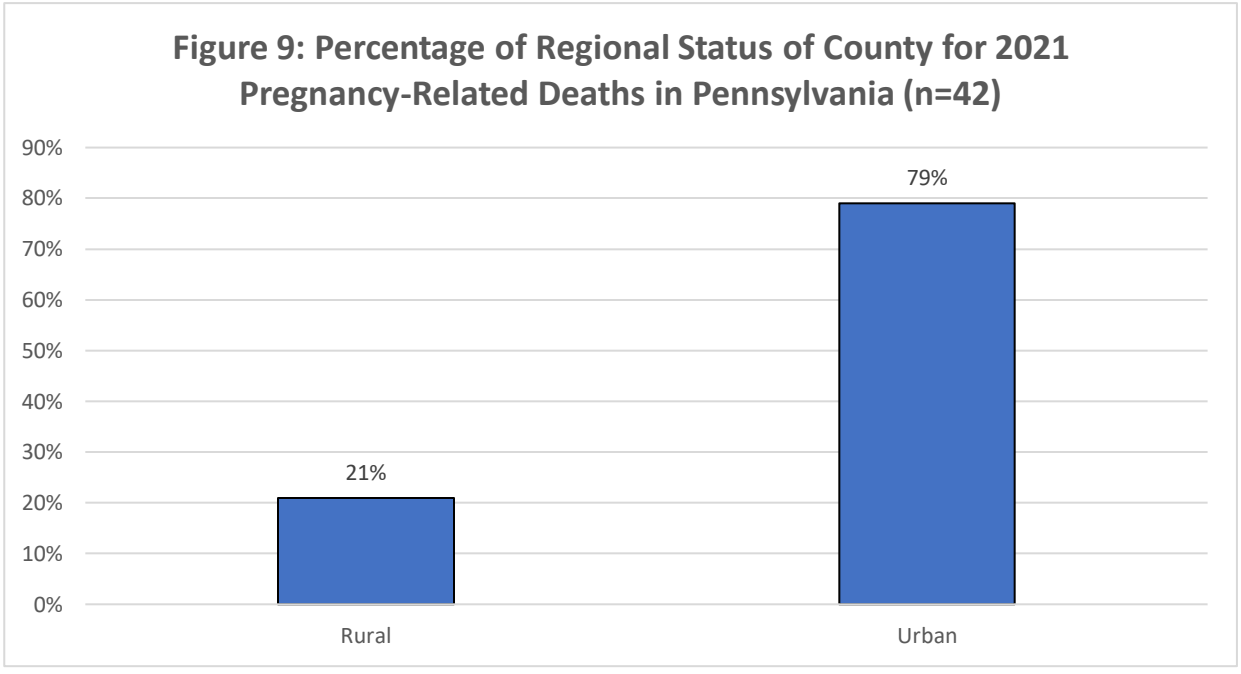
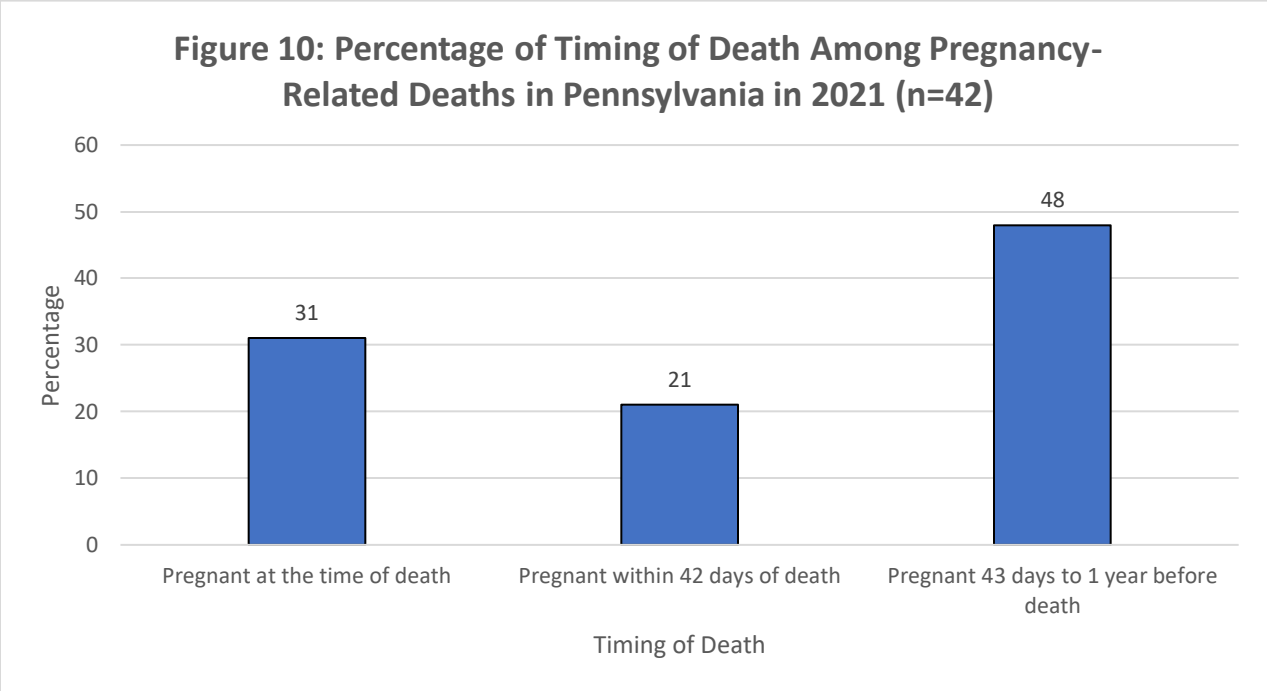


Table 4: Percentage of Leading Causes of Death for 2021 Pregnancy-Related Deaths in Pennsylvania by Regional Status (n=42)			
Cause of Death	Regional Status (%)		
	Rural	Urban	**Total**
Mental health condition	5	29	34
Cardiac and coronary condition	10	12	22
Hemorrhage	2	12	14
Injury	0	10	10
Infection	0	7	7
Metabolic/endocrine condition	2	5	7
Pulmonary condition	2	0	2
Embolism	0	2	2
Cerebrovascular accident	0	2	2
Total	21	79	100

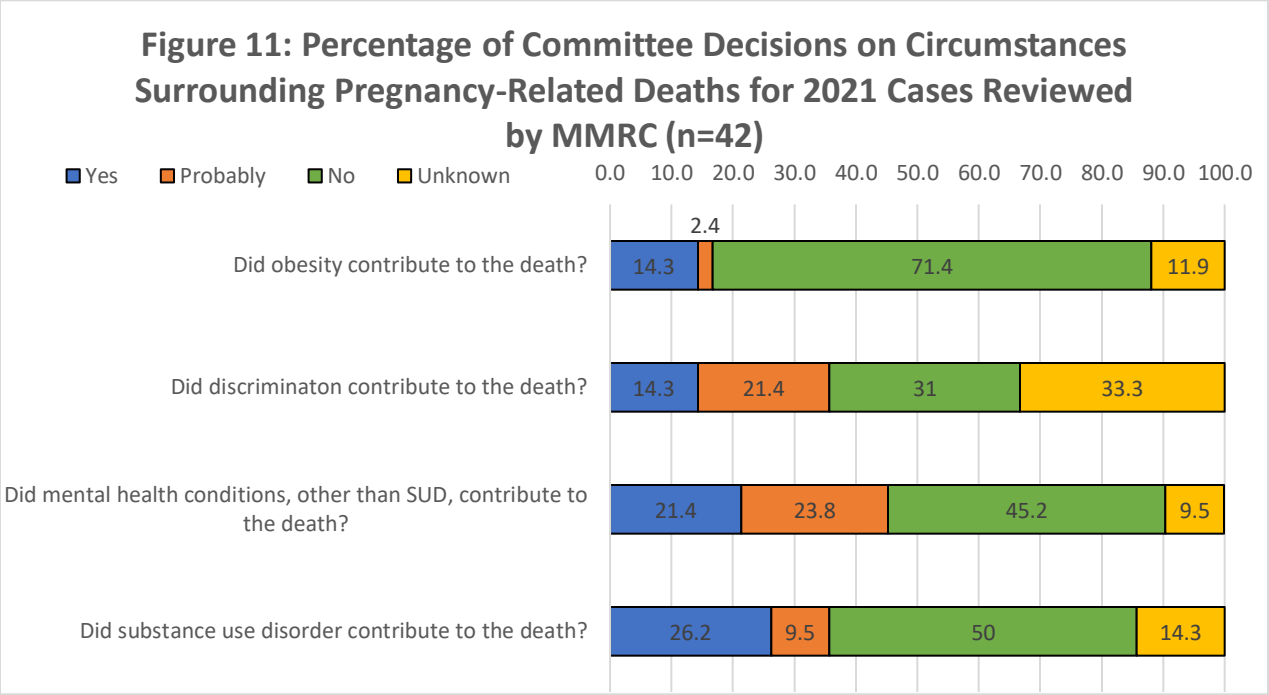
Timing from Pregnancy to Death

The graph below shows the timing of death among all pregnancy-related deaths. About half of these cases (48%) died 43 days to one year after the end of pregnancy. Approximately 31% of the pregnancy-related cases died while pregnant, showing a greater frequency of pregnancy-related deaths occurring after pregnancy **(Figure 10: Percentage of Timing of Death Among Pregnancy-Related Deaths in Pennsylvania in 2021 (n=42))**.



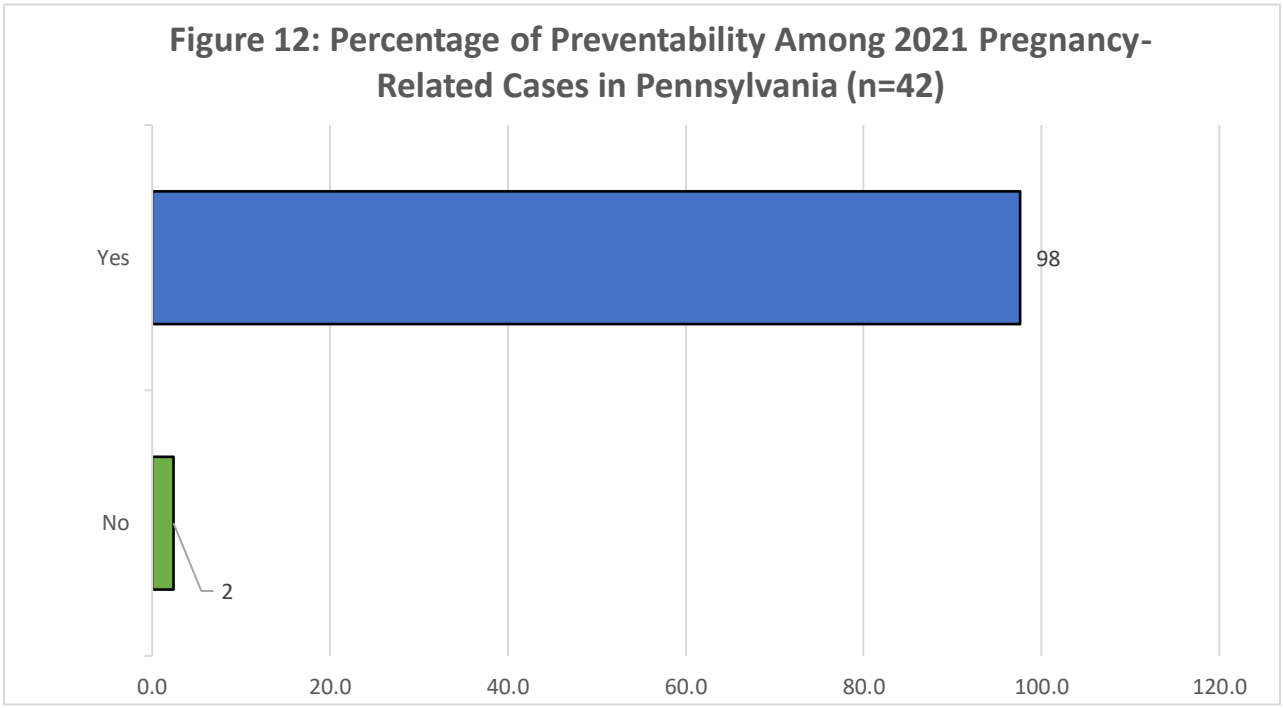
Circumstances Surrounding the Death

The MMRCs examine contributing factors to see which, if any, may have played a part in each death. The committees classified 14.3% of pregnancy-related cases as having obesity contribute to the death, 14.3% as having experienced discrimination that contributed to the death, 21.4% as having mental health conditions other than SUD that ultimately contributed to the death, and 26.2% as having SUD as a contributing factor in the death **(Figure 11: Percentage of Committee Decisions on Circumstances Surrounding Pregnancy-Related Deaths for 2021 Cases Reviewed by MMRCs (n=42))**. Identifying discrimination in medical records can be challenging. These percentages may underestimate the true amount of discrimination the individuals faced.



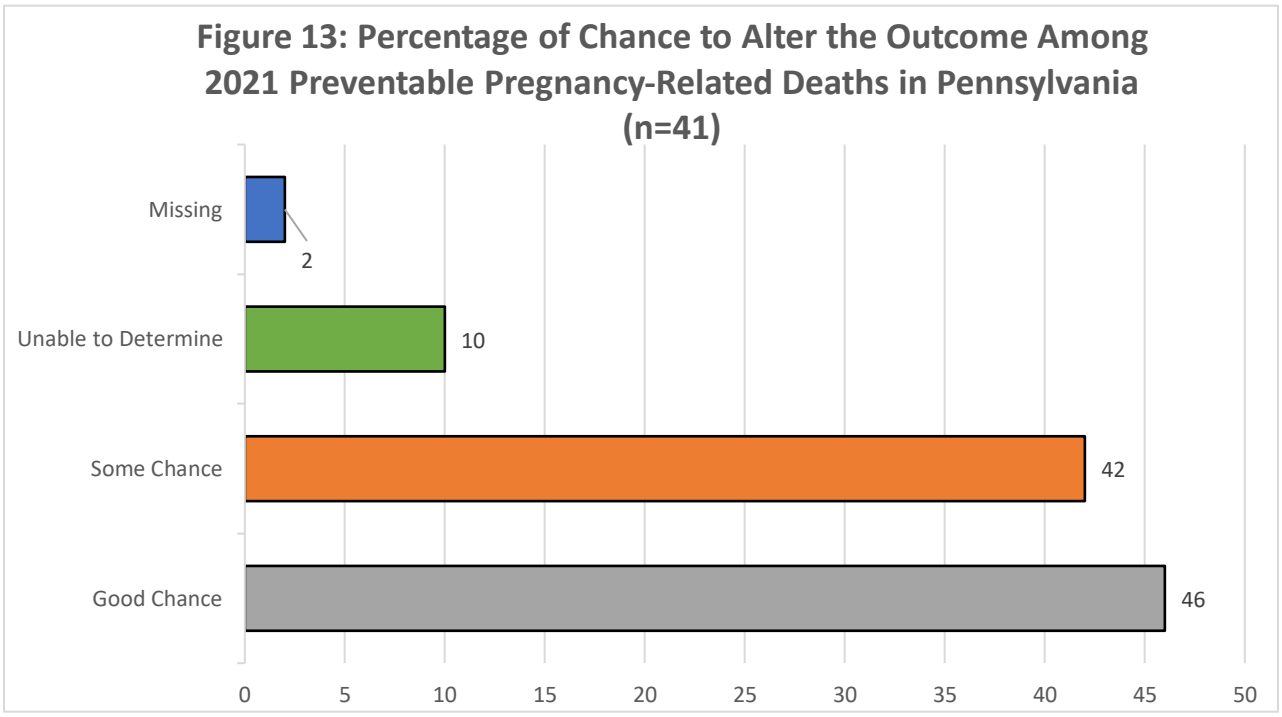
Preventability

The committees also made determinations on the preventability of the deaths. Deaths are considered preventable if there was at least some chance of the death being averted by one or more reasonable changes to patient, family, provider, facility, system, and/or community factors. Preventability does not indicate that an individual made a mistake to cause a death, but that improvements can be made within the scope of care to prevent similar deaths in the future. Of the 42 deaths that were pregnancy-related, the committees classified 41 (98%) as preventable **(Figure 12: Percentage of Preventability Among 2021 Pregnancy-Related Cases in Pennsylvania (n=42))**. It is also important to note that the members of the committees represent many but not all professions that might have expertise to determine preventability of cases; however, committee members are experts in their fields and use that expertise when determining preventability.



Chance to Alter Outcome

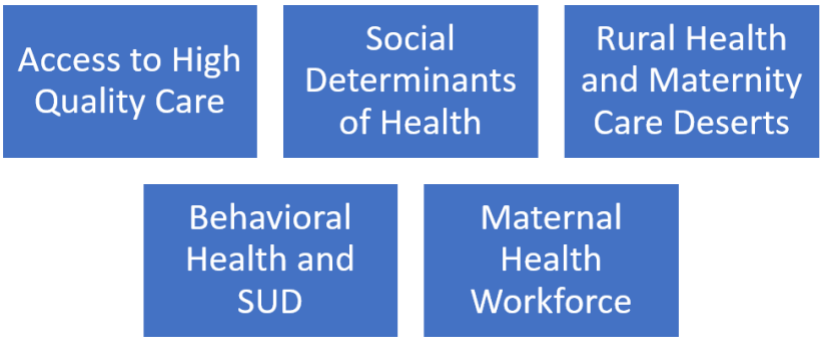
Among deaths classified as preventable, the committees determined whether there was a chance that the outcome could have been altered. Committee members chose between good chance, some chance, and unable to determine. Of the 41 pregnancy-related deaths determined to be preventable, the committees classified 46% as having a good chance, 42% as having some chance, and 10% as unable to determine **(Figure 13: Percentage of Chance to Alter the Outcome Among 2021 Preventable Pregnancy-Related Deaths in Pennsylvania (n=41))**.



Recommendations

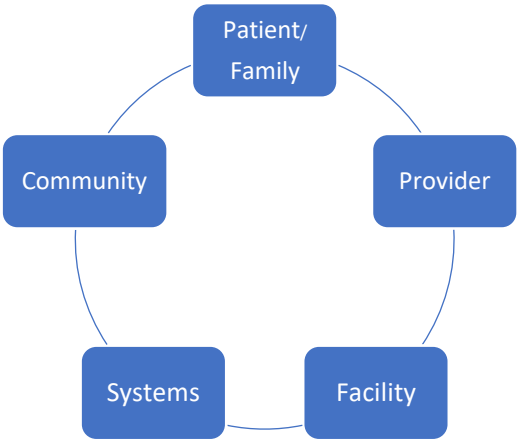
Members of the PA and Philadelphia MMRCs formulate actionable recommendations after review of each case. Recommendations aim to improve the overall health of an individual or advance the system caring for them where opportunities of missed intervention were identified in case review.

After review of the 129 cases, the MMRCs made 481 recommendations. In an effort to align maternal health initiatives occurring in the Commonwealth, the priority areas chosen mirror the Maternal Health Strategic Plan which is currently being drafted for release in 2025. The plan is the first of its kind in PA and is a collaborative effort by DHS, DOH, Pennsylvania Insurance Department, and DDAP, together with the Governor's Advisory Commission on Women and PA's General Assembly. Priorities include:



While each case is unique, there were instances of similar recommendations throughout the data, which were combined. Many recommendations overlap multiple priority areas, especially those in Rural Health and Maternity Care Deserts; however, those duplicate recommendations were retained to understand the unique challenges and solutions to quality, equitable health care faced by those living in rural communities.

Recommendations for each priority area were then organized by the groups that interact with pregnant individuals:



- **Patient/family:** this is inclusive of an individual before, during or after pregnancy, and their family, internal or external to the household, with influence on the individual.
- **Provider:** someone with training and expertise who provides care, treatment, and/or professional advice to an individual before, during, or after pregnancy.
- **Facility:** a physical location where care is provided and can include inpatient and outpatient centers, clinics, hospitals, and urgent care centers.

AN ESSENTIAL COMPONENT OF MATERNAL HEALTH CARE IS ENSURING THAT QUALITY, EQUITABLE PRENATAL AND POSTPARTUM SERVICES ARE AVAILABLE TO ALL MEMBERS OF A COMMUNITY.

- **Systems:** the interacting entities that support services before, during, and after pregnancy including health care systems, payors, and public programs.
- **Community:** a group with a shared sense of place or identity ranging from physical neighborhoods to communities based on common interests and shared circumstances.

Improving Access to High-Quality Care

An essential component of maternal health care is ensuring that quality, equitable prenatal and postpartum services are available to all members of a community. Access to these services is often limited by geographical location, financial constraints, including insurance coverage, and social determinants of health (SDOH). When access is insufficient, it leads to disparities in care, adverse health outcomes, and missed opportunities for early intervention. In response to these challenges, almost half of the MMRCs' recommendations were aimed at improving timely and consistent access to care while prioritizing preventative health care, managing existing chronic conditions, and identifying emerging health risks through patient-centered care and evidence-based practices. Recommendations in this section also had frequent themes of warm hand-off referrals and life-saving health education needed for the public. By implementing these recommendations, access to high-quality care can be improved to meet the unique needs of all pregnant and postpartum individuals, promote optimal pregnancy outcomes, and reduce the risk of pregnancy-associated mortality.

For Patient/Family:

- Pregnant individuals need to initiate prenatal care during the first trimester or as early as feasible.
- All pregnant individuals, regardless of insurance coverage, need to be offered a pregnancy care coordinator during prenatal care visits.
- Patients need to be informed prior to providers performing drug screens.

RECOMMENDATIONS TO IMPROVE ACCESS TO HIGH-QUALITY CARE HAD FREQUENT THEMES OF WARM HAND-OFF REFERRALS AND LIFE-SAVING HEALTH EDUCATION NEEDED FOR THE PUBLIC.

For Providers:

- Health care providers need to educate patients in a culturally responsive manner regarding:
  - vaccinations, emphasizing the importance of all recommended vaccinations during pregnancy, including COVID-19, using evidence-based data. If a patient declines, reason for refusal needs to be documented.
  - weight management, discussing healthy weight gain or loss during pregnancy. If additional support is required, there needs to be a warm hand-off to appropriate specialists such as registered dietitians.
  - smoking cessation, providing education and resources both during and between pregnancies.
  - risks of ectopic pregnancy, including when to seek care for symptoms.
  - signs of pregnancy complications, highlighting those that require prompt medical attention.
  - emergency response, providing guidance to families on what to do when finding a pregnant or postpartum individual unconscious.
- Points of contact with health care providers need to include:
  - routinely asking all individuals of child-bearing age if there is a possibility of pregnancy, regardless of the reason for the call/visit.
  - pregnancy testing and assistance with entry into prenatal care, including prenatal providers for uninsured individuals.
- Maternal care providers need to be consulted in-person, or by telehealth, when a pregnant or recently postpartum individual presents to the emergency department (ED), is admitted to the hospital, after any changes in clinical status, and at discharge.
- In relation to intimate partner violence (IPV), maternal health providers need to:
  - check records during prenatal visits for history of violence. Positive results need to be flagged for screening, social work consults, and safety planning.
  - ask about firearms in the home and inform individuals with a history of IPV about safety measures regarding firearms.
  - conduct a private, evidence-based IPV screening at every visit, but at a minimum, at the first prenatal visit, at least once per trimester, during the postpartum checkup, annually at preventative visits, and when IPV is suspected (e.g., falls, repeated injuries).
  - offer brief counseling and referrals to IPV programs for patients who disclose IPV, regardless of when the abuse occurred, and document it privately in the medical records.

IPV IS A PATTERN OF ABUSE BY SOMEONE IN, WANTING TO BE IN, OR FORMERLY IN AN INTIMATE RELATIONSHIP WITH ANOTHER PERSON.

- After a pregnancy termination, providers need to discuss and offer contraception options while addressing risks associated with short interval pregnancies.

- At first appointment, all obstetric providers need to provide informed consent to individuals who are pregnant after having a previous cesarean birth, per American College of Obstetricians and Gynecologists (ACOG) guidelines, so they know the risks of trial of labor versus repeat cesarean.

OBSTETRICS IS A MEDICAL SPECIALTY THAT FOCUSES ON THE CARE OF INDIVIDUALS BEFORE, DURING, AND AFTER PREGNANCY.

- Providers need to refer patients to a specialized case manager throughout pregnancy and postpartum for additional support if a chronic illness, including a mental health condition, is poorly controlled or there is inconsistent adherence to medications.
- Providers need to recommend community resources to help uninsured individuals apply for insurance, including medical assistance.
- ED providers need to collaborate with OBGYN providers and community-based pregnancy resources to:
  - facilitate smooth transitions for pregnant individuals treated in the ED, especially those who present without documented prenatal care.
  - provide reproductive health planning and access to preferred resources.
  - offer bereavement doula support after a pregnancy loss to meet individuals' emotional needs.
  - schedule follow-up appointments for all pregnant and postpartum individuals while addressing potential SDOH barriers, including transportation and childcare, prior to discharge.

A DOULA PROVIDES NON-MEDICAL COMFORT AND SUPPORT THROUGH A SIGNIFICANT HEALTH-RELATED EXPERIENCE, SUCH AS PREGNANCY, CHILDBIRTH, PREGNANCY LOSS, OR POSTPARTUM.

- Providers need to discuss their obligation to report a parent to Children and Youth Services (CYS) and if possible, file the report together.
- Prior to discharging patients from hospital encounters, providers need to:
  - schedule follow-up appointments, home visits, or phone calls as individually appropriate, including for any cases involving mental health conditions, for pregnant and postpartum individuals who were hospitalized.
  - obtain accurate pain levels with education on pain management and postpartum warning signs, including when to seek medical attention for symptoms.
  - discuss, educate, and provide (if requested) long-acting reversible contraception (LARC) and other contraception options to all individuals who have recently given birth and provide follow-up as necessary.
  - ensure multiple forms of contact for patients are obtained while noting their preferred method of contact, especially for a self-directed discharge.
  - review vital signs of pregnant patients who demonstrate poor blood pressure control and adhere to cardiac care and hypertension protocols.
  - implement remote blood pressure monitoring for all patients.

- coordinate with ongoing chronic disease management providers to ensure the individual is seen as appropriate for the condition but no later than 12 weeks of delivery.

For Facilities:

- Facilities need to collaborate with IPV organizations to:
  - implement annual training and guidelines for all staff on IPV identification using an evidence-based tool, screening best practices, response, referral options, and appropriate CYS requirements to address bias.
  - display IPV resources in a plain language sign in English and other common languages, as determined by the facility's location.
- Facilities need to implement annual or regularly scheduled training, with time for reflection, follow-up, and tangible means of accountability, to providers (including emergency medical services and other first responders) regarding:
  - the leading causes of pregnancy-associated morbidity and mortality.
  - appropriate, supportive, non-punitive use of CYS, including how to ensure the safety of both the parent and the child, ensuring a focus of non-discrimination.

TRAINING FOR PROVIDERS MUST INCLUDE TIME FOR REFLECTION, FOLLOW-UP, AND MEANS OF ACCOUNTABILITY.

  - recognition of conditions related to pregnancy and postpartum physiology and pathology that can contribute to or exacerbate physical and mental health diagnoses.
  - trauma-informed care practices to facilitate effective patient education, specifically with difficult conversations on contraception, unexpected pregnancy outcomes, and pregnancy complications.
  - recognition and timely management of amniotic fluid embolism, massive transfusion, and disseminated intravascular coagulation protocols.
  - possible life-saving measures of pregnancy termination for individuals whose lives are threatened by continued pregnancy during the pre-viable period.
  - utilization of patient advocates when communication barriers or feelings of inadequate care are identified by pregnant and postpartum individuals or their families.
  - motivational interviewing techniques with a healing-centered approach focusing on engagement and supporting autonomy.
- Patients beyond the viability threshold need to be admitted to primary OBGYN service upon hospital admission, regardless of diagnosis, unless they require ICU-level care, in which case, OBGYNs need to be directly involved.
- Social work, patient advocacy, pastoral care, and other supports need to be offered and provided, if desired, in cases with critically ill patients.
- Facilities need to provide additional supportive services, including access to social workers and grief counseling, to pregnant and postpartum individuals and their support

partners in cases involving miscarriage, fetal anomaly, high-risk pregnancy, family separation, adoption placements, and other high-stress situations.

- Facilities need to establish a protocol to evaluate for preeclampsia and hypertension in all pregnant and postpartum individuals along with intervention planning (like delivery) when results are positive.
- Chronic condition treatment facilities need to provide patients with tools and knowledge to make informed decisions about pregnancy termination and associated risks prior to conception.
- Facilities need to implement and follow:
  - Centers for Medicare and Medicaid Services (CMS) sepsis bundle including tracking outcomes for pregnant and postpartum individuals with sepsis.
  - ACOG guidelines on the safe prevention of the primary cesarean delivery.
  - Society for MFM guidelines for interval pregnancy care for pregnant individuals with identified pregnancy complications.
  - Society for Vascular Medicine guidelines for venous thromboembolism treatment.
  - anesthesia guidelines and neurological exams for post-dural headache, especially with changing or worsening symptoms.
- Facilities need to obtain full obstetric and medical history at entry into care and re-address chronic medical and psychosocial conditions in the postpartum period, even if the conditions were inactive during pregnancy.
- When pregnant individuals planning homebirth seek facility care, the facility staff need to contact the homebirth provider upon admission for care coordination.
- If OBGYN offices must turn away pregnant patients from prenatal care, the office needs to facilitate a warm hand-off to another facility.
- Facilities need to utilize alternative care options, such as telehealth, phone calls, and home visits when appropriate.

For Systems:

- Systems need to collaborate with IPV organizations to:
  - increase community awareness of IPV services and supports.
  - utilize embedded specialists in facilities caring for pregnant and postpartum individuals for timely IPV referrals and resources when a positive result is identified.
  - support evidence-based maternal and infant home visiting programs as another venue to screen and identify IPV and promote safety planning.
- Health care systems need to:
  - establish care coordination for mother and infant visits to screen for perinatal mood and anxiety disorders, IPV, SUD, and hypertension disorders.
  - prioritize appropriate care of chronic health conditions in pregnancy in a risk-to-benefit ratio, not solely on fetal wellbeing.

PERINATAL MOOD AND ANXIETY DISORDERS CAN OCCUR DURING PREGNANCY OR THE YEAR AFTER. THEY ARE THE MOST COMMON COMPLICATION OF PREGNANCY.

    - ensure low thresholds to refer pregnant individuals with rare, complex, and life-threatening chronic health conditions to a tertiary care center with experts.
    - create targeted educational programs for providers and patients in EDs, urgent care centers, and OBGYN triage units, focusing on headache management, utilization of imaging during pregnancy, the elevated mortality risk of IPV and mental health conditions, including SUD, and other unique aspects of care related to pregnancy.

TERTIARY CARE IS A HIGHER LEVEL OF SPECIALIZED CARE.

    - implement a structured employee assistance program for health care teams to address secondary trauma associated with providing care.
    - collaborate with the justice system, such as prisons/jails, to develop policies and procedures to improve treatment for incarcerated pregnant and postpartum individuals and communication among providers.
- Hospitals and payors need to require and pay for patient advocates for immediate crisis communication and de-escalation.
- Legislators need to require autopsies, including toxicology, for all pregnancy-associated mortality cases.
- Payors need to adequately reimburse for alternative care options, such as telehealth, phone calls, and home visits.
- Telehealth policies at community hospitals need to be regularly reviewed so providers can obtain consults from higher-level hospitals when needed.
- The DOH needs to develop a county-based program for all-hours telehealth access to MFM, aiding local hospitals in patient care and transfers to tertiary care when medically indicated.
- All individuals of child-bearing age need to have access to preconception MFM screenings and counseling through their health system (via their PCP or internal medicine physician) or state-funded MFM telehealth consults.
- Case studies need to be published for rare causes of death/events to enhance clinical knowledge and quality of care for hospitals and health care providers.

For Communities:

- Community-based organizations need to develop and distribute comprehensive resource guides listing local prenatal care providers, emergency resources, and support services.
- DHS, Office of Children, Youth and Families, needs statewide standardization on when to notify and involve CYS for the care of pregnant and postpartum individuals.
- State and local departments of public health and health systems need to:
    - develop and distribute information about effects of birth trauma and post-traumatic stress disorder on pregnant individuals and their future health care engagement.
    - prioritize the allocation of funding for unhoused pregnant and postpartum individuals.
    - create a hotline for access to experienced pregnancy care providers specializing in high-risk pregnancy conditions.

    - collaborate to examine imaging policies for pregnant individuals and create continuing education for health care providers on imaging safety during pregnancy.
    - provide free CPR training in accessible locations, including individual patients' homes, for family members of patients at risk for sudden cardiac arrest.
- To enhance public health, there needs to be awareness campaigns that disseminate evidence-based information regarding the following critical areas:
    - ongoing management of chronic health conditions prior to conception, stressing the importance of contraception.
    - continuation of Medicaid/health insurance coverage up to one year postpartum, including cases of miscarriage and fetal loss.
    - accessibility and utilization of naloxone.
    - significance of routine care for preconception counseling/care.
    - availability of services during pregnancy, such as WIC, Medicaid, doula care, home visiting programs, and prenatal care.
    - identifying and recognizing warning signs during pregnancy and postpartum for conditions such as preeclampsia, venous thromboembolism, hemorrhage, infectious diseases, and others.
    - promoting awareness and available resources for mental health conditions, SUD, and IPV to eliminate the stigma.
    - knowledge of insurance-covered referral programs to assist in patient care.
- The PA Board of Education needs to include comprehensive sexual education in the Health, Safety, and Physical Education Standards before grade nine, covering complications during pregnancy and postpartum.
- Public figures need to ensure that shared health information is based on credible scientific evidence to ensure trustable, fact-based information is presented to the public to avoid harmful health outcomes.

PUBLIC HEALTH AWARENESS CAMPAIGNS EDUCATE THE PUBLIC ABOUT HEALTH ISSUES AND ENCOURAGE HEALTHY BEHAVIORS.

Addressing Social Determinants of Health

Social determinants of health (SDOH) are the circumstances and environments that impact an individual's health including, but not limited to:

- access to safe and affordable housing and transportation;
- access to healthy, affordable food and opportunities for physical activity;
- educational and career opportunities and income; and
- language and literacy.

SOCIAL DETERMINANTS OF HEALTH ARE THE CIRCUMSTANCES AND ENVIRONMENTS THAT IMPACT AN INDIVIDUAL'S HEALTH.

Health care providers, including those caring for pregnant and postpartum individuals, play a key role in identifying individuals' SDOH needs through screenings. Each interaction allows opportunity for immediate intervention and

connection to resources. Additionally, there is opportunity for providers, health care systems, and communities to acknowledge the history of structural racism that has led to health care inequities by addressing bias and educating health care providers. The committees classified 14.3% of pregnancy-related cases as having experienced discrimination that contributed to the death. Eleven recommendations explicitly addressed targeting bias and discrimination.

Identifying barriers to care is the first of many steps in addressing SDOH. A large contributor to individuals' barriers to health care is Medicaid coverage. In April 2022, Pennsylvania effectively increased access to health insurance coverage with the expansion of Medicaid to provide coverage up to one year postpartum. However, for individuals with Medicaid insurance, navigating the health care system is challenging, especially with complex co-existing conditions. Unfortunately, some subspecialty health care providers do not accept Medicaid because reimbursement rates are low compared to private insurance. Reducing barriers to care will address SDOH and save lives.

For Providers:

- Health care providers need to connect individuals, via warm hand-off, to community-based organizations that can supply resources for obtaining reliable communication such as cell phones.
- Health care providers need to screen for and address patients' SDOH needs to ensure there is adequate childcare, financial support, adoption options, and social supports/resources in the community. As appropriate, these providers need to give information and warm hand-offs for individuals who require referral for services.

For Systems:

- Health care professionals and hospital staff need to be trained on the use of non-stigmatizing language in both their patient interaction and their written documentation during their education and on-boarding process. Additional training needs to be provided on utilizing harm-reduction, de-escalation, and trauma-informed methods when interacting with patients and their families.
- Health care providers need to receive regular education about the use of interpretation and translation services, language nuances, and gender/cultural considerations to facilitate better use of language resources for individuals who do not speak English as a first language. If the pregnant or postpartum individual declines and prefers to use a support person, it needs to be clearly documented by the provider.
- Payors need to allocate funds to address inequities related to an individual's SDOH needs.
- Health care systems and providers who are caring for pregnant individuals who have a disability and insufficient housing need to connect the individual with social workers and community services to aid in housing and/or accommodations needed for safe living.
- Federal insurance programs, such as Medicaid, need to adequately reimburse health care providers for their time to complete SDOH screening and intervention.
- Pennsylvania needs to require trauma-informed care and implicit bias training for all licensed health care professionals at the time of their license renewal.

- DHS needs to require Medicaid Managed Care Organizations to inform their members of the benefits available related to SDOH (e.g., transportation, food, housing, and financial support).
- Health care systems need to ensure that patients have access to transportation to attend their prenatal and postpartum visits. When necessary, vouchers or passes need to be provided for public transit or ride-shares.
- Health care systems need to ensure their ED providers have up-to-date information on community referral resources for individuals who report IPV.

For Communities:

- The PA Board of Education needs to include education on healthy relationships and signs of violence in the Health, Safety, and Physical Education Standards before grade nine.
- Legislative policies should be created to increase community awareness and provide funding for ongoing health care and social services for families at higher risk of morbidity and mortality due to IPV or inability to access medical care.

Improving Rural Health and Maternity Care Deserts

All pregnant and postpartum individuals deserve dependable and equitable access to care, regardless of where they live. PA has 48 rural counties based on the definition of urban and rural from the Center for Rural Pennsylvania. In 2020, nearly 3.4 million people, or about 26% of the state's 13 million residents, lived in a rural county[8]. Living in rural counties can pose many challenges to residents' health care, especially while pregnant or postpartum. Specialized health care is needed for pregnant and postpartum individuals, yet 7.5% of PA's rural counties are known as a Maternity Care Desert, which according to the March of Dimes, is any county in the United States without a hospital or birth center offering obstetric care and without any obstetric providers[9]. In rural areas across the state, 47.6% of women live over 30 minutes from a birthing hospital compared to 11.9% of women living in urban areas. Traveling farther for care can impact attendance at prenatal and postpartum appointments and timeliness of care during birth or an emergency.

RURAL RESIDENTS FACE UNIQUE CHALLENGES AND SOLUTIONS TO QUALITY, EQUITABLE HEALTH CARE.

Recommendations in this section were developed after the review of deaths that occurred in rural counties. While many of these recommendations overlap with other priorities, it is important to examine deaths of rural county residents separately, as rural residents face unique challenges and solutions to quality, equitable health care.

For Patient/Family:

- If a person has a known history of SUD and is receiving medical care, the family needs to be equipped with harm reduction resources and education prior to discharge.
- People with mental health conditions receiving medical care need to be connected to peer recovery services as soon as issues are identified.

For Providers:

- Screenings for IPV with referral to resources need to be provided to all pregnant and postpartum individuals. Screenings need to occur at every visit, but at a minimum, at the first prenatal visit, at least once per trimester, during the postpartum checkup, annually at preventative visits, and when IPV is suspected (e.g., falls, repeated injuries).
- Education, and when applicable, consent, needs to occur before non-emergency procedures, including drug screenings.
- Chronic medical and psychosocial conditions need to be monitored even if they are not currently active in the pregnant or postpartum individual.
- All treating facilities need to consult multi-disciplinary care teams, specific to SUD, at time of admission or when noted that a pregnant or postpartum individual with SUD is not receiving recovery services.
- Pregnant patients need to be screened for substance use at the first prenatal visit.
- Naloxone needs to be offered and provided, when desired:
  - when there is a self-directed discharge of a patient with known SUD.
  - with education for patients, partners, and family members on proper use.
- Regarding medication for the treatment of SUD:
  - Health care providers need to be empowered to offer and prescribe maintenance medication for patients with opioid use disorder (OUD).
  - When patients receive methadone from clinics, providers need to coordinate dosage to ensure adequate treatment of OUD.
- All providers need to connect pregnant or postpartum individuals with mental health conditions to psychiatrists or other prescribers with competency in treating patients in pregnancy or postpartum.
- Care teams need to follow-up with patients who miss scheduled outpatient mental health intake or routine appointments.
- Education on safer injection practices needs to be provided to patients when there is known IV substance use.
- Warm hand-offs, and when applicable, follow-up appointments, need to be scheduled before discharge:
  - for any postpartum appointments.
  - for all high-risk patients, especially those with behavioral health conditions.
  - when any unaddressed SDOH concerns are present.

For Facilities:

- Harm reduction practices for SUD need to include:
  - all patients prescribed an opioid need to also be prescribed naloxone.
  - education for patients on potential contamination of drug supply and distribution of drug testing strips.
- CMS sepsis bundle needs to be implemented including tracking outcomes and following up on outliers.

HARM REDUCTION FOCUSES ON WORKING WITH PEOPLE WITHOUT JUDGEMENT, COERCION, AND DISCRIMINATION.

- If OBGYN offices have to turn away pregnant patients from prenatal care, the office needs to facilitate a warm hand-off to another facility.
- Trauma-informed care training needs to be available for all OBGYN providers with a focus on unexpected pregnancy outcomes.
- Patient advocates need to be available to assist with de-escalation and communication in crisis situations.
- Tele-medicine consultations need to be available at all times when facilities do not have MFM, OBGYN, oncology, or other specialists on staff.
- IPV support staff need to be available at all times in case of disclosure of IPV.
- Clinics that treat chronic conditions need to counsel individuals on contraception and informed decisions on pregnancy termination.
- Any high-risk pregnant individual needs to have a consultation with MFM at entry to care with documentation in patient records.

For Systems:

- All providers who may care for pregnant individuals need to be educated on warning signs, including early onset preeclampsia.
- All providers need access to consultation with specialized care providers.
- Referrals need to occur to tertiary care centers to treat pregnant individuals with rare, complex, life-threatening chronic conditions.
- If not available in person, telehealth consultations with MFM need to be available at all times.
- Education needs to be provided to non-OBGYN providers to increase awareness of the importance of control of chronic health conditions prior to conception, the importance of contraception, and pregnancy termination options to prioritize maternal health.
- Care coordinators need to be available to patients with medical complexity to encourage collaboration and record-sharing through pregnancy and postpartum.
- Regarding CYS involvement:
    - CYS needs to provide parents with options for psychosocial support when children are permanently removed from homes.
    - Information on CYS reporting requirements needs to be provided to all patients verbally and in writing.
    - Protocols and training need to be provided to health care teams on when to report to CYS with a focus on ensuring consistency and non-discrimination.
    - CYS needs to encourage and support meaningful contact between family members for individuals with SUD who have had their child(ren) removed from their care.
- State telehealth policies need to allow greater opportunity for community hospitals to consult with higher-level hospitals.
- Hospital social workers need to provide postpartum counseling and follow-up when a child is placed for adoption.
- State and local funding needs to incentivize providers to deliver mental health treatment in underserved areas.
- Funding from appropriate state departments needs to be directed toward inpatient and intensive outpatient facilities, ideally with capacity for infant care, to treat pregnant or postpartum patients with mood disorders and other serious mental health conditions.

- Incentivized training needs to be made available for primary care, OBGYN, and psychiatric providers on treating mental health conditions in pregnancy and postpartum, including prescribing medication.
- Screening for IPV and mental health conditions need to be performed routinely, without bias, and warm hand-off referrals need to be made when screens are positive. Referrals need to include the use of peer navigators to help engage and retain patients in treatment.

MORE PRACTIONERS MUST BE TRAINED AND MADE AVAILABLE TO MEET THE NEED FOR BEHAVIORAL HEALTH CARE SERVICES.

- Health care systems need to collaborate with IPV programs to ensure support staff are available on-site for when a pregnant person discloses IPV.
- Mental health support including follow-up needs to be made available to postpartum individuals with a pregnancy or infant loss.
- DOH needs to partner with the Pennsylvania Department of Education (PDE) to provide mandatory public-school education on SUD, how to obtain and use naloxone, and immunity from prosecution to report SUD overdose and call for help.
- Supports and programs need to be in place to help infants stay in the care of their parents while they receive mental health treatment.
- Health care systems need to standardize discharge plans for pregnant and postpartum individuals with a history of SUD, to include distribution or prescription of naloxone, instructions on how to use it, what to do after administering it, where to get it, and family education.
- The justice system needs to ensure that individuals who have a history of SUD are connected with harm reduction and/or recovery services at the time of release.
- Annual education needs to be provided on motivational interviewing, trauma-informed care, and the use of non-stigmatizing language in both patient interactions and documentation.
- Health care systems need to ensure that all postpartum patients have a follow-up appointment scheduled prior to discharge, especially after a pregnancy loss.
- Health care systems need to follow-up with any patients who have a self-directed discharge to ensure follow through with recommended treatment. All attempts at contact need to be documented in the records.
- Health care systems need to screen for SDOH, including housing and safety, and when there is a need, make warm hand-off referrals.

For Communities:

- Access to educational resources and trainings including basic life support classes, such as CPR, need to be made available to communities.
- Information on naloxone use needs to be a part of public health education campaigns.
- Education needs to be provided to the public on pregnancy and postpartum complications, warning signs, and the importance of early and ongoing prenatal care.

Supporting Behavioral Health and Substance Use Disorder Needs

Behavioral health is a broad term that encompasses the emotional, psychological, and social wellbeing of an individual or group. It includes a person's thoughts, feelings, and behaviors as well as their ability to cope with stress and manage their emotions. Pregnant and postpartum behavioral health conditions, which include mental health conditions and SUD, are the leading cause of death for both pregnancy-related and pregnancy-associated cases in Pennsylvania. Left untreated, depression, anxiety, and SUD worsen the prevalence of pregnancy-associated death.

More behavioral health care services for pregnant and postpartum individuals are needed, and more practitioners must be trained and made available to meet the need. Pennsylvania's data highlights the importance of screening pregnant and postpartum individuals with validated tools to identify unmet needs and connecting individuals through warm hand-offs to qualified practitioners to provide resources, medications, education, and support.

For Patient/Family:

- If a person has a known history of SUD and is receiving medical care, the family needs to be equipped with harm reduction resources and education prior to discharge.

For Providers:

- Health care providers need to educate patients and support people about naloxone use and steps to take in case of an overdose. Education needs to occur when an opioid is prescribed and prior to discharge.
- Hospital providers need to provide a naloxone prescription and education prior to any self-directed discharge of an individual with SUD.
- Providers need to educate patients and support people about the interaction between opioids and benzodiazepines and the risk of respiratory depression, which can be fatal, prior to discharge.
- All providers need to administer mental health and SUD screenings, with follow-up screenings and referrals for any positive result.
- Health care providers need to be empowered to offer and prescribe maintenance therapy for individuals with OUD when SUD is known.
- OBGYNs, PCPs and ED providers need to connect pregnant and postpartum individuals with mental health conditions to a mental health or psychiatry provider who has competency in treating that patient population.
- OBGYN providers need to ensure that individuals at high-risk for mental health conditions and postpartum complications have services and appointments in place with a closed loop referral completed prior to discharge.
- Care teams need to follow-up with patients who miss scheduled outpatient mental health intake or routine appointments.

PROVIDERS NEED TO ENSURE THAT INDIVIDUALS AT HIGH-RISK FOR MENTAL HEALTH CONDITIONS HAVE SERVICES AND APPOINTMENTS IN PLACE PRIOR TO DISCHARGE.

- Social service providers need to follow-up with individuals with a mental health or SUD diagnosis shortly after discharge. Follow-up needs to be via phone call or text message for a well check, with referral to follow-up appointments and access to additional health care and community supports as needed.
- Providers need to collaborate with methadone clinics to advocate for individuals who state their current methadone dose is not adequately treating their OUD.

CARE TEAMS NEED TO FOLLOW-UP WITH PATIENTS WHO MISS SCHEDULED OUTPATIENT MENTAL HEALTH INTAKE OR ROUTINE APPOINTMENTS.

- Providers need to provide education about safer injection practices at every interaction where there is known ongoing IV substance use.
- When an individual is stable on antidepressants prior to pregnancy, providers need to consistently counsel on the risks of stopping antidepressants during pregnancy.

For Facilities:

- All treating facilities need to consult multi-disciplinary care teams, specific to SUD, at time of admission or when noted that an individual is not receiving recovery services.
- Hospitals and EDs need to employ recovery service specialists or peer navigators who are available to provide consultation prior to discharge of individuals with SUD.
- Hospitals need to have standard protocols in place to avoid bias and discrimination for individuals who are suspected of using substances at time of admission.
- All health care providers need to routinely evaluate for co-occurring psychiatric disorders or mental health challenges with SUD at all interactions and levels of care.

For Systems:

- DOH needs to partner with the PDE to provide mandatory public-school education on SUD, how to obtain and use naloxone, and immunity from prosecution to report SUD overdose and call for help.
- Health care systems and providers need to routinely educate individuals and support people about potential contamination of drug supply and offer drug testing strips as a form of harm reduction at all interactions with individuals with known SUD.
- Hospital systems need to standardize discharge plans following all hospital encounters for pregnant individuals with known OUD, including naloxone prescription and distribution.
- Health care systems need to educate providers on benzodiazepines and polysubstance use annually.
- Health care systems, EDs, and social workers need to ensure appropriate referrals and follow-up after a residential treatment stay to increase prevention of drug use reoccurrence, overdose, and death.
- Funding needs to be directed toward inpatient facilities and intensive outpatient facilities, ideally with capacity for infant care, to treat pregnant or postpartum individuals with mood disorders and other serious mental health conditions.

- Jails and prisons need to ensure that individuals who have a history of SUD are provided with harm reduction and recovery services while incarcerated and at the time of their release.
- State or local government needs to create programs for individuals identified as having behavioral health challenges that reinforce a parent's ability to maintain the infant/child bond while supporting recovery and mental health resources in the postpartum period.
- CYS needs to support and develop protocols to assist individuals struggling with SUD to remain in meaningful contact with their children whenever separation is initiated.
- Payors need to make funding available for community-based organizations that provide mental health, substance use, and IPV services to engage in screenings and respond to all SDOH needs.

For Communities:

- Legislators need to pass laws to support safe consumption sites to reduce the risks associated with using substances during the perinatal period.

Expanding and Diversifying the Maternal Health Workforce

In 2022, the White House released their Blueprint for Addressing the Maternal Health Crisis which highlighted the need to expand the maternal health workforce, including behavioral health providers[10]. Historically, the maternal health workforce has referred to the medical providers (e.g., physicians, registered nurses, and certified nurse midwives) involved in pregnant and postpartum care. However, there are many professionals who are crucial to maternal care, including but not limited to, doulas, home visitors, social workers and case managers, peer support specialists, and behavioral health professionals.

A MIDWIFE IS A HEALTH CARE PROVIDER WHO IS TRAINED TO PROVIDE OBSTETRIC AND GYNECOLOGICAL SERVICES, INCLUDING PRIMARY CARE, PRENATAL AND OBSTETRIC CARE, AND ROUTINE GYNECOLOGICAL CARE LIKE ANNUAL EXAMS AND CONTRACEPTION.

The leading cause of pregnancy-associated and pregnancy-related deaths in Pennsylvania is mental health conditions which includes perinatal mood and anxiety disorders, SUD, and other causes determined to be related to a mental health condition. Increasing access to behavioral health providers, particularly those trained in pregnant or postpartum care, is essential for improving maternal health outcomes.

For Providers:

- Health care providers who practice in the hospital setting need to have routine meetings with health care providers who practice in outpatient and private settings, such as certified nurse midwives and doulas, to ensure adequate communication and comprehensive care for shared patients.

For Systems:

- Commercial insurance payors need to provide coverage for doula services in the prenatal, birthing, and postpartum periods, for a minimum of six months postpartum.
- Culturally concordant, community-based doulas need to be available, free of charge, to all pregnant and postpartum individuals with physical or behavioral health conditions, or SDOH needs that increase their risk of complications.
- Reimbursement needs to be increased for psychiatric and behavioral health services to incentivize physicians and other behavioral health professions to specialize in psychiatry.
- Health systems and payors need to incentivize training for PCP, OBGYN, and psychiatric providers, specifically to address mental health conditions in pregnancy and postpartum, including proper dosing of psychiatric medications.

INCREASING ACCESS TO BEHAVIORAL HEALTH PROVIDERS IS ESSENTIAL FOR IMPROVING MATERNAL HEALTH OUTCOMES.

For Communities:

- State and local governments need to fund the development and operation of facilities as well as provide salary support for behavioral health providers and personnel to implement appropriate psychiatric and substance use programs in underserved communities.

Recommendations on Intimate Partner Violence

IPV is a pattern of abuse which can include physical injury, emotional abuse, sexual assault, isolation, stalking, deprivation, intimidation, and reproductive coercion[11]. IPV occurs by someone in, wanting to be in, or formerly in an intimate relationship with another person. Abuse often starts or intensifies during pregnancy. In a study of deaths from 2018-2019, the homicide rate for women aged 15-44 was 16% higher for those who were pregnant or within one year of pregnancy, compared to those who were not[12]. Many relationships involving IPV do not end in homicide but still have long-term, life-threatening consequences, such as mental health conditions including SUD.

The PA and Philadelphia MMRCs devised 45 recommendations for 20 cases, or 15% of all cases, where IPV was identified, which highlights that improvements must be made to serve individuals experiencing IPV. Those recommendations are found throughout the priority areas. The most common themes of IPV recommendations include screening of pregnant individuals throughout pregnancy, warm hand-off referrals to community organizations, and education on IPV and trauma-informed care for providers. IPV is more likely to be disclosed to a provider after multiple screenings, making prenatal visits a crucial time to intervene and prevent future deaths. Health care systems need to develop meaningful collaborations with local IPV programs. These collaborations need to include education for providers on the unique intersection of IPV and pregnancy, including strategies for screening and responding to disclosures. Similarly, health care providers need to provide crucial education to advocates to help them learn how to best support the health needs of pregnant and postpartum

survivors. This collaboration would create a coordinated network of partners where health care providers and advocates share knowledge, resources, and referrals to ensure safety for survivors and their families.

Recommendations on Receiving Complete Records

The PA MMRC created 16 recommendations regarding the need for increased record-sharing. The MMRP creates case summaries of pregnancy-associated deaths based on the records received. Case summaries enable committee members to get a clear picture of the individual's medical and social history, police and court records, and records from the coroner or medical examiner. However, receiving requested records continues to be a challenge for the PA MMRP. While Act 24 gave the authority for DOH to receive pregnancy-associated records, some entities still do not comply with the requests. When a more complete picture of a decedent's life and death is available through comprehensive records, the MMRC is better equipped to make recommendations aimed at preventing future deaths.

Recommendations Implemented

Some recommendations provided by the MMRCs for 2021 cases have been enacted or are in the process of implementation. These include:

- the creation of a suicide review committee.
- Medicaid coverage for doula services in the prenatal, birthing, and postpartum periods.
- the establishment of a statewide network for real-time behavioral health consultation for maternity care providers and clinical practices – this has been established as a pilot project, but additional funding must still be identified to be sustained over time.
- the use of MMRC recommendations in the development of the priorities of the Maternal Health Strategic Plan.

Limitations

Timeliness of Case Review

Pennsylvania is considered a high-burden state with many pregnancy-associated deaths reported annually. Because of the time required to identify cases, request necessary medical and social history records, fully abstract cases, and review cases, there is a significant delay for reporting final data and recommendations. Great improvements have been made in the delay, by creating an additional MMRP Medical Records Abstractor position and improving efficiency of reviews during PA MMRC meetings. Pennsylvania continues to improve program and committee policies and procedures to become timelier.

Mortality Ratios

The pregnancy-associated and pregnancy-related mortality ratios are calculated based on reported live births. These are not inclusive of pregnancies that did not result in a live birth (e.g., terminated pregnancies, ectopic pregnancies, still births).

Autopsy Requirements

Autopsies are not required to be performed on individuals pregnant at the time of death or within one year of death. In 2021, at least 40% of cases did not include an autopsy.

Autopsies can be important in determining the cause of death, determining pregnancy-relatedness, and creating recommendations to prevent future deaths.

Consideration of Pregnancy Termination
PA MMRP has no way to match death certificate data to pregnancy termination data to determine if any of those individuals died within 365 days of being pregnant. Cases may be identified through the pregnancy checkbox on the death certificate if the death certifier was aware of the pregnancy.

Future Planning for PA MMRC

To increase the number of entities that share records, the MMRP is working to strengthen existing partnerships and form new partnerships. The MMRP stresses the significance of access to complete records in preventing death among pregnant and postpartum individuals.

The MMRP added a registered nurse position to aid in abstracting cases and to begin a new informant interview process beginning with 2022 pregnancy-associated deaths. When contact information is available in records, MMRP staff will reach out to family of the decedent to offer an interview to understand more about the life and death of their loved one. These interview details will be added to the case summary to help the PA MMRC create actionable recommendations to prevent similar deaths and improve care in the future.

The MMRP will continue to work with partners on the implementation of MMRC recommendations. The MMRP will continue to collaborate with the Maternal Health Strategic Plan partners and regional maternal health coalitions to improve health outcomes for pregnant and postpartum individuals.

During review of the 2021 case year, the MMRP welcomed 13 new PA MMRC members. Additional members diversify the expert opinions during case review and ease the burden of time required for members to lead review. The MMRP recruited members based on vacant roles required by legislation and the creation of new positions for members who have lived experience with events relevant to pregnancy and birth. The MMRP also completed targeted recruitment of members with personal and professional experience with populations disproportionately affected by pregnancy-associated deaths in 2020 in Pennsylvania, including Black or African American individuals and those from rural areas.

For the first time since the COVID-19 pandemic, the PA MMRC conducted a review meeting in person. Sixteen MMRC members and four subject matter experts, including Secretary of Health Dr. Debra Bogen, met to review cases, collaborate, and participate in training. The MMRP hopes to plan an in-person MMRC meeting annually to facilitate continued collaboration among committee members.

Closing Statement

Entities putting MMRC recommendations into action should contact the MMRP by emailing the resource account, ra-dhmmrc@pa.gov. Informing the MMRP when MMRC recommendations are implemented will help assess the impact of this report and the maternal health initiatives occurring across Pennsylvania. Significant time and effort by the PA and Philadelphia MMRCs have been dedicated to reviewing pregnancy-associated deaths and identifying opportunities for intervention to prevent future deaths. The data and recommendations from the review and analyses of 2021 case review are used to inform federal, state, and local governments, community-based organizations, health care systems and providers, and pregnant individuals and their support systems. With continued dedication and commitment from the PA and Philadelphia MMRCs, the MMRP looks forward to continued collaboration with partners to ensure the efforts of the committees to address disparities in all forms of care, prevent future pregnancy-associated deaths, and promote improved health of all pregnant and postpartum individuals are put into practice and policy.

CONTACT THE MMRP (RA-DHMMRC@PA.GOV) WHEN MMRC RECOMMENDATIONS ARE IMPLEMENTED SO THAT THE IMPACT OF THIS REPORT CAN BE ASSESSED.

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