

ANNUAL REPORT 2019

Public Health Maternal Mortality Review Program



Kentucky Department for Public Health
Division of Maternal and Child Health

November 2019



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EXECUTIVE SUMMARY

Infant mortality is the single best indicator of a state's health. Maternal mortality is a related key indicator and has long-term impact on the infant mortality rate. Both infant and maternal mortality are priority needs for Kentucky. To reduce mortality, Kentucky will continue to promote optimal health prior to, during, and after pregnancy by promoting and addressing:

- Healthy nutrition and diet,
- Exercise and reducing obesity,
- Identification and treatment of chronic health conditions,
- Substance use including tobacco and other sources of nicotine,
- Healthy timing of pregnancy and time between pregnancies,
- Health equity,
- Education on social determinants of health and their impact on:
 - Access to prenatal care and health care providers,
 - Adequate health insurance,
 - Transportation to health care visits, and
 - Social supports
- Early and ongoing prenatal care, and
- Reduction of early elective deliveries by cesarean section.

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 expanded this definition to include deaths occurring within one year of the end of the pregnancy. Kentucky is using this expanded timeline for maternal mortality reviews.

The Centers for Disease Control and Prevention report nearly 700 women die each year in the United States as a result of pregnancy or delivery complications. The American College of Obstetricians and Gynecologists reported that more women die from pregnancy-related complications in the United States than in any other developed country. The national maternal mortality rate has increased by 26% in recent years. Racial disparities are apparent. Black women are estimated to be three to four times more likely to die from a pregnancy-related complication than non-Hispanic white women (Centers for Disease Control and Prevention, 2019).

Disparities in Kentucky vary by geography, race, and access to care. Kentucky's population is 87.6% White/Caucasian, 8.4% Black/African American, and 3.7% Hispanic. The number of deaths of Black or Hispanic women in Kentucky is too small to form conclusions about racial disparity. Death certificates show maternal deaths appear to be higher among black women in the two largest urban areas in Kentucky (Lexington and Louisville). Providers and birthing hospitals are more readily available in these two cities.

The 2016 maternal mortality rate in the U.S. is 18.8 deaths per 100,000 births. Almost half of all pregnancy-related deaths are reported to be caused by hemorrhage, cardiovascular and coronary

conditions, cardiomyopathy, or infection. However, it is estimated more than 60% of pregnancy-related deaths are preventable (Building U.S. Capacity to Review and Prevent Maternal Deaths, 2018).

RECOMMENDATIONS

The committee developed two recommendations for addressing maternal mortality in Kentucky.

Improve care coordination throughout a woman’s pregnancy between all health care providers addressing morbidities, emergency care, oral health, and mental health.

Refer pregnant women to address morbidities to ensure they start and continue care throughout pregnancy and postpartum periods.

Review prescription history in Kentucky All Schedule Prescription Electronic Reporting system prior to prescribing.

Educate providers on best practice for prescribing pain medication for dental procedures and vaginal and cesarean deliveries.

Screen and refer to substance use treatment or mental health providers through care coordination.

Expand presumptive eligibility of Medicaid.

Encourage implementing safety measures throughout various clinical disciplines associated with the health care of pregnant and postpartum women.

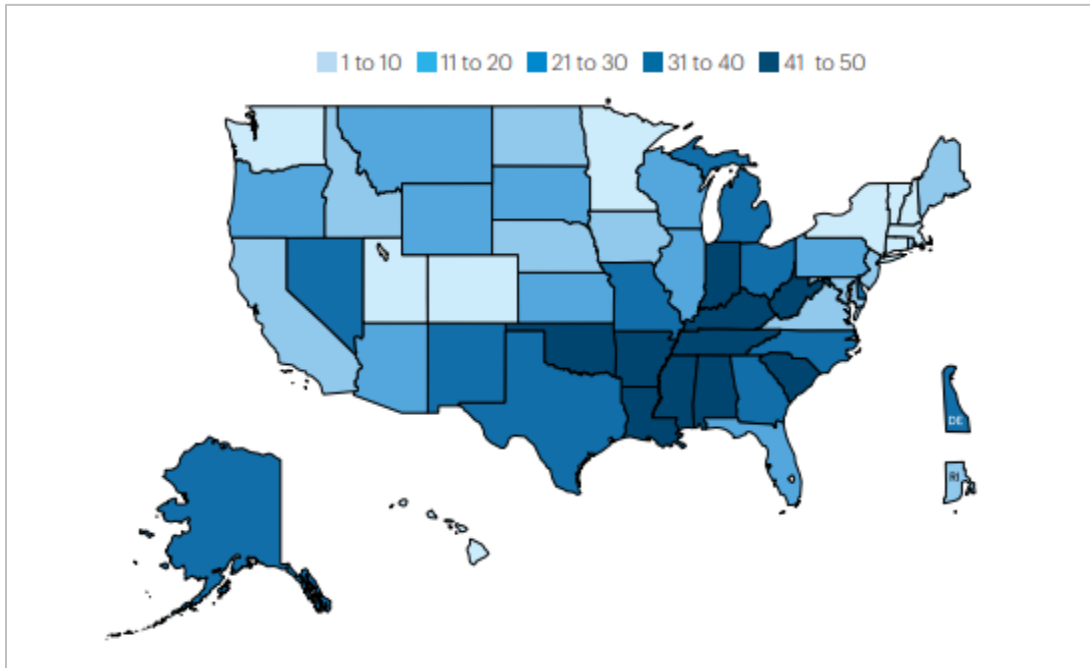
Education of maternal safety bundles (maternal venous thromboembolism, obstetric hemorrhage, safe reduction of primary cesarean births, severe hypertension in pregnancy, obstetric care of women with opioid use disorder, maternal mental health, and postpartum care basics for maternal safety) and recommendations for initiation by different providers (emergency medical services, emergency rooms, obstetricians/gynecologists, dentists, nurses, specialists).

Emphasis of the importance of education on use of seatbelts and an established safety plan (i.e., fire evacuation) to prenatal and well women care providers.

INTRODUCTION

In the past five years, some of the nation’s healthiest states have experienced increases in key measures of mortality (America’s Health Rankings, 2018). Kentucky dropped from 42nd to 45th among the states in America’s Health Rankings. The importance of Kentucky’s overall health and well-being has significant effect on the health of a woman prior to, during, and after pregnancy

Figure 1: America’s Health Rankings by State (2018)



America’s Health Rankings Map retrieved from https://assets.americashealthrankings.org/app/uploads/2018ahrannual_020419.pdf

Risk factors impacting maternal mortality include tobacco use, obesity, racial disparities, depression, opioid use, and other social determinants of health such as transportation, access to care, domestic violence, and a rural state. Morbidities such as diabetes, hypertension, or other health conditions require additional follow-up and management during the pregnancy.

The first step to reduce the maternal mortality rate and improve Kentucky’s health is to identify women whose deaths occur during pregnancy or within one year of the pregnancy from:

Pregnancy-associated death	Death while pregnant or within one year of the end of the pregnancy regardless of the cause of death.
Pregnancy-associated, but not related death	Death during pregnancy or within one year of the end of the pregnancy from a cause of death unrelated to pregnancy.

Pregnancy-related death

Death 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.

The next step is to conduct in-depth reviews to identify risk factors, system issues, and preventable causes of maternal deaths. The final step is to use data from the in-depth reviews to inform and guide public health prevention programs.

The maternal mortality review committee works to answer the following questions:

- Was the death pregnancy-associated, pregnancy-associated, but not related, or pregnancy related?
- What was the cause and manner of the death?
- Was the death preventable?
- What contributed to the death?
- What recommendations and actions are needed to address the contributing factors?
- What is the anticipated impact if the actions were implemented?

Kentucky Maternal Mortality Review

History

Maternal mortality review has existed in the United States for more than a century. Medical professionals conducted the reviews to determine if the maternal death had a preventable cause.

In Kentucky, maternal mortality review started over 40 years ago through contracts with state universities to determine if trends or patterns could be identified for prevention. A university maternal mortality chair specializing in obstetrics and maternal fetal medicine collaborated with obstetricians across Kentucky to review death certificates of women 15-55 years of age who had been pregnant within 12 months before death. There was no formal maternal mortality review legislation defining how the review should be conducted, who should participate, or recommendations for prevention from this activity. Cases from pregnancy-associated, but not related deaths such as homicide, suicide, accident, or poisoning were excluded. No formal report was published from this review process.

In 2017, the Centers for Disease Control and Prevention, American College of Obstetricians and Gynecologists, and the Association of Maternal and Child Health Programs started to promote and build capacity in the United States for review and prevention of maternal mortality. The effort focused on expanding the scope of deaths reviewed, providing a consistent framework for the review, and developing multidisciplinary review committees.

Fall 2017

Kentucky's maternal mortality review advisory team was organized. The team is comprised of Department for Public Health staff:

- Department for Public Health Senior Deputy Commissioner

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- Maternal and Child Health Division Director
- Maternal and Child Health Nurse Consultant
- Maternal and Child Health Senior Epidemiologist
- Maternal and Child Health Data and Evaluation Officer
- Maternal and Child Health Nurse Administrator

The maternal mortality review advisory team started a review of the current maternal mortality review process. The review advisory team identified the need to expand the scope to include all deaths because of increasing rates of maternal mortality related to suicide, homicide, or overdose.

The maternal mortality review advisory team participated in Centers for Disease Control and Prevention and regional Maternal and Child Health Title V conference calls. Team members attended trainings sponsored by the Centers for Disease Control and Prevention to determine how other states were addressing maternal death reviews and developing prevention efforts. The Centers for Disease Control and Prevention provided technical assistance to begin developing process and procedures for a multidisciplinary state team, records management, data review, and documentation of the reviews and outcomes. The Maternal Mortality Nurse Consultant continues to participate in Centers for Disease Control and Prevention trainings and webinars.

A structured maternal mortality review committee was organized using the expertise of health care providers, community agencies, and maternal mortality experts. The composition of the Kentucky maternal mortality review committee aligns with guidance from the Centers for Disease Control and Prevention, American College of Obstetricians and Gynecologists, and Association of Maternal and Child Health Programs. The committee's goal is to identify risk factors contributing to maternal deaths and recommend prevention initiatives, policies, or systems change.

June 2018

Maternal and Child Health staff presented maternal morbidity and mortality information to health care professionals at the Kentucky Perinatal Association's annual meeting.

August 2018

Federal partners were informed of maternal mortality review plans during the annual face-to-face Maternal and Child Health Title V update. Dr. John Barton was appointed as chair of the maternal mortality review Committee. Dr. Barton is a maternal-fetal medicine specialist and 30-year member of the American College of Obstetricians and Gynecologists. Invitations to participate on the maternal mortality review Committee were sent to health care representatives from multiple medical disciplines. The committee currently consists of 30 volunteers including:

OB/GYN generalists	DPH Senior Deputy Commissioner
Maternal fetal medicine specialists	Maternal and Child Health Director
Certified Nurse Midwife	Maternal and Child Health Nurse Administrator
OB anesthesiology	Maternal Mortality Nurse Consultant
OB cardiology	Maternal and Child Health Senior Epidemiologist
American Academy of Pediatrics	Department for Medicaid Services

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American College of Obstetricians and Gynecologists	Department for Behavioral Health, Developmental and Intellectual Disabilities
Association of Women’s Health obstetric and neonatal nurses	Kentucky All Schedule Prescription Electronic Reporting
Kentucky Hospital Association	Department for Community Based Services
Chief Medical Examiner	Kentucky State Police
Office of Attorney General - Domestic Violence and Human Trafficking Program	Obstetricians and gynecologists from private and university hospitals, and representing urban and rural hospitals

Maternal Mortality Review Assessment and Strategic Plans

The mission of 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,
- Promote healthy pregnancies,
- Prevent pregnancy complications related to or associated with maternal deaths, and
- Protect the mother and infant.

The maternal mortality review advisory team met to determine program process and planning with the analysis of available data and technical assistance from the Centers for Disease Control and Prevention.

October 2018

The first maternal mortality review committee meeting was held. The committee determined the new case review process would begin with calendar year 2017 cases. Additional members were identified for recruitment to the committee. The committee reviewed process guidelines, forms, and materials. Two 2016 cases were abstracted and used for training purposes for this meeting. The information from these cases is not included in any data reported.

July 2019

The 2018 maternal mortality review Report was released to the maternal mortality review committee to distribute to partners and within agencies they represented.

September 2019

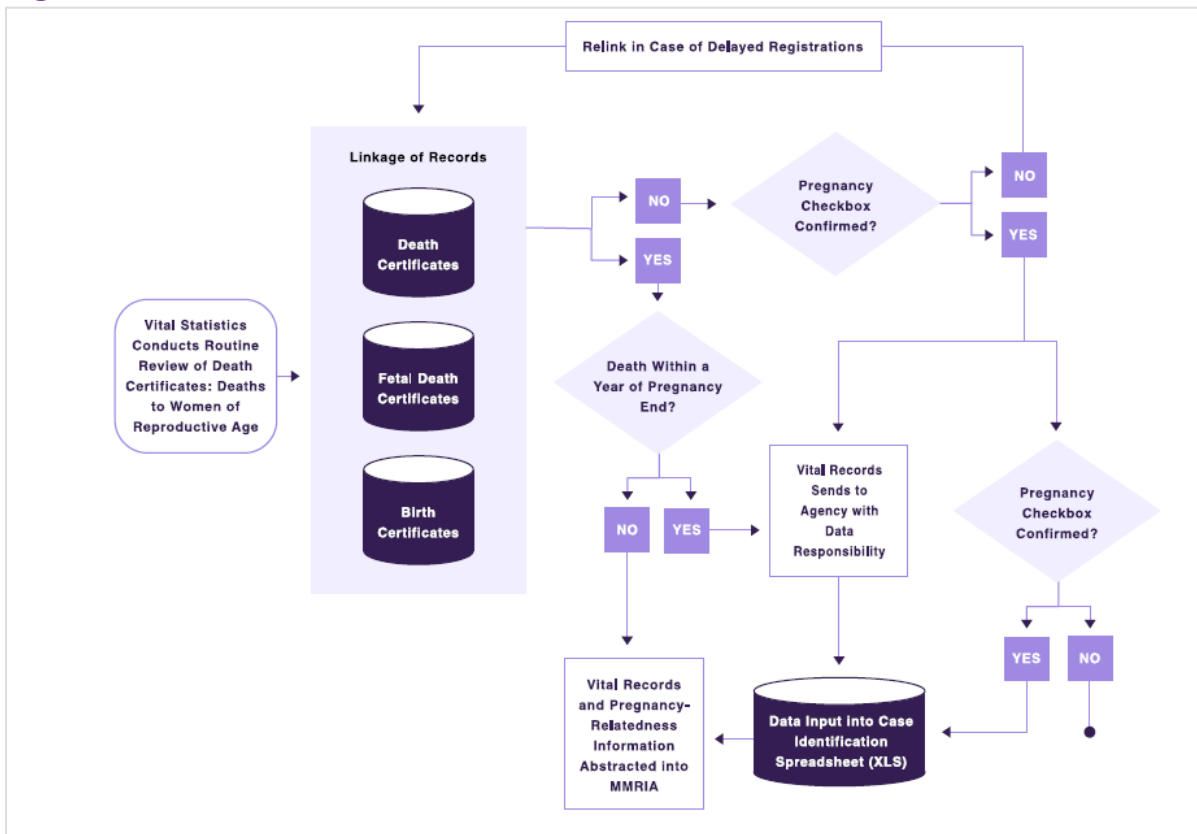
To date, the maternal mortality review committee has held four meetings and reviewed 26 cases since October 2018.

METHODOLOGY

Maternal and Child Health epidemiology staff reviewed vital statistics data from 2013 to 2018 for:

- | | | |
|---|--|---|
| 1 | 2 | 3 |
| <ul style="list-style-type: none"> Deaths of women 10 to 55 years of age | <ul style="list-style-type: none"> Deaths linked to live birth or stillborn death certificates occurring within one year prior to death | <ul style="list-style-type: none"> Deaths identified by the completion of the pregnancy boxes on the death certificate |

Figure 2: Case Identification and Data Flow



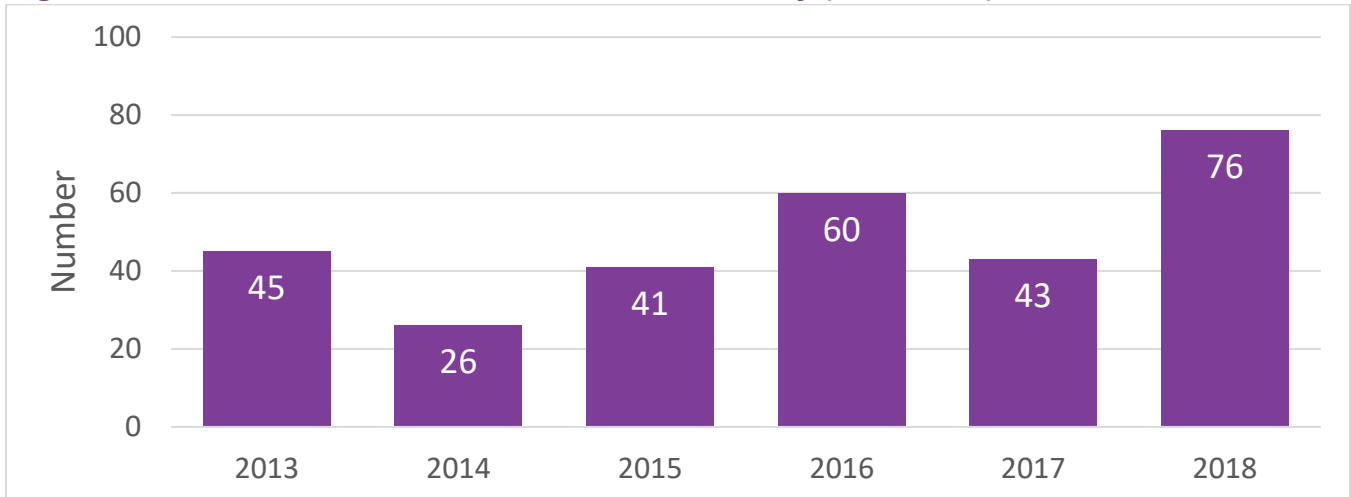
Retrieved from reviewtoaction.org

<https://reviewtoaction.org/sites/default/files/national-portal-material/Case%20Identification%20and%20data%20flows.pdf>

MATERNAL MORTALITY REVIEW DATA

The maternal mortality review committee began in-depth review with 2017 deaths. As illustrated in Figure 3, mortality deaths have risen annually and are currently the highest rate recorded.

Figure 3: Total Number of Maternal Deaths, Kentucky (2013-2018)



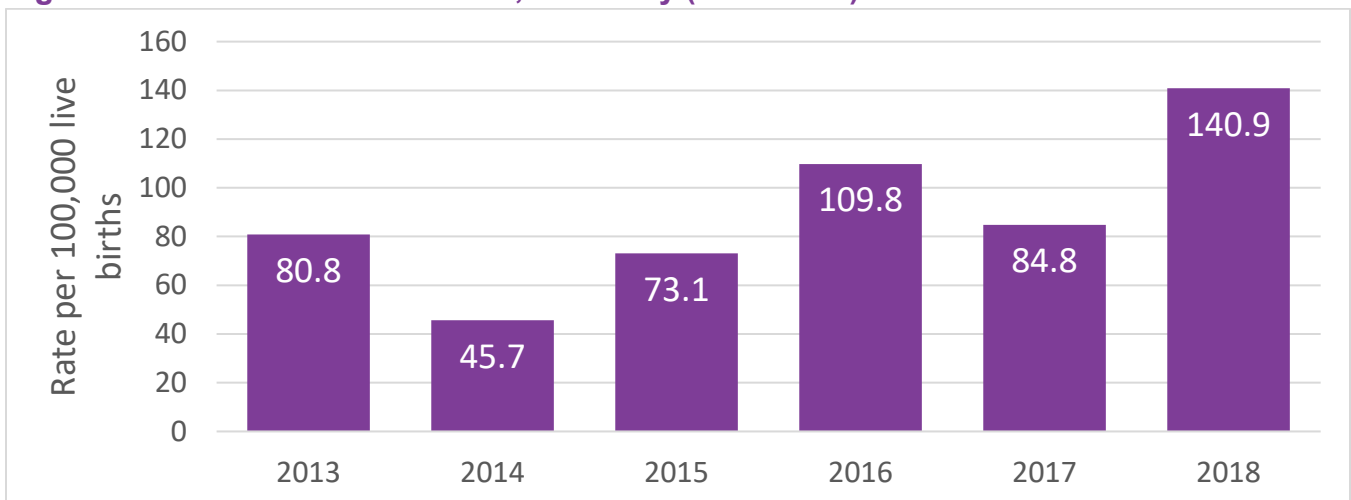
Note: Maternal death is defined as any female between the ages of 15-55 that was pregnant within one year prior to death or pregnant at death and died from any cause. 2016-2018 data is preliminary and numbers may change

Data Source: Kentucky Vital Statistics files, linked live birth and death certificate files years 2013-2018

Because the number of maternal deaths in 2014 were lower than previous years, reevaluation of death certificate data for all years was completed with no explanation for this difference found.

Nationally, maternal death rates are represented as deaths per 100,000 live births as illustrated in Figure 4.

Figure 4: Rate of Maternal Deaths, Kentucky (2013-2018)



Note: 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. 2016-2018 data is preliminary and numbers may change

Data Source: Kentucky Vital Statistics files, linked live birth and death certificate files years 2013-2018

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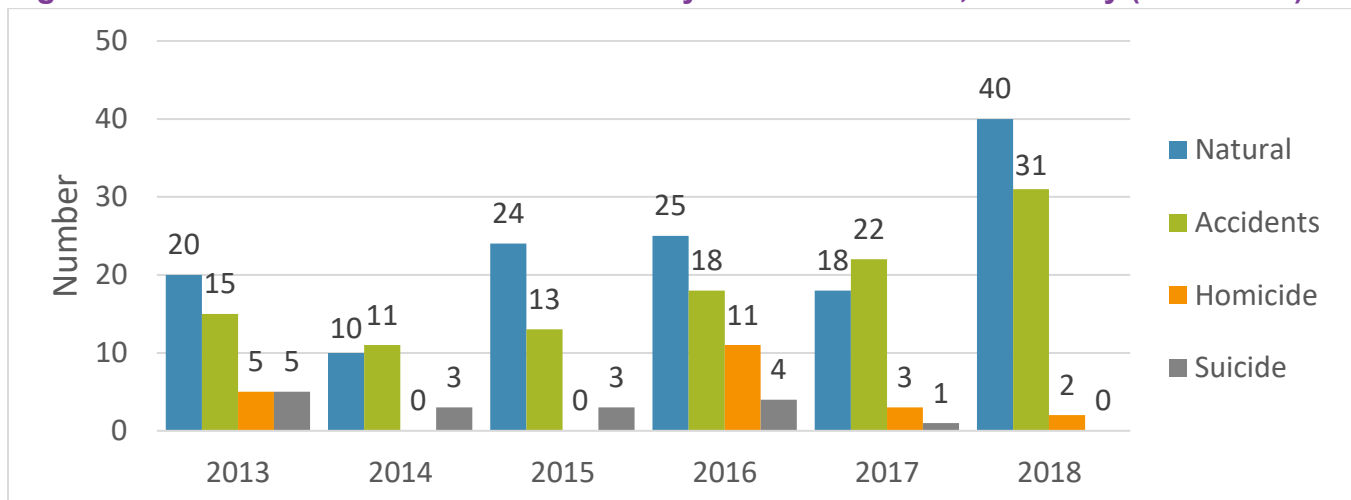
Using only cause, manner of death, and minimal International Classification of Diseases coding of death certificates, Maternal and Child Health determined approximately half of the deaths in Kentucky were primarily related to a pregnancy-related cause. The remainder of those deaths was due in part to pregnancy-associated causes such as motor vehicle collisions or other accidental deaths. The number of pregnancy-related cases appears to remain the same, while the number of pregnancy-associated cases has steadily risen with half of the accidental deaths having substance use as a mitigating factor.

As shown in Figure 5, maternal deaths continue to grow. The number of deaths for each year is reflective of all causes of maternal death.

On the death certificate, the manner of death is defined as natural, accidental, homicide, suicide or undetermined. These are defined as follows:

- Natural death: A death occurring because of disease or a natural process.
- Accidental death: A death resulting in an inadvertent event.
- Homicide death: A death occurring due to the action of another party directly causing the death of a person.
- Suicide death: A death from self-inflicted injury with evidence of intent to die.
- Undetermined death: A death in which very little information is available, and for which preponderance of information to classify otherwise is not available.

Figure 5: Total Number of Maternal Deaths by Manner of Death, Kentucky (2013-2018)



Note: 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. 2016-2018 data is preliminary and numbers may change

Data Source: Kentucky Vital Statistics files, linked live birth and death certificate files years 2013-2018.

Figure 5 shows an increasing number of deaths related to accidents, homicide, and suicide. A similar trend is reported nationally. Natural deaths have increased again emphasizing a need for deeper review to understand risk factors and causation. From the 2017 case reviews, multiple cases with a natural manner of death were pregnancy-associated and had substance use disorder as a contributing factor. While the data for 2017 is not finalized from the maternal mortality review committee, substance use disorder is linked to medical cases of women with heart disease, mental health disorders, and domestic violence. This suggests a need for early intervention and care coordination beyond

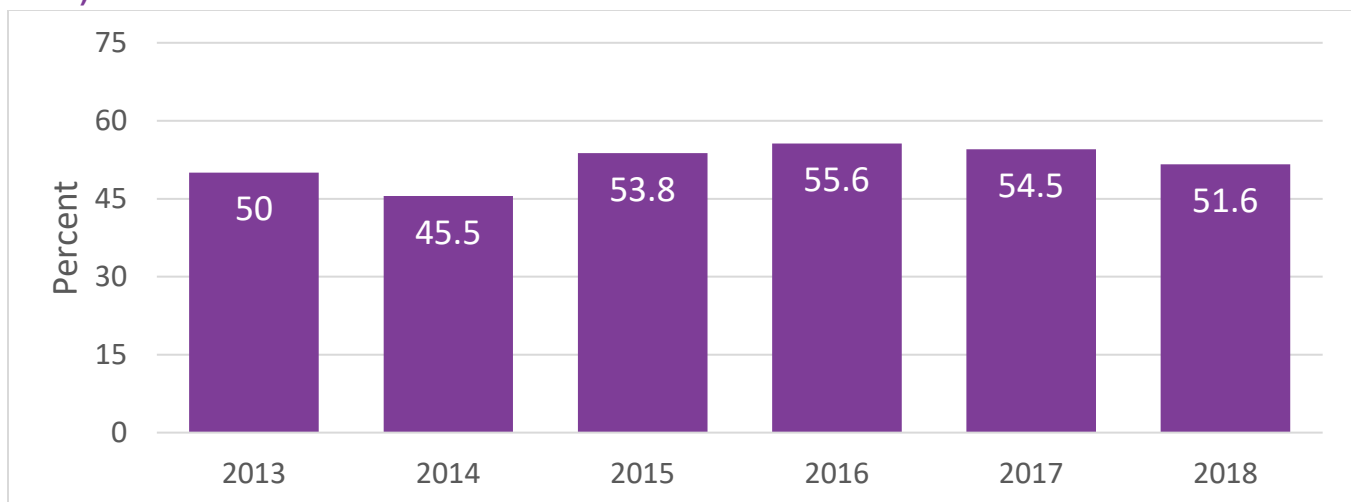
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recommendation and passive referrals for follow-up. Screening for depression at every prenatal visit could help to identify at-risk women.

In Kentucky, suicide deaths require clear evidence of intent such as history of suicidal ideation documented in a note. The concern from the 2017 reviews is some overdose deaths listed as accidental could have been suicide attempts as risk factors such as depression, other mental health disorders, or domestic violence have been noted during the abstraction of the case.

The maternal mortality review committee determines if they are in agreement with the coroner's cause of death. The committee did agree with the cause of death in 78% of reviewed cases. Differences between committee determinations and coroner determinations were related to the committee having more 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 causes of death based on all available details.

Figure 6: Percent of Accidental Maternal Deaths due to Drug Overdose, Kentucky (2013-2018)



Note: 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 ICD10 code X40-X49. 2016-2018 data is preliminary and numbers may change

Data Source: Kentucky Vital Statistics files, linked live birth and death certificate files years 2013-2018

Many death certificates have causes of death consistent with substance use or infected injection sites based on the International Classification of Diseases 10th revision (ICD-10). Preliminary conclusions found more than half of the accidental maternal deaths were directly related to drug overdose (Figure 6). The conclusions strengthen the need to address substance use before or during early pregnancy, and confirms the need for ongoing care management after delivery.

It is beneficial to learn if early identification and treatment for substance use began, if depression screening was completed, and whether women were referred to community services that may have prevented accidental death. Psychosocial and environmental risk factors associated with maternal health conditions include:

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- Chronic environmental stressors such as racism and poverty,
- Lack of access to care including adequate insurance, transportation, and health care providers,
- Unplanned pregnancy,
- Social isolation and lack of social supports,
- Homelessness,
- Domestic violence,
- Unsafe neighborhoods,
- Chronic disease management,
- Substance use, and
- Obesity, lack of exercise, and poor nutrition.

The maternal mortality review committee was concerned when abstraction noted pregnant women with decreased substance use or enrolled in treatment programs. Many women returned to previous patterns of substance use after pregnancy without understanding that their personal tolerance of a substance was much less than before their pregnancy. This was often combined with depression and associated with emotional stress from losing custody of their newborn to child protective services. Multiple cases were also associated with prescription narcotics or opioids for postpartum or oral health procedures. Pain could have been successfully managed with non-steroidal anti-inflammatory medications.

EVALUATION

The maternal mortality review committee committed to reviewing all 2017 deaths before 2020. The committee decided to meet more frequently to ensure timely reviews within one year of the maternal death beginning with deaths from 2017. Meetings were scheduled every other month for full days.

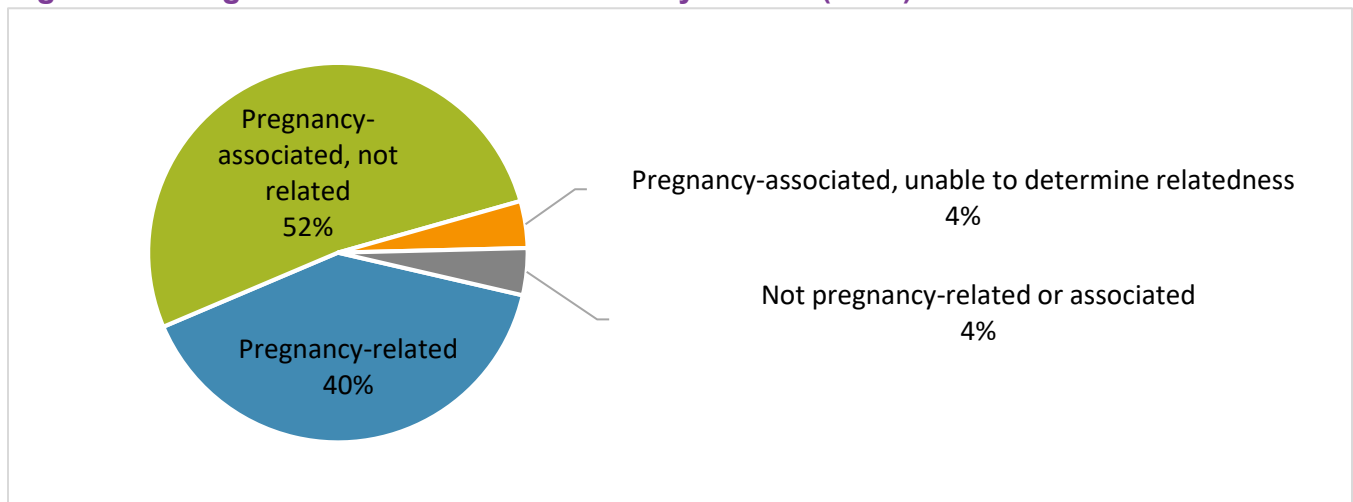
Since October 2018, the committee successfully completed review of 26 of the 42 maternal deaths. The maternal mortality review advisory team decided four cases will not be reviewed. One case did not have sufficient records to review, and three cases did not meet the case definitions for review.

The committee reviews each death as outlined in the Centers for Disease Control and Prevention decision algorithm. The algorithm helps to determine the following factors:

- Extent death was related to pregnancy,
- Amount of relevant information,
- Determination of cause of death,
- Agreement with underlying cause of death on death certificate,
- Extent related to suicide or homicide, if applicable,
- Contributing factors,
- Other contributing factors (e.g., mental health, substance use, mental health, and obesity),
- Determination of extent death was preventable, and
- Committee recommendation.

During the review process, categorization of the case occurs with the consensus of the maternal mortality review Committee. This information is collected using the Centers for Disease Control and Prevention decision form. The maternal mortality review committee agreed that over half (52%) were associated or aggravated by the pregnancy. Often this was either related to ongoing case management of morbidities during or after pregnancy or substance use treatment.

Figure 7: Categorization of Maternal Mortality Deaths (2017)



Data Source: Kentucky maternal mortality review committee decision form 2017

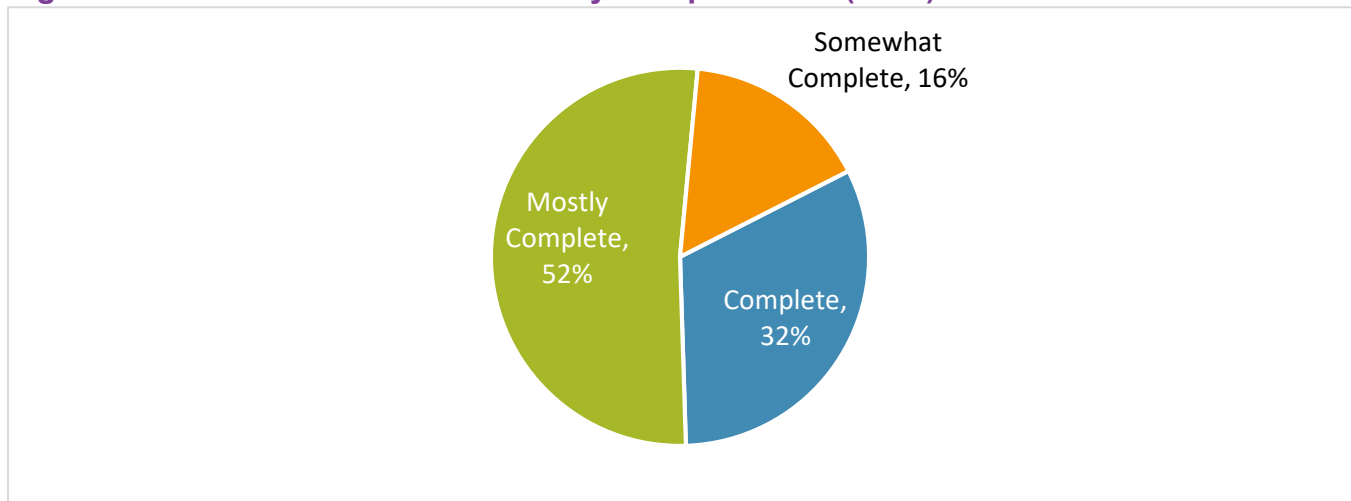
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One of the greatest challenges for abstraction is obtaining records before the review. The treatment provider location of the birth or end of pregnancy is often not where prenatal care or treatment for substance use or other health issues occurs. Abstractors spend a large amount of time researching many data sources (e.g., Medicaid claims data, hospital data, death certificate information). Abstractors may need to call health care providers within the geographic location of residence. Reviews may be limited if health care was provided in a neighboring state.

Having a complete record when abstraction of a death occurs is critical to understanding all details of the death. When categorizing a death, the maternal mortality review committee determines if the records used were:

- Complete: All records necessary for adequate review of the death were available
- Mostly Complete: Minor gaps (i.e. information that would have been beneficial but was not essential to the review of the death)
- Somewhat Complete: Major gaps (i.e. information that would have been crucial to the review of the death)
- Not Complete: Minimal records available for review (i.e. death certificate and no additional records)

Figure 8: Percent of Patient Records by Completeness (2017)

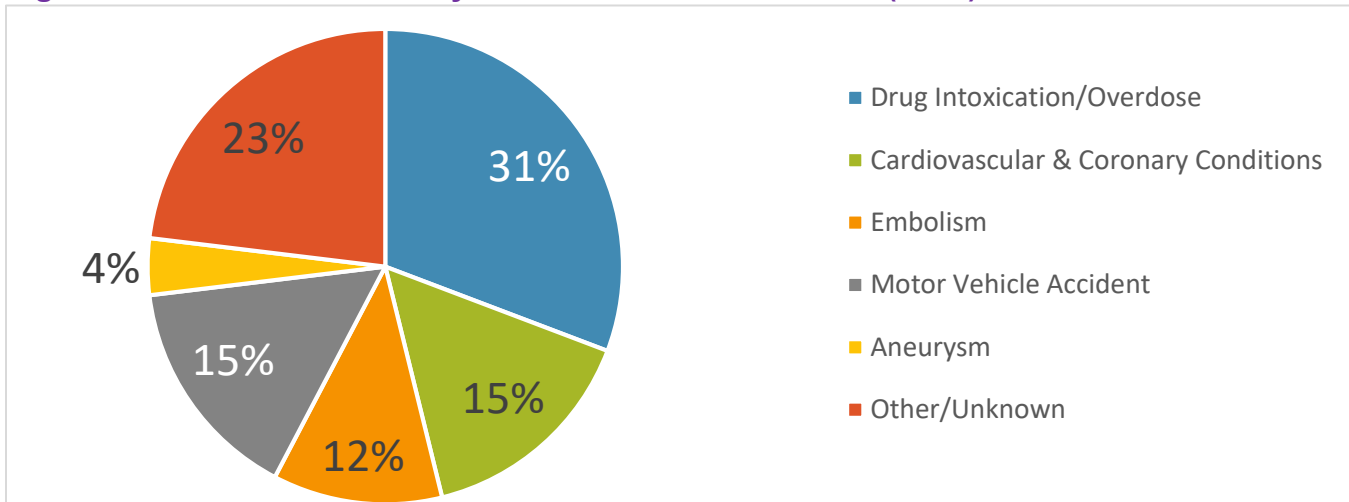


Data Source: Kentucky maternal mortality review committee decision form 2017

As shown in Figure 8, the maternal mortality review committee determined that 52% of records used for the 2017 death reviews were mostly complete. Many maternal deaths did not have autopsy records available. Autopsies are not required for many of the deaths in Kentucky. One of the committee's recommendations was for all women meeting the Maternal Mortality case definition have an autopsy and toxicology screen completed.

For this recommendation to be achieved, intense education and outreach to coroners would need to occur. Likewise, additional legislative guidelines, funding and workforce capacity would need to be addressed.

Figure 9: Percent of Deaths by Immediate Cause of Death (2017)



Data Source: Kentucky maternal mortality review committee decision form 2017

The committee expects the percentage associated with substance use will increase because some of the cases that have been reviewed did not have substance use listed on the death certificate. Some of the death certificates may report cardiac conditions or other morbidities as the immediate cause of death.

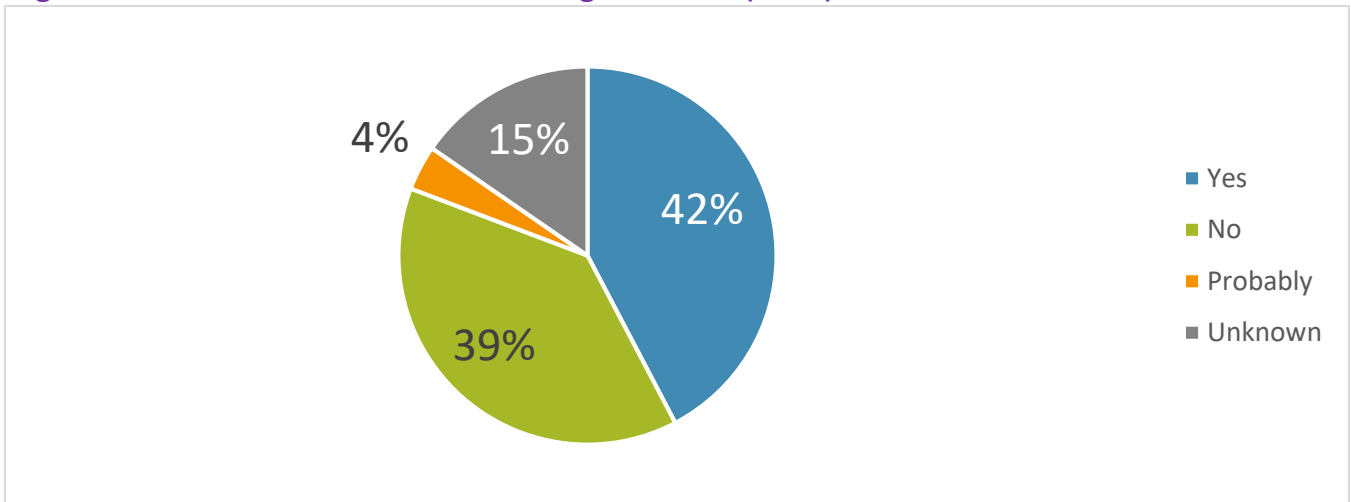
Other determinations of cause of death were related to aggravation of known medical conditions such as diabetes, cardiac, hypertension, or risk of thromboembolism. The committee believed care coordination or continuity of care throughout the pregnancy might have prevented a death. These deaths were categorized as other/unknown. The pregnancy was known, but the committee was unable to categorize the death because the direct cause or manner remained unknown.

Other/unknown was often associated with deaths where the woman was healthy, had obstetric or prenatal care, and no cause could be determined.

Substance use contributed to 42% of maternal deaths. Three deaths did not have substance use listed on the death certificate, but the terminal diagnosis was directly associated to the patient's intravenous drug use.

Chronic health conditions or morbidities worsened as a result of substance use. This was noticed in cardiology cases. For example, a known cardiac birth defect of a mother developed into a vegetative heart condition, or a woman chose to leave care against medical advice. In other cases, seeking medical care or follow-up for known health conditions was delayed because of lack of ongoing substance use treatment.

Figure 10: Substance Use Contributing to Death (2017)

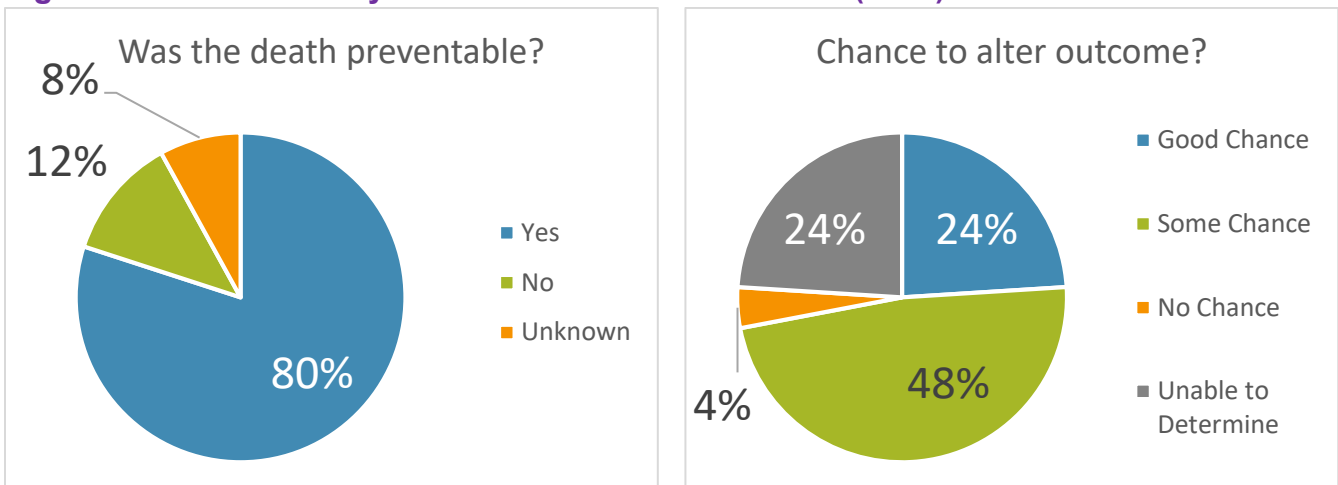


Data Source: Kentucky maternal mortality review committee decision form 2017

The maternal mortality review committee determines if reviewed deaths were preventable. The committee also considers what actions could have been taken to prevent a death.

The maternal death was preventable in 80% of the reviews. Records indicated nearly three out of four deaths had a chance of a different outcome if preventive actions, behavior changes, or substance use treatment and follow-up had occurred.

Figure 11: Preventability and Chance to Alter Outcome (2017)



Data Source: Kentucky maternal mortality review committee decision form 2017

CONTINUED PUBLIC HEALTH PREVENTION EFFORTS

The Division of Maternal and Child Health led the implementation of the maternal mortality review committee and continues additional prevention efforts to reduce maternal mortality by the following:

- Maternal and Child Health Title V Block Grant supports evidence-informed perinatal education and strategies including assessment of health, chronic health conditions, substance use, tobacco use, domestic violence screening, and mental health screening. Referrals are made to various community programs and providers for evaluation and treatment.
- Maternal and Child Health continues to collaborate with local health departments, birthing facilities, and Kentucky Chapter of March of Dimes to reduce early elective deliveries using evidence-informed strategies from Healthy Babies are Worth the Wait.
- Maternal and Child Health provides education to promote positive health outcomes at the Kentucky Perinatal Association Annual Conference.
- Maternal and Child Health encourages local health departments to assist mothers with applying for presumptive eligibility for Medicaid.
- Maternal and Child Health participates in a Social Determinants of Health Collaborative Improvement and Innovation Network workgroup with the Office of Health Equity, March of Dimes, Louisville Healthy Start Program and Maternal and Child Health Division. The workgroup provides ongoing training about social bias with long-term plans to address health equity in the local health departments.

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