Kentucky Department for Public Health

Maternal Mortality Review

2025 Report

Cohort Data: 2017-2022

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Contents

Acknowledgements

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Additional Contributors to Data:

- Kentucky Maternal Mortality Review Committee, KDPH

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Section 1: Executive Summary & Key Findings

Maternal mortality is a key indicator of a state's health and has long-term impacts on health outcomes. It is pertinent to track and implement means to reduce maternal mortality rates. To reduce mortality, Kentucky is promoting optimal health before, during and after pregnancy. This includes addressing healthy nutrition, chronic health conditions, substance use disorder (SUD), health disparities, social determinants of health, low-resource areas, prenatal care and early elective deliveries. **All maternal deaths during pregnancy and within 365 days from the end of pregnancy are reviewed by the Maternal Mortality Review Committee (MMRC).** This expands upon current Centers for Disease Control & Prevention (CDC) standards for "maternal deaths," which only include deaths with pregnancy-related causes. Any comparison of mortality rates should be limited to pregnancy-related deaths to ensure data integrity, as not all states review or report data related to all maternal deaths.

Key Findings to Date (2017-2022* Cohorts Combined)

- Kentucky's pregnancy-related maternal mortality rate for the 2022 cohort is 15.3 deaths per 100,000 live births. (*The metrics for the 2022 cohort and combined data is preliminary as two cases for the 2022 cohort remain under review at the time of reporting).
- 82% of pregnancy-related deaths were deemed to be preventable when analyzing all cohorts. When considering all maternal deaths reviewed, 89% were deemed preventable.
- 21% of maternal deaths were pregnancy-related deaths.
- 17% of pregnancy-related deaths had mental health as a contributing factor. 33% of all maternal deaths had mental health as a contributing factor.
- 57% of maternal deaths occur within 43 days to a year of the end of pregnancy (late maternal deaths).
- 76% of all decedents had Medicaid-funded healthcare.

Committee Recommendations

Obstetric (OB) Recommendations

- Women with a history of known cardiac conditions or risks, and who are planning to become pregnant or are of childbearing age should have regular cardiology follow-up annually.
- Providers should refer mothers early in the pregnancy for inpatient evaluation with a Transesophageal Echocardiogram (TEE), including an echocardiogram, when mothers experience barriers to compliance with recommendations for outpatient workup.

Mental/Behavioral Health Recommendations

- Providers/facilities should contact patients who fail to appear for follow-up appointments for postpartum depression after the scheduled appointment.
- Providers caring for pregnant and postpartum women should develop a list of behavioral and mental health providers/facilities for referrals and update that list annually.
- Offices and hospitals should schedule pregnant women with mental health or medical complications with prompt postpartum follow-up within 7 to 10 days of delivery discharge.
- Providers should perform standardized postpartum depression screenings at two to six weeks postpartum and at three months postpartum in high-risk patients.
- KDPH should develop a trauma-informed program that includes access to behavioral health consultants and programmatic resources and encourage participation.

Sepsis Recommendations

- The Kentucky Maternal Morbidity & Mortality Task Force should inform laboratories regarding the critical nature of Group A sepsis and Group A positive cultures in pregnant patients.
- Hospitals and healthcare providers should use a screening tool that has a high sensitivity and a low false positive rate for the identification of patients with sepsis.

Pregnancy and Postpartum Recommendations

- Women found at risk based on social determinants of health during any prenatal or postpartum visit, including an emergency room visit, should receive a consult for referral to health agencies and community-based services as indicated.
- Hospitals and providers should promote the support of doulas and the Health Access Nurturing Development Services (HANDS) program during pregnancy and postpartum care.
- All providers should conduct maternal postpartum depression screening at OB office visits and pediatric follow-up visits.
- Health care systems should contact pregnant and postpartum patients who fail to keep their clinic/OB follow-up appointments after they've missed an appointment.
- Pregnant women with mental health or medical complications should have prompt postpartum follow-up within 7 to 10 days or sooner if indicated.

General Safety Recommendations

- Behavioral health facilities should develop a safety plan for patients with mental health disorders regarding access to a firearm prior to the patient leaving the facility.
- A safety plan for patients and families who have access to a firearm should be developed.

Substance Use Disorder (SUD)

- Providers should perform screening for SUD using a validated screening tool at each encounter.

- Providers caring for pregnant and postpartum women should maintain an updated list of providers, facilities, agencies and behavioral health facilities/SUD treatment facilities and refer patients with SUD.
- For women with SUD, facilities/health care systems should implement a prevention strategy for a Plan of Safe Care model to discharge from the hospital delivery event to address maternal and infant health outcomes and to increase OB and hospital involvement in implementation of the Plan of Safe Care through one year postpartum.
- SUD providers/counselors should develop a one-year postpartum plan for monitoring and treatment for new mothers with SUD.
- Payors or MCOs should develop and provide an educational plan on the risks of relapse during the postpartum period, most commonly at 2 to 10 months postpartum.
- Providers should perform a postpartum behavioral health assessment before discharge from a delivery hospital stay and again at six weeks postpartum visit for individuals with alcohol or drug use or DUI history.
- The KY Society of Addiction Medicine (KYSAM), Department for Community Based Services (DCBS), obstetricians and addiction medicine specialists/facilities should develop a framework through a multidisciplinary meeting for pregnant/postpartum women in residential facilities with a primary physician, OB provider, SUD specialist, pediatrician and family support person for a Plan of Safe Care for the mother and infant.

MMRC Future Review Efforts

Kentucky's MMRC continuously works to improve existing review practices to address timely review and data updates to inform recommendations. All MMRC members volunteer their time, and scheduling conflicts can impede their input on medically complex cases. Meetings occur quarterly. Based on CDC recommendations, to improve timely review, sub-committees and breakout rooms were formed to review less medically complex cases. The MMRC reviews committee recommendations quarterly for implementation and feasibility. The MMRC aims to adopt new practices to overcome inconsistencies with the legislative timing of reporting and the completion of cohort review. The CDC is currently processing data for the 2021 cohort for national reporting. Kentucky is currently processing the 2022 cohort with 2 cases remaining for review.

Data Foreword: The data in this report comes from two sources: the Kentucky Office of Vital Statistics and Kentucky's MMRC. Data in figures 1-4 are sourced from the Office of Vital Statistics and data in figures 5-10 are sourced from Kentucky's MMRC. The complexity of the review process creates a data lag in the availability of information for dissemination at the time of reporting.

Section 2: Background

Importance of Maternal Health

To reduce the rate of maternal mortality and improve state health, the first step is to identify women whose death occurred during pregnancy or within one year of the end of the pregnancy. These deaths fall into three categories:

- Pregnancy-related death: a death of a woman during pregnancy or within one year of the end of the pregnancy, from a pregnancy complication, a chain of events initiated by a pregnancy or the aggravation of an unrelated condition by the physiologic effects of pregnancy.

- Pregnancy-associated death: A death of a woman during or within one year of pregnancy, regardless of the cause.
- Pregnancy-associated, but not related death: A death of a woman during or within one year of pregnancy from a cause that is not related to pregnancy.

The World Health Organization defines maternal death or mortality as "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." CDC expanded this definition to include pregnancy-related deaths occurring within one year of the end of the pregnancy. Kentucky further expanded the CDC definition to include all maternal deaths from any cause for its maternal mortality reviews.

Disparities in Kentucky vary by geography, race, ethnicity and access to care. Kentucky's population is 82.3% White, 8% Black or African American, and 4.6% Hispanic (US Census Bureau, 2022). Death certificates indicate maternal deaths are higher among Black women in the two largest urban areas in Kentucky (Lexington and Louisville) compared to the remainder of the state.

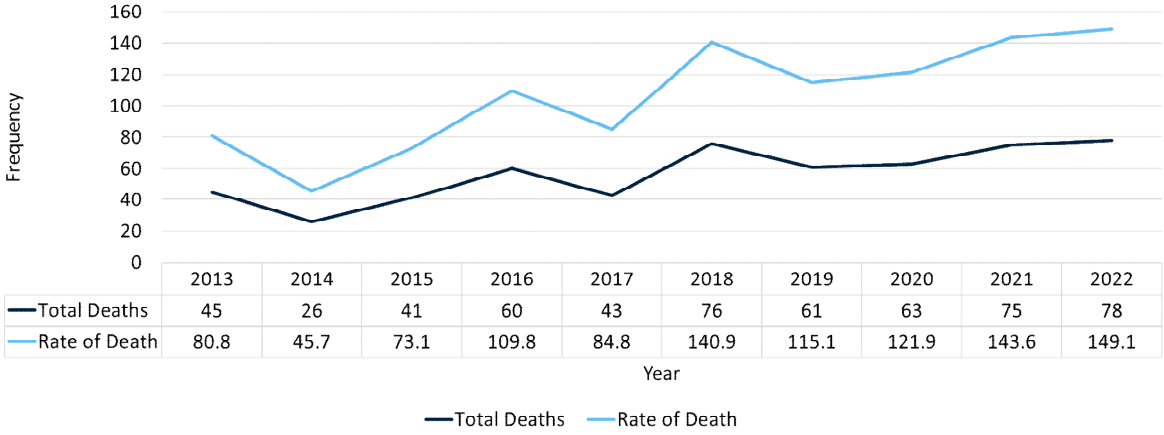
In 2022, the pregnancy-related maternal mortality rate in the U.S. was 22.3 deaths per 100,000 live births. That represents a significant decrease as the 2021 rate was 32.9 per 100,000 live births (Hoyert, 2024). Almost half of all pregnancy-related deaths are reported as caused by hemorrhage, cardiovascular and coronary conditions, cardiomyopathy or infection. It is estimated that more than 80% of pregnancy-related deaths are preventable.

Kentucky's Maternal Mortality from Vital Statistic Records

Kentucky's maternal health and well-being has a significant impact on the overall health of the state. Risk factors impacting maternal mortality include tobacco use, obesity, racial disparities, depression, SUD and other social determinants of health, such as transportation, access to care, domestic violence, and Kentucky's rurality. Morbidities, such as diabetes, hypertension and other health conditions, require additional follow-up and management during the pregnancy.

Figure 1 displays the count of all maternal deaths of those pregnant at the time of death or within one year of pregnancy as well as the rate of deaths as an expression of live births within Kentucky, using Kentucky death certificate data. This figure displays data by year from 2013 to 2022, inclusive of all causes of death.

Figure 1: Total Number of Maternal* Deaths and Rate of Death from All Causes, per 100,000 Live Births; Kentucky, 2013-2022

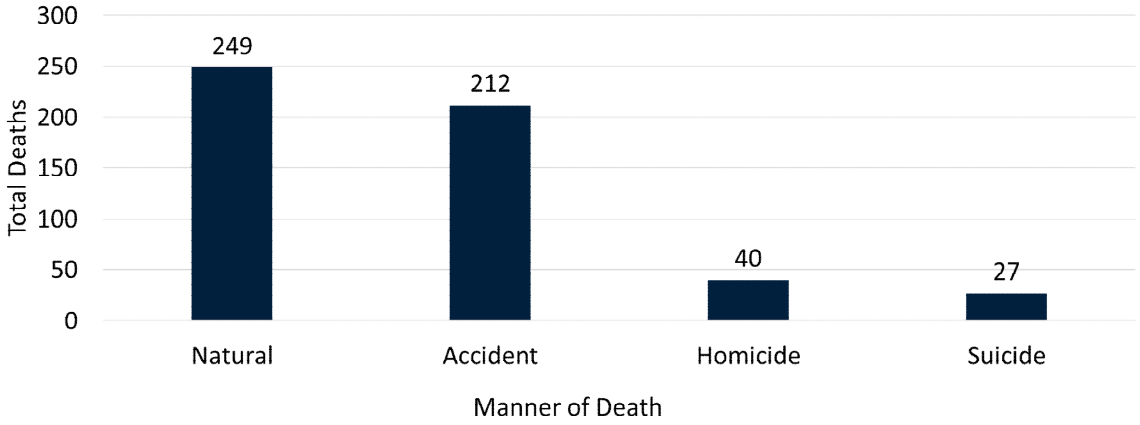


	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Deaths	45	26	41	60	43	76	61	63	75	78
Rate of Death	80.8	45.7	73.1	109.8	84.8	140.9	115.1	121.9	143.6	149.1

*Maternal death is defined as any female between the ages of 15-55 who was pregnant within one year prior to death or pregnant at death and died from any cause.
Data Sources: KY Vital Statistics files, linked live birth and death certificate files years 2013-2022.

On the death certificate, the manner of death is defined as natural, accidental, homicide, suicide or undetermined. Figure 2 shows the total number of maternal deaths based on the manner of death. Natural deaths include any death occurring because of disease or a natural process. Accidental deaths are categorized as resulting from an inadvertent event. Homicide deaths are considered to occur due to the action of another party directly causing the death of a person. Suicide deaths are from self-inflicted injury with evidence of intent to die. Outside of these criteria are undetermined deaths for which very little information is available, and no other classification is possible.

Figure 2: Total Number of Maternal* Deaths by Manner of Death; Kentucky, 2013-2022 Combined

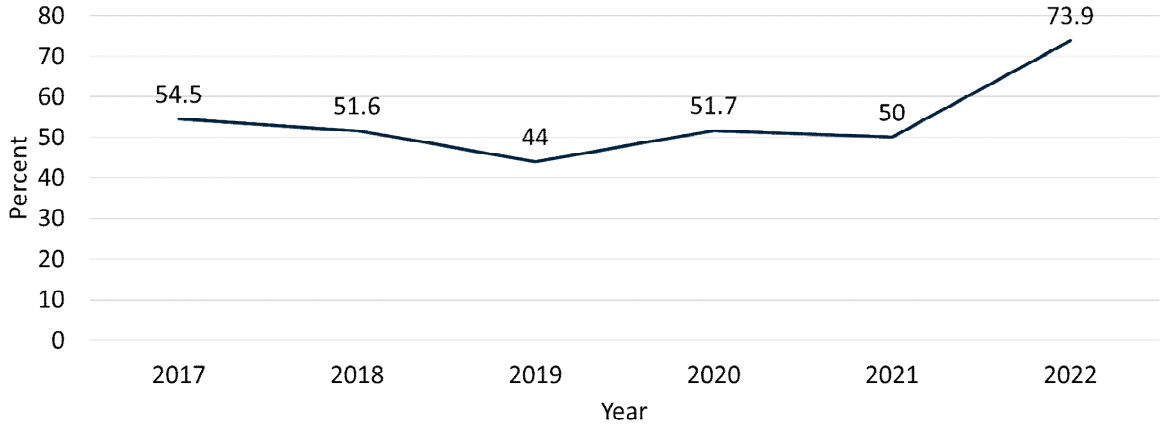


*Maternal death is defined as any female between the ages of 15 and 55 who was pregnant within one year prior to death or pregnant at death and died from any cause. The 2020-2022 data is preliminary and numbers may change.
Data Source: KY Vital Statistics files, linked live birth and death certificate files years 2013-2022.

In Kentucky, suicide deaths require clear evidence of intent, such as a history of suicidal ideation documented in writing. A concern identified in Kentucky maternal mortality reviews is that some overdose deaths listed as accidental may have been death by suicide. This represents a limitation to some of the categorizations of Kentucky maternal deaths. Risk factors, such as depression, other mental health disorders, or domestic violence for deaths not pregnancy-related or associated, have been noted during the abstraction of these cases for reference. Many death certificates have causes of death

consistent with substance use or infected injection sites based on the International Classification of Diseases 10 (ICD-10) revision. Those accidental deaths that have met the classification of being accidental and related to substance overdose are noted within Figure 3.

Figure 3: Percent of Accidental Maternal* Deaths due to Drug Overdose, Kentucky, 2017-2022

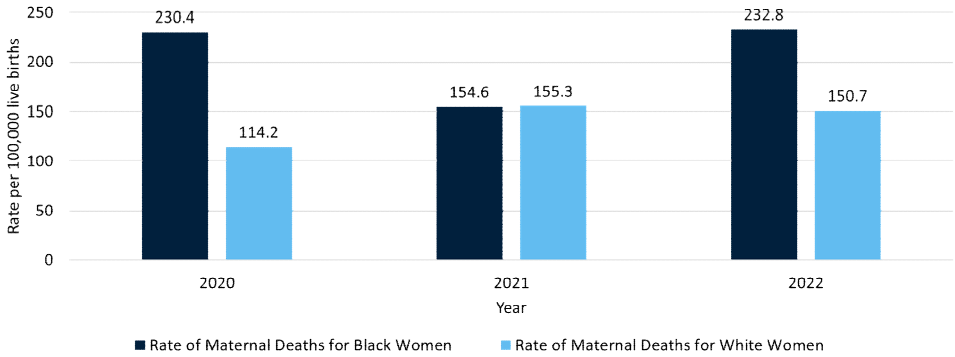


*Maternal death is defined as any female between the ages of 15 and 55 who was pregnant within one year prior to death or pregnant at death and died from any cause. Drug overdose is defined by the ICD-10 code X40-X49. The 2020-2022 data is preliminary, and numbers may change.
Data Source: KY Vital Statistics files, linked live birth and death certificate files, years 2017-2022.

Racial Disparity in Maternal Mortality in Kentucky

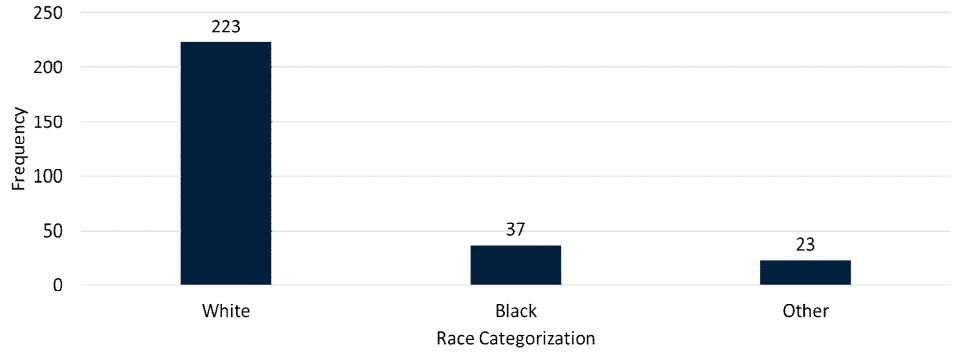
Maternal mortality in the United States negatively impacts Black women at a rate of nearly three times greater than that of white women. In Kentucky, Black maternal deaths occurred at a rate slightly above one and half times greater than that of white mothers any cause in 2022 (Figure 4). This is not directly associated with an increased number of maternal deaths among Black mothers (Figure 5). The disparity in maternal death rate for Black women in Kentucky is indicative of systemic disparities, allostatic load and population differences. As maternal mortality is an expression of maternal deaths over live births per 100,000 live births, a smaller population with fewer births (as is the case with black maternal deaths) annually experiences greater impacts despite a lower count of deaths. Additional data are necessary to determine the preventable contributing factors among these mothers.

Figure 4: Difference in Maternal* Deaths from Any Cause by Race, 2020-2022



*Maternal death is defined as any female between the ages of 15 and 55 who was pregnant within one year prior to death or pregnant at death and died from any cause. The 2020-2022 data is preliminary, and numbers may change.
Data Source: KY Vital Statistics files, linked live birth and death certificate files, years 2017-2022.

Figure 5: Categorization of Maternal Death by Race, Kentucky MMRC 2017-2022*



Data Source: KY Maternal Mortality Review Program, 2017-2022. *These metrics are preliminary as two cases from the 2022 cohort are under review.

Section 3: Maternal Mortality Review Assessment and Strategic Plans

The mission of Kentucky's maternal mortality review program is to:

- Identify all causes of maternal death in Kentucky.
- Review cause and manner of maternal deaths to identify risk factors, system deficits, or preventable causes.
- Prevent pregnancy complications related to or associated with maternal deaths.

The MMRC meets to determine program process and planning with the analysis of available data and technical assistance from the CDC and began in 2019 with the 2017 cohort. This involves identification of maternal deaths during or within one year of the end of pregnancy, case selection for abstraction and potential recommendations.

The MMRC works to answer a variety of questions, including the following core questions:

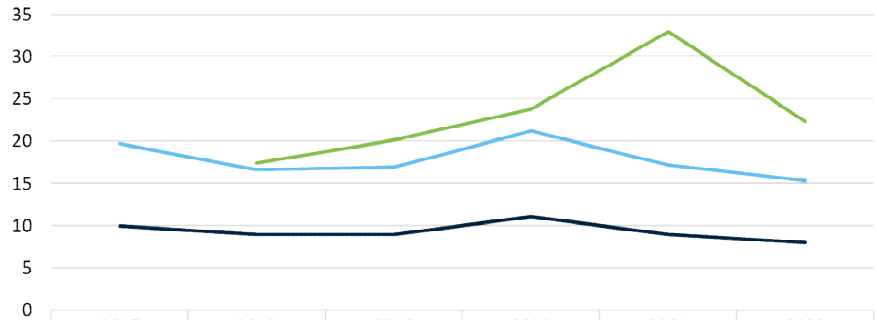
- Was the death pregnancy-related?
- What was the cause of the death?
- What factors contributed to the death?
- Was the death preventable?
- What recommendations and actions are needed to address the contributing factors?
- What is the anticipated impact if the recommendations and actions were implemented?

The state is currently utilizing CDC's Maternal Mortality Review Information Application (MMRIA) to track case reviews, informant interviews and additional variables beyond the scope of the MMRC review forms. This includes information on the method of delivery, community vital signs and insurance status (Medicaid vs non-Medicaid) before, during and after pregnancy. As the implementation time for the MMRIA application did not align with the creation of Kentucky's MMRC, abstractors have uploaded data for the 2020 cohort and onwards. This data is primarily utilized by the Kentucky Perinatal Quality Collaborative and the Kentucky Maternal Morbidity & Mortality Task Force to address committee recommendations and inform individual Kentucky Maternal Morbidity & Mortality committees assessing social determinants of health and OB causes of death such as sepsis, OB hemorrhage, hypertension and cardiac conditions.

Review Findings 2017-2022 Cohorts

Using established review criteria, the Division of Maternal & Child Health determined that more than one in five maternal deaths in Kentucky are pregnancy related. Those deaths are due in part to OB causes, such as cardiac causes, preeclampsia, embolism, sepsis and hemorrhage. As the CDC definition for maternal deaths includes only pregnancy-related deaths, Figure 6 illustrates the total number and the rate of pregnancy-related deaths as reviewed by the MMRC for 2017 to 2022. **The 2022 pregnancy-related mortality rate for Kentucky's MMRC is preliminarily 15.3 deaths per 100,000 live births. There are two cases from the 2022 cohort remaining for review, and any additional pregnancy-related deaths will significantly impact final reporting.**

Figure 6: Total MMRC Pregnancy-Related Deaths and Rate of Deaths Compared to National Rate of Death; Kentucky MMRC 2017-2022*



	2017	2018	2019	2020	2021	2022
Total Deaths	10	9	9	11	9	8
KY Rate of Death per 100,000 live births	19.7	16.6	16.9	21.2	17.2	15.3
National Rate of Death per 100,000 live births		17.4	20.1	23.8	32.9	22.3

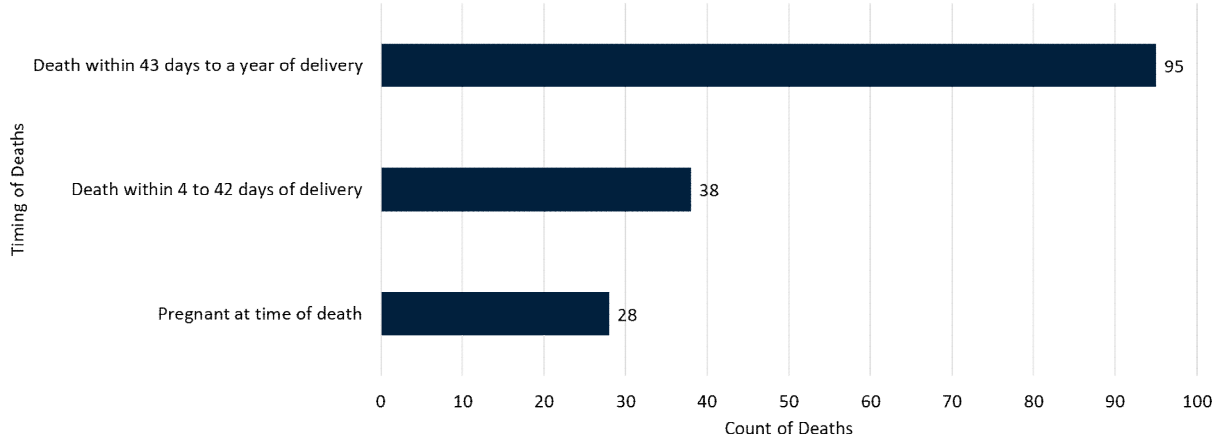
Data Source: KY Maternal Mortality Review Program, 2017-2022. *These metrics are preliminary as two cases from the 2022 cohort are under review.

The MMRC determines its agreement with coroners' recorded causes of death. The committee agreed with the underlying cause of death for 80% of the reviewed cases. Differences between committee determinations and coroners' determinations are typically related to availability of medical records and other information. A coroner's determination may have been based on limited information if the decedent had multiple providers in different facilities or jurisdictions in Kentucky or surrounding states. Abstraction of medical records and review of individual cases by the committee is necessary to confirm the causes of death based on all available details.

When assessing pregnancy-related deaths the committee reviews found the leading underlying cause of death is due to cardiac causes, such as cardiomyopathy or cardiomegaly, in 32% of cases. Mental health conditions including SUD account for the underlying cause in 17% of pregnancy-related maternal deaths. Embolism (amniotic fluid embolism, thrombotic and other embolism) is the underlying cause of death in 17% of pregnancy-related maternal deaths. Infection was the underlying cause of death in 8.9% of pregnancy-related maternal deaths. The categorization of infection includes deaths from sepsis and COVID-19. A variety of complications from clinical skill and quality of care to patient access impact these underlying causes of pregnancy-related deaths. Committee recommendations from referral to specialists in these fields provide significant insight for the Kentucky Maternal Morbidity & Mortality Task Force to address the outcomes of these mothers.

The committee found that in more than half of all cases reviewed, substance use contributed to the death. The distribution broken out along the timing of maternal death is seen in Figure 7. The number of maternal deaths attributed to substance use strengthens the need to address its impact before or during early pregnancy and the need for ongoing care management after delivery.

Figure 7: Maternal Deaths with Substance Use Disorder Contributing by Timing; Kentucky MMRC 2017-2022*



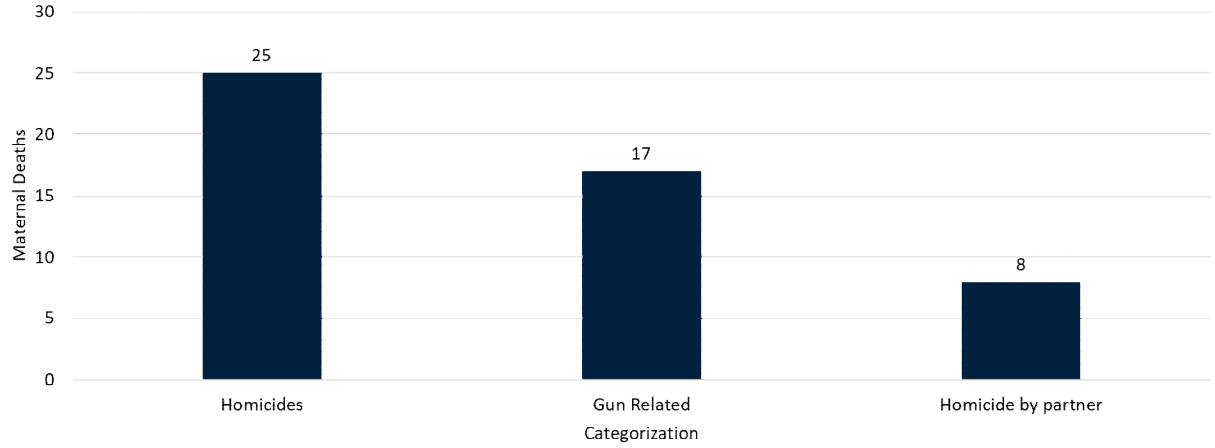
Data Source: KY Maternal Mortality Review Program, 2017-2022. *These metrics are preliminary as two cases from the 2022 cohort are under review.

It is beneficial to assess early identification and treatment for substance use disorder for mothers throughout Kentucky. If a depression screening was completed, it can provide an understanding of whether women were subsequently referred to community services that could help prevent death triggered by depression or anxiety disorder. Psychosocial and environmental risk factors associated with maternal health conditions, such as social inequality, lack of access to care, homelessness, chronic disease management, substance use, and food insecurity, are pertinent to address. These factors impact a person's mental health and are continually considered during the review process. An existing barrier to continuity of care is financial stability, although to date, the only information available on this is maternal health coverage. Within the 2017-2022 cohorts, 77% of mothers utilized Medicaid coverage as their payor source of insurance, as it covers mothers for one year postpartum.

Domestic Violence and Violent Maternal Deaths

MMRC review has provided Kentucky insight into maternal domestic violence screening, results and violent deaths. Roughly one in three mothers from 2017-2022 have documented domestic violence screenings. These domestic violence screenings rarely include the magnitude or duration of abuse, which is crucial for informing recommendations to help mothers experiencing or at risk of abuse. This gap consists of the one in five mothers whose domestic violence result is unknown. Over half of the violent death is gun violence, occurring in sixteen of the twenty-five homicide cases reviewed to date. Eight of these gun-related deaths were perpetrated by a partner (Figure 8). The remaining causes of violent death include blunt force trauma and other instruments of harm. Additional years of data and information are required to assess the impact of domestic violence on maternal access to care.

Figure 8: Homicides and Violent Maternal Deaths; Kentucky MMRC 2017-2022*

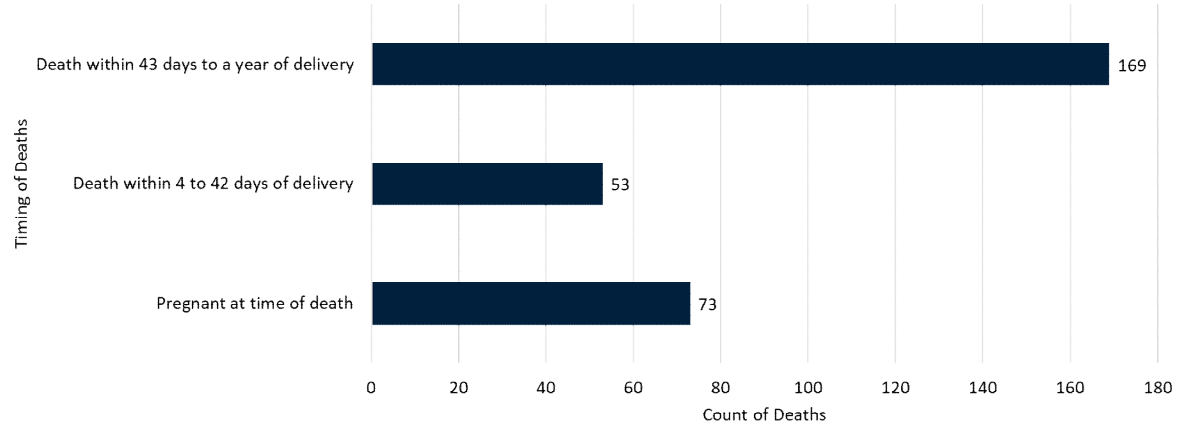


Data Source: KY Maternal Mortality Review Program, 2017-2022. *These metrics are preliminary as two cases from the 2022 cohort are under review.

Timing of Maternal Deaths

Reviewing when maternal deaths occur relative to pregnancy improves our understanding of when interventions can have the greatest impact. Over half (57%) of the maternal deaths that occur within Kentucky present within 43 days of delivery to a year after the end of their pregnancy. Without the expanded definition to include all maternal deaths, these cases would not be reviewed for intervention. Figure 9 below provides the distribution of maternal deaths by their timing:

Figure 9: Timing of Maternal Deaths; Kentucky MMRC 2017-2022*

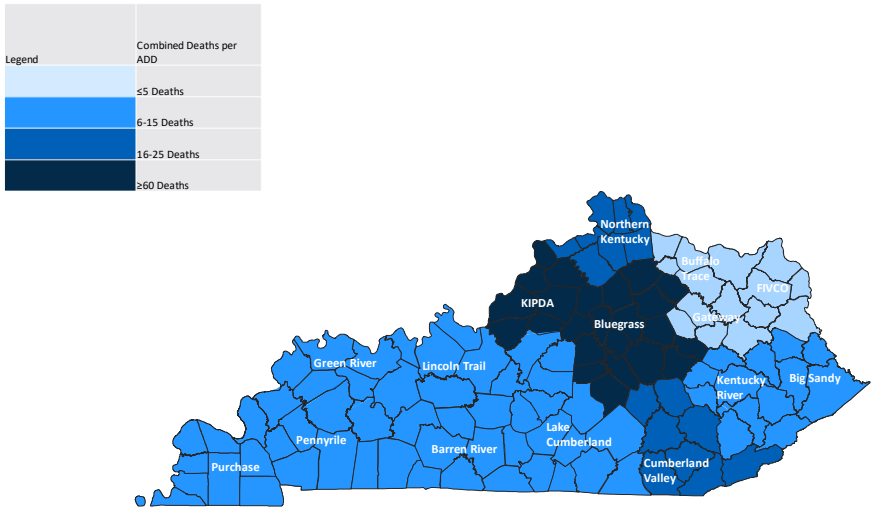


Data Source: KY Maternal Mortality Review Program, 2017-2022. *These metrics are preliminary as two cases from the 2022 cohort are under review.

Race and Geographic Distribution of Maternal Deaths

Kentucky is a predominantly rural state, which presents a challenge in providing consistent access to care. Prolonged trips to birthing hospitals are required; on average, a trip of 20.3 miles is needed to receive services in areas where their accessibility is limited (Fontenot, 2023). The distribution of maternal deaths is presented by the area development district (ADD) where the death occurred in Figure 10.

Figure 10: Kentucky Maternal Deaths by Area Development District; Kentucky MMRC 2017-2022*



Data Source: KY Maternal Mortality Review Program, 2017-2022. *These metrics are preliminary as two cases from the 2022 cohort are under review.

Evaluation

A significant challenge posed during the abstraction of medical records is obtaining records for review. The location of the birth or end of pregnancy is often not where prenatal care, SUD treatment or other health care occurs. Abstractors spend a substantial amount of time researching many data sources (e.g., Medicaid claims data, hospital data, death certificate information, pregnancy-linked birth certificates) to verify that delivery occurred. Abstractors may need to call healthcare providers for additional information. Reviews are greatly impacted by the availability and amount of information for review, with 65% of all cases having complete records. This means just over one third of cases could use additional information in making the final determination of preventability and death. Overall, 82% of Kentucky's pregnancy-related maternal deaths reviewed from 2017 to 2022 cohorts were considered preventable. This is slightly higher than the CDC predicted average that four out of five maternal deaths in the United States are preventable. Several entities are exploring opportunities to address the leading causes of preventable maternal mortality in Kentucky. This includes The Kentucky Department for Medicaid Services, which leverages Hospital Rate Improvement Program dollars to encourage birthing hospitals to conduct Edinburg Postnatal Depression Screening, along with the 5 Ps for SUD (a validated tool), within 14 days of delivery. The Kentucky Maternal Morbidity & Mortality Task Force also engages MMRC recommendations utilizing best practice to prevent the unnecessary death of Kentucky mothers.

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