Kentucky Department for Public Health

Maternal Mortality Review

2024 Report

Cohort Data: 2017-2021

Vital Records: 2017-2022

Our mission is to improve the health and safety of people in Kentucky through prevention, promotion, and protection.

Kentucky Public Health

Prevent. Promote. Protect.

Contents

Acknowledgements

The following individuals and organizations contributed to this report. Others not mentioned here include public health professionals who developed reports and compiled data for the source documents and reference materials used to compile this assessment.

Kentucky Department for Public Health (KDPH) employees who contributed to the process and data:

- James Cousett, Division of Maternal and Child Health
- Maternal Mortality Review Program Staff

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, health equity, social determinants of health, 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 and Prevention and Prevention (CDC) standards for "maternal deaths," which only include deaths with pregnancy-related causes.

Key Findings to Date (2017-2021 cohorts combined*)

- 90% of maternal mortality cases were deemed to be preventable.
- 17% of maternal deaths were pregnancy-related deaths.
- 58% of maternal deaths occur within 43 days to a year of end of pregnancy (late maternal deaths).
- 74% of mothers had Medicaid funded healthcare.
- 51% of all deaths had substance use as a contributing factor.

*Preliminary data from the 2021 cohort is included in these findings and this report. Eight cases are still under review and will impact final reporting.

Recommendations

Prenatal and pregnancy

- The Kentucky Department for Public Health will provide education and promote holistic and peri-conceptional care.
- Facilities should incorporate suicide and depression screening into emergency department visits.

- Clinicians should prescribe the minimal amount necessary of post-operative narcotics for cesarean section deliveries.
- Clinicians should follow-up on patients with multiple missed behavioral health appointments.
- Clinicians and facilities should provide a follow up appointment and emphasize their importance, rather than expecting the patient to call in for a follow-up appointment.

Post-delivery

- Clinicians and facilities should establish guidelines for mothers with or without prenatal care with coordinated referrals among primary physicians, obstetric providers, substance use disorder specialists, and infant providers, with follow-ups and a plan of safe care for the infant.
- Facilities should provide comprehensive screening for depression at discharge.
- Clinicians should follow up with patients who have a history of substance use disorder within three months of delivery.

General safety

- Clinicians and/or facilities should document post-mortem toxicology and seatbelt usage for all those involved in motor vehicle accidents.
- Law enforcement should request/access autopsy findings when conducting a death investigation when one of the accident victims is pregnant or within one year postpartum.

MMRC Future Review Efforts

Kentucky's MMRC is continuously working 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 specialist input on challenging cases. Meetings occur quarterly and CDC recommendations to improve timely review include sub-committees to review less medically complex cases and more frequent meetings. These recommendations are currently being reviewed for implementation and feasibility by Kentucky's MMRC. The MMRC aims to adopt new practices to overcome difficulties with legislative timing of reporting not aligning with the timing of case review. The CDC is currently processing data for the 2020 cohort for national reporting. Kentucky is further along than most states, which report reviewing the 2020 cohort or recently beginning review of 2021 cohort data.

There is also a potential for delay while state staff work to obtain records. MMR program staff have obtained federal funding to help support these activities and the abstraction of records. The award granted by the CDC allowed for a change from 0.75 Full-time equivalent (FTE) in 2018 to 5.0 FTE in 2023. This helps MMR program staff address the magnitude of requests for records and minimizes the risk of incomplete review. Without an autopsy, Kentucky All Schedule Prescription Electronic Reporting (KASPER), and other reports it is nearly impossible to provide basic categorization, meaningful abstraction, or informed review. For the 2021 cohort 3,100 requests were made and 1,829 records are available to MMR program staff.

Data Foreword

The data in this report comes from two sources: 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 available information for dissemination.

Section 2: Background

Importance of Maternal Health

To reduce the maternal mortality rate 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 from:

- Pregnancy-related death: 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 during or within one year of pregnancy regardless of the cause.
- Pregnancy-associated, but not related death: A death 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." The Centers for Disease Control and Prevention (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 86.9% White/Caucasian, 8.7% Black/African American, and 4.3% Hispanic (U.S. Census Bureau, 2022). Death certificates indicate maternal death is higher among Black women in the two largest urban areas in Kentucky compared to the remainder of the state (Lexington and Louisville).

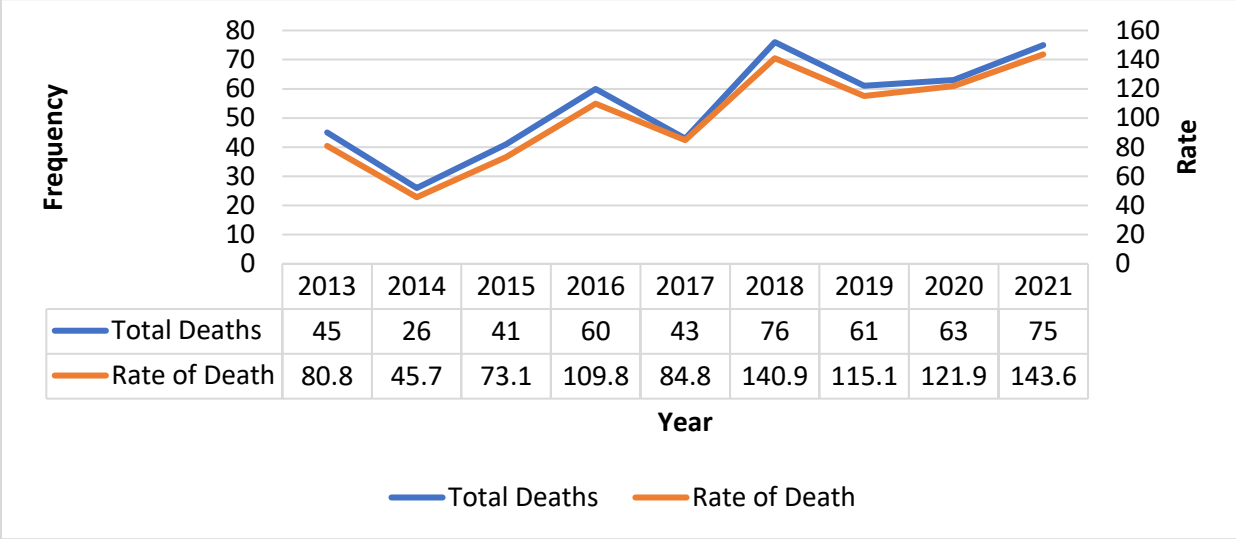
The 2022 pregnancy-related maternal mortality rate in the U.S. is 22.3 deaths per 100,000 live births. That represents a significant decrease as the 2021 rate was 32.9 per 100,000 live births (Centers for Disease Control and Prevention). Almost half of all pregnancy-related deaths are reported as caused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

Maternal Mortality from Vital Statistic Records

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

Figure 1 displays the finite count of all maternal deaths of those pregnant at the time of death or within one year of pregnancy and the rate of deaths as an expression of live births within Kentucky using Kentucky death certificate data. This figure displays data by respective years from 2013 to 2021 and is inclusive of any cause of death.

Figure 1: Total Number of Maternal* Deaths and Rate of Death from All Causes; Kentucky, 2013-2021



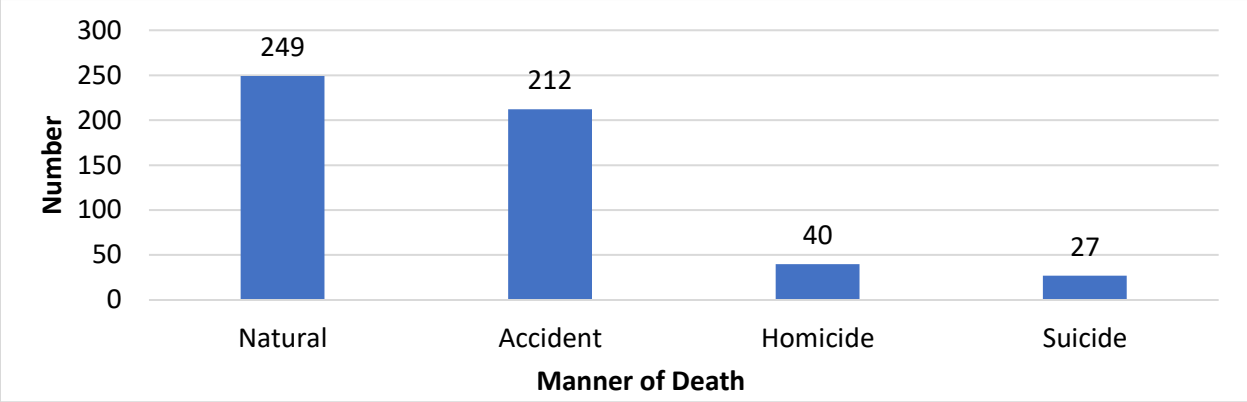
	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total Deaths	45	26	41	60	43	76	61	63	75
Rate of Death	80.8	45.7	73.1	109.8	84.8	140.9	115.1	121.9	143.6

*Maternal death is defined as any female between the ages of 15-55 that 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 2013-2021.

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.

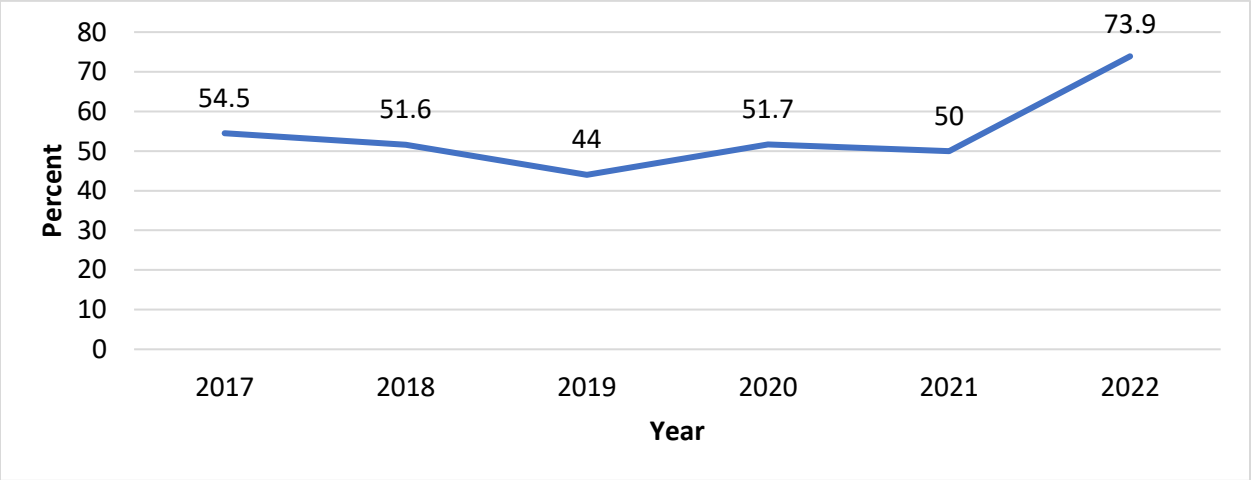
In Kentucky, suicide deaths require clear evidence of intent, such as a history of suicidal ideation documented in a note. A concern identified in Kentucky maternal mortality reviews is that some overdose deaths listed as accidental may have been suicide attempts. This represents a limitation to some 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 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 15-55 that 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.

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



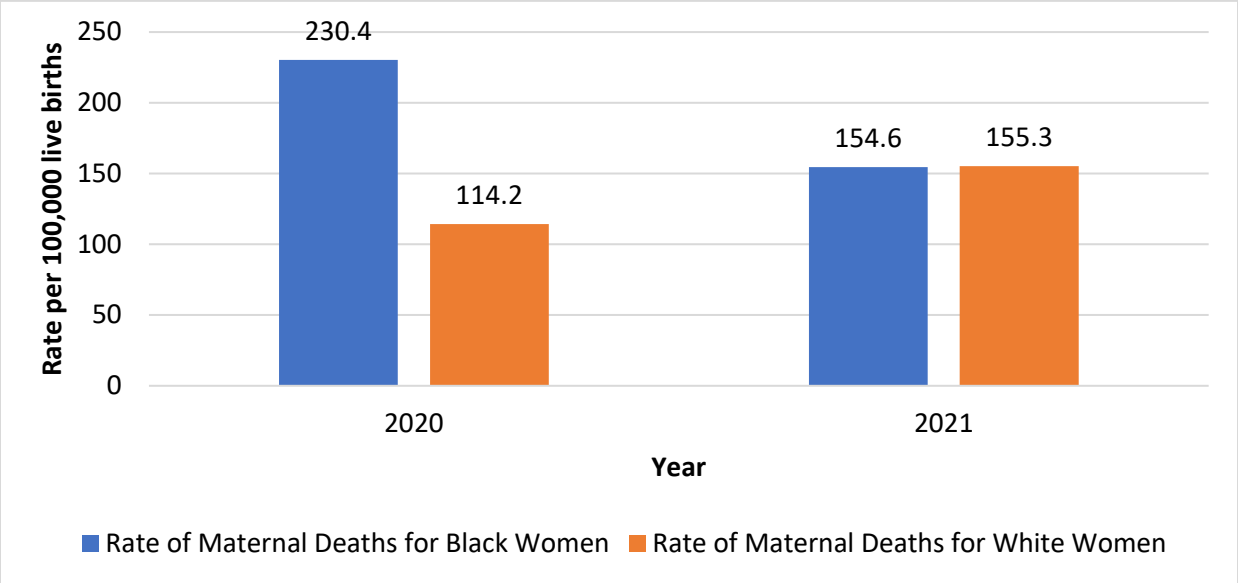
*Maternal death is defined as any female between the ages of 15-55 that was pregnant within one year prior to death or pregnant at death and died from any cause. Drug overdose is defined by the ICD-10 code X40-X49. The 2020-2022 data is preliminary, and numbers may change.
Data Source: KY Vital Statistics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

Racial Disparity in Maternal Mortality

Maternal mortality in the United States negatively impacts black women at a rate of nearly three times greater than white women. Within Kentucky, a black maternal death has occurred as high as twice the rate of a white woman from any cause within recent years of data (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 annually experiences greater impacts

despite a lower count of deaths. Additional data are necessary to determine the preventable contributing factors among these mothers.

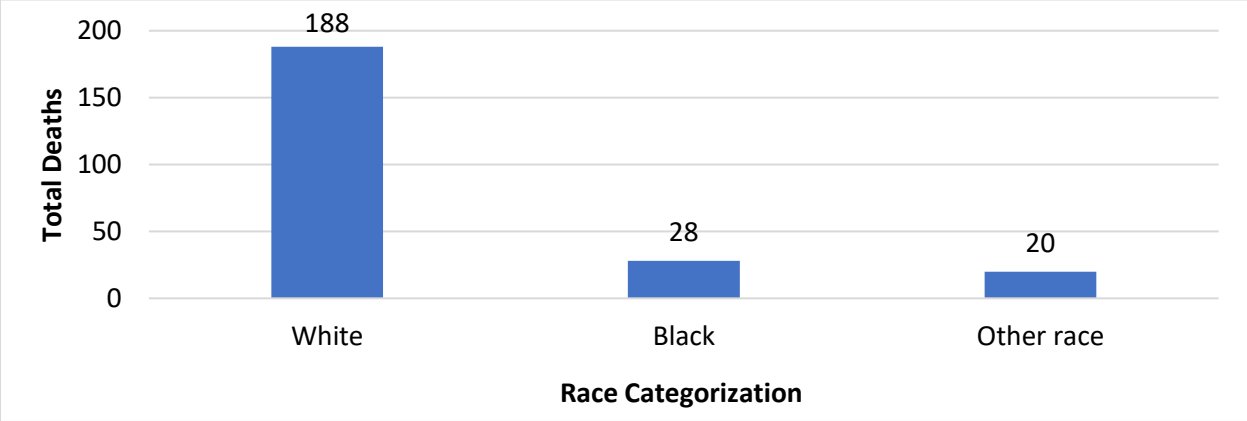
Figure 4: Difference in Maternal Deaths from Any Cause by Race, 2020-2021*



*Maternal death is defined as any female between the ages of 15-55 that was pregnant within one year prior to death or pregnant at death and died from any cause. The 2020-2021 data is preliminary, and numbers may change.

Data Source: KY Vital Statistics files, linked live birth, and death certificate files years 2017-2021.

Figure 5: Categorization of Maternal Death by Race, Kentucky MMRC 2017-2021*



*Preliminary data from the 2021 cohort is included in these findings. Eight cases are still under review and will impact final reporting.

Section 3: Maternal Mortality Review Assessment and Strategic Plans

The mission of Kentucky's maternal mortality review 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 Maternal Mortality Review Committee (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.

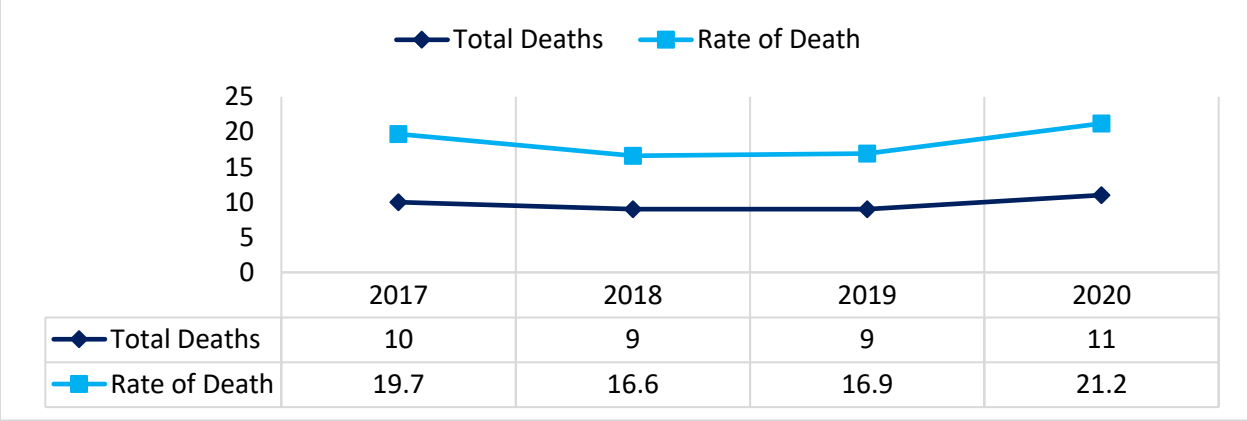
The MMRC works to answer a variety of questions including the following core questions:

- 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?

Review Findings 2017-2021 Cohorts

Using established review criteria, the Division of Maternal and Child Health determined more than one in five maternal deaths in Kentucky are pregnancy-related. Those deaths are due in part to pregnancy-associated causes, such as preeclampsia, embolism, sepsis, and hemorrhaging. 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 2020. **The 2020 pregnancy-related mortality rate for Kentucky's MMRC saw decreases in 2018 and 2019, but increased to 21.2 deaths per 100,000 live births, lower than the 2020 U.S. rate of 23.8 deaths per 100,000 live births.**

Figure 6: Total Number of MMRC Pregnancy-Related Deaths and Rate of Deaths; Kentucky MMR 2017-2020*



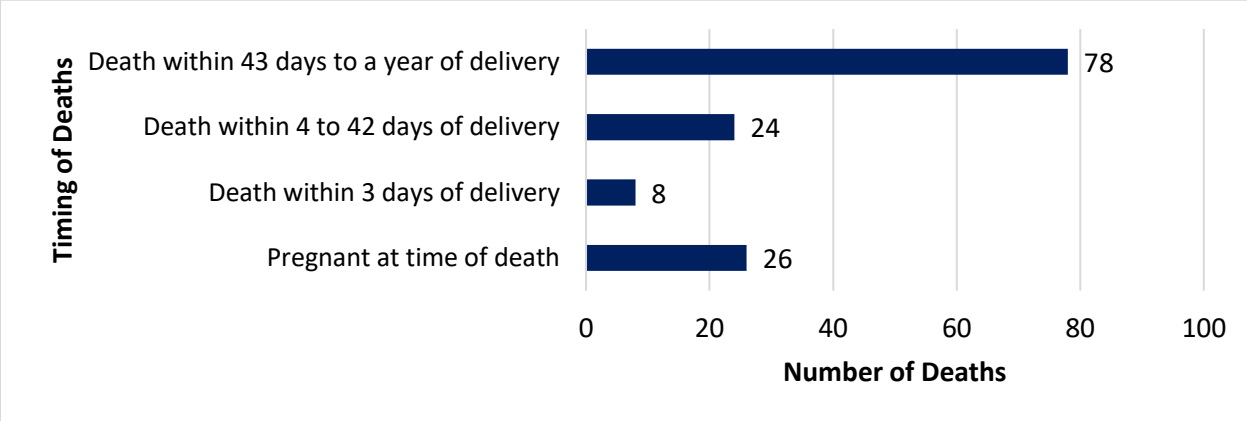
	2017	2018	2019	2020
Total Deaths	10	9	9	11
Rate of Death	19.7	16.6	16.9	21.2

*Preliminary data from the 2021 cohort is not included in these findings given the impact a single death has upon a state's maternal mortality rate. This metric will be updated upon completed review of the 2021 cohort.

The MMRC determines agreement with the coroner's cause of death. The committee agreed with the underlying cause of death for 84% of reviewed cases. Differences between committee determinations and coroner determinations are typically related to availability of information and medical records. The 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.

The committee found that in more than half of all cases reviewed, substance use contributed to the death. The distribution broken out along timing of maternal death is seen in Figure 7. The number of maternal deaths attributed to substance use strengthen 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 MMR 2017-2021*



*Preliminary data from the 2021 cohort is included in these findings. Eight cases are still under review and will impact final reporting.

It is beneficial to learn if early identification and treatment for substance use is performed for mothers throughout Kentucky. If a depression screening was completed, it is necessary to understand if women were subsequently referred to community services that could help prevent accidental death. 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.

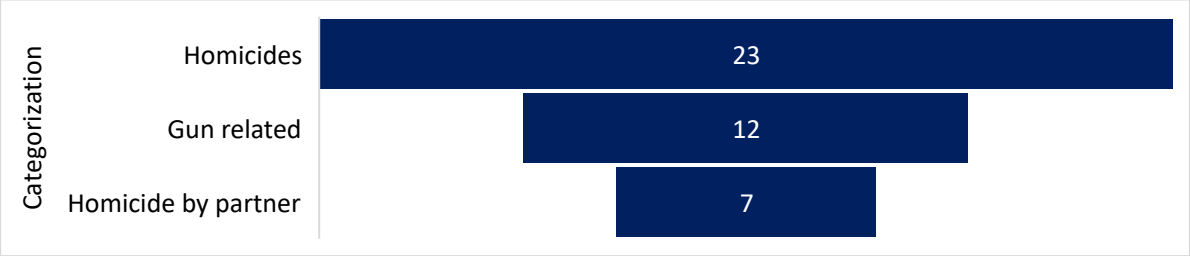
The MMRC has encouraged better understanding of maternal experiences through follow up of pregnant persons who are enrolled in treatment programs. Many women return to previous patterns of substance use without understanding that their tolerance to substances is lower after pregnancy. Another major issue is the continuity of care in providing support to these mothers post-delivery. It is meaningful to consider comorbidities such as depression and traumatic stress experienced when upon the loss custody of a newborn infant mothers with substance use factor may experience. 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 2017-2021 cohorts 176 (74%) 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 2017-2021 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 abuse. This gap includes the one in five mothers whose domestic violence result is unknown. The leading cause of death is gun violence, occurring in twelve of the twenty-three homicide cases reviewed to date. Seven 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 is required to assess the impact of domestic violence on maternal access to care.

Figure 8: Homicides and Violent Maternal Deaths; Kentucky MMR 2017-2021*

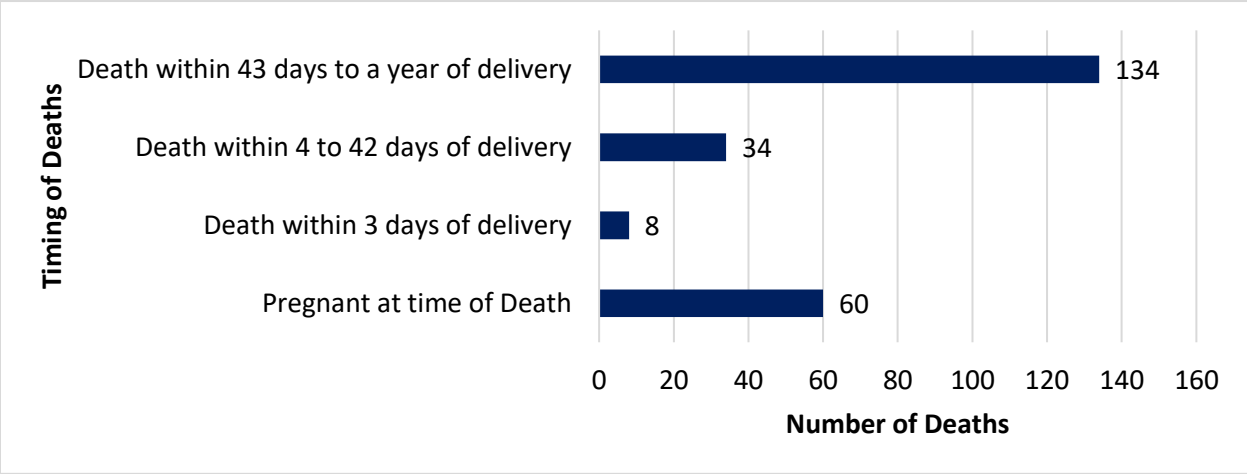


*Preliminary data from the 2021 cohort is included in these findings. Eight cases are still under review and will impact final reporting.

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 of the maternal deaths that occur within Kentucky present within 43 days of delivery to a year of 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 MMR 2017-2021*

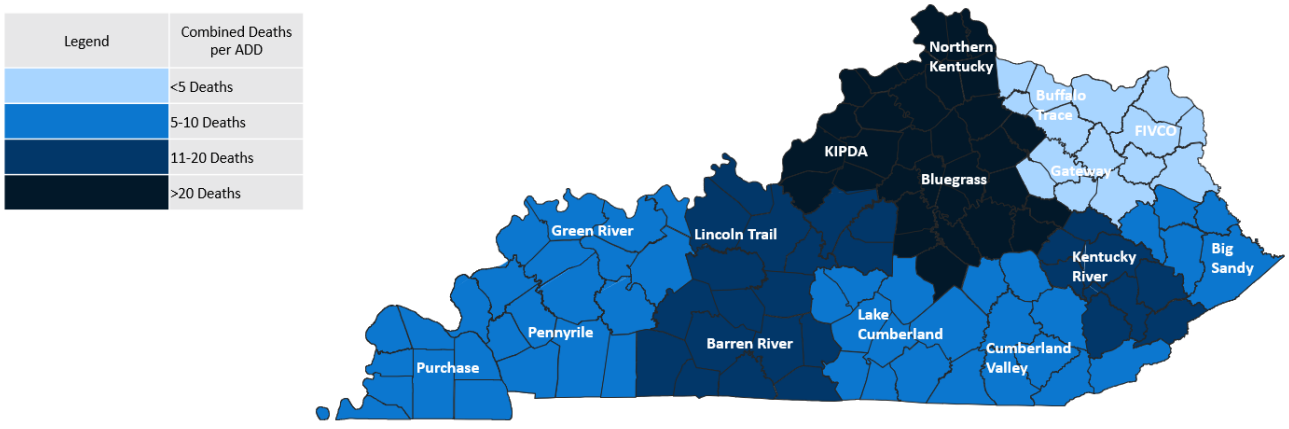


*Preliminary data from the 2021 cohort is included in these findings. Eight cases are still under review and will impact final reporting.

Geographic Distribution of Maternal Deaths

Kentucky is a predominantly rural state with major metropolitan areas consisting of Louisville and Lexington. This presents a challenge in providing consistent access to care. Prolonged trips to birthing hospitals are required to receive services in areas where their accessibility is limited. The distribution of maternal deaths is presented by the area development district where the death occurred in figure 10.

Figure 10: Kentucky Maternal Deaths by Area Development District; Kentucky MMRC 2017-2021*



*Any values with a count less than 5 are suppressed due to data sharing limitations. *Preliminary data from the 2021 cohort is included in these findings. Eight cases are still under review and will impact final reporting.

Evaluation

A great challenge posed during abstraction of medical records is obtaining records for review. The treatment provider location of the birth or end of pregnancy is often not where prenatal care or treatment for substance use or other health issues occurs. Abstractors spend a substantial amount of

time researching many data sources (e.g., Medicaid claims data, hospital data, death certificate information, and pregnancy linked birth certificate 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 68% of all cases having complete records. This means over one in four cases could use additional information in making the final determination of preventability and death.

Overall, 90% of Kentucky's maternal deaths reviewed from 2017-2021 cohorts were considered preventable. This is higher than the CDC predicted average that four out of five maternal deaths in the United States are preventable. A notable improvement in deaths with mental health as a contributing factor persists, as they trended downward to a low of 25% of cases in 2020. This trend also occurred with deaths where substance use disorder contributed, to a low of 44% in 2020. This categorization remains prevalent across cohorts. It is important for Kentucky to continue reviewing maternal deaths, providing meaningful recommendations, and actionable interventions to improve these outcomes.

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