Kansas Severe Maternal Morbidity and Maternal Mortality, 2016-2022

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KDHE Bureau of Family Health will release the 2016-2022 Kansas *Severe Maternal Morbidity, Pregnancy-Associated Deaths, and Pregnancy-Related Deaths* reports in Winter 2024. To view the full reports, please visit https://kmmrc.org/.

Background

In the United States, there are two national sources for trends and information on maternal mortality using vital statistics data (Table 1).[1] The first, the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS) uses two pieces of information on the death certificate – the pregnancy checkbox and the certified recording of the cause of death to assign International Classification of Diseases, 10th Revision (ICD-10) codes – are used together to identify maternal deaths and produce a maternal mortality rate (following the World Health Organization [WHO] definition, i.e., maternal deaths while pregnant or within 42 days postpartum per 100,000 live births).[1,2] The second, CDC's Pregnancy Mortality Surveillance System (PMSS) uses death certificates that show a relationship to pregnancy, identified by a linked birth or fetal death certificate registered in the year preceding death or using causes of death and pregnancy status information on the death records.[1] Medical epidemiologists review this information to identify pregnancy-related deaths and produce a pregnancy-related mortality ratio (i.e., pregnancy-related deaths while pregnant or within a year postpartum per 100,000 live births).[1]

Relying on vital statistics data alone to measure maternal mortality makes it challenging to determine whether changes observed are the result of improved identification or changes in the risk.[1] While surveillance using vital statistics data can tell us approximate trends and disparities, Maternal Mortality Review Committees (MMRCs) have access to multiple sources of information that is more comprehensive and provides more insight into the circumstances surrounding each pregnancy-associated death (Table 1).[2] For this reason, MMRCs are better positioned to comprehensively assess each death, develop actionable recommendations, and identify opportunities to prevent for future deaths.

Kansas Maternal Mortality Review Committee

The Kansas maternal mortality work began in 2018 with the passage of Kansas House Bill 2573. The bill amended existing public health law (K.S.A. 65-177) to strengthen efforts related to monitoring maternal morbidity and mortality, thus, establishing the first Kansas Maternal Mortality Review Committee (KMMRC). In FY 2019, CDC announced 24 awards, supporting 25 states for the Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) Program.[3] ERASE MM funding supports agencies and organizations that coordinate and manage Maternal Mortality Review Committees to identify, review and characterize pregnancy-associated deaths, and identify prevention opportunities. In FY 2024, Kansas entered into a new cooperative agreement with the CDC for an additional five years of ERASE MM funding. As of August 2024, the CDC has made 52 awards, supporting 46 states and six U.S. territories and freely associated states for the ERASE MM program.

Table 1. Maternal Mortality Review Committees (MMRCs) are multidisciplinary groups that have access to comprehensive information from multiple sources, enabling them to gain deeper insights into the circumstances surrounding each pregnancy-associated death.
Source: National Sources of Maternal Mortality Information[4]

	CDC – National Health Statistics (NCHS)	CDC – Pregnancy Mortality Surveillance System (PMSS)	Maternal Mortality Review Committees
Data Source	Death certificates	Death certificates linked to fetal death and birth certificates	Death certificates linked to fetal death and birth certificates, **medical records, social service records, autopsy, informant interviews…**
Time Frame	During pregnancy – 42 days	During pregnancy – 365 days	During pregnancy – 365 days
Source of Classification	Pregnancy checkbox ICD-10 codes	Medical epidemiologists (PMSS-MM)	**Multidisciplinary committees**
Terms	Maternal death	Pregnancy associated, (Associated and) Pregnancy related, (Associated but) Not pregnancy related	Pregnancy associated, (Associated and) Pregnancy related, (Associated but) Not pregnancy related
Measure	Maternal Mortality Rate # of Maternal Deaths per 100,000 live births	Pregnancy Related Mortality Ratio # of Pregnancy Related Deaths per 100,000 live births	Pregnancy Related Mortality Ratio # of Pregnancy Related Deaths per 100,000 live births
Purpose	Show national trends and provide a basis for international comparison	Analyze clinical factors associated with deaths, publish information that may lead to prevention strategies	**Understand medical and non-medical contributors to deaths, prioritize interventions that effectively reduce maternal deaths**

Executive Summary

The issue of maternal morbidity and mortality is complex. While severe maternal morbidity (SMM) occurs nearly 100 times more frequently than maternal death, SMM represents only the "tip of the iceberg," when it comes to adverse maternal outcomes.[5] Death certificates alone do not provide all the necessary information to assess the proximate and contributory causes of maternal mortality, whether the deaths were directly related to the pregnancy and whether they were preventable. Nationally, the Centers for Disease Control and Prevention (CDC), Pregnancy Mortality Surveillance System (PMSS) indicates that the number of reported pregnancy-related deaths in the United States increased from 7.2 deaths per 100,000 live births in 1987 to 24.9 deaths per 100,000 live births in 2020 (the latest available year of data).[6] This rise underscores the urgent need for continued efforts to optimize maternal health and reduce disparities in maternal outcomes. KDHE identifies all pregnancy-associated deaths – defined as deaths occurring during pregnancy or within a year of pregnancy – in order to collect data on maternal mortality. KDHE has worked with the Kansas Maternal Mortality Review Committee (KMMRC) to review cases of pregnancy-associated deaths that occurred in Kansas from 2016 to 2022. The KMMRC is a multi-disciplinary committee that convenes at the state level to conduct comprehensive reviews of deaths among women during or within a year of pregnancy. The KMMRC has access to both clinical and non-clinical information (e.g., vital records, medical records, social service records) to better understand the causes and circumstances surrounding each death. The KMMRC also develops statewide recommendations for action to prevent future maternal deaths, while determining whether the deaths were pregnancy-related (due to a pregnancy complication) and whether they were preventable.[7]

Key Findings

Severe Maternal Morbidity: Using the Kansas hospital discharge data and the International Classification of Diseases (ICD), 10th Revision, Clinical Modification/Procedure Coding System (ICD-10-CM/PCS) based on the CDC-developed definition of SMM,[8] the following findings were observed for deliveries from 2018 to 2022. Of the 157,881 delivery hospitalizations of Kansas residents, 1,067 deliveries involved one or more severe maternal morbidities, representing a rate of 67.6 per 10,000 delivery hospitalizations. This implies that approximately ***1 in 148 women who delivered a baby experienced SMM***. The SMM rate increased significantly from 56.1 per 10,000 delivery hospitalizations in 2016 to 71.0 in 2020, with an annual percent change (APC) of 6.5%. However, it then decreased non-significantly to 69.4 in 2022, with an APC of -0.7%.

- The top five most common indicators of SMM were:
  - Disseminated intravascular coagulation (14.8 per 10,000 delivery hospitalizations)
  - Acute renal failure (13.1)
  - Adult respiratory distress syndrome (12.2)
  - Sepsis (11.1)
  - Hysterectomy (9.1)
- Some conditions often required procedural intervention. In 2018-2022, 17.5% of deliveries with shock involved a hysterectomy.
- SMM rates were ***highest among women aged 40+ years*** (156.5 per 10,000 delivery hospitalizations) and lowest among women aged 25-29 years (52.9).
- The SMM rate for non-Hispanic Black women was 105.6 per 100,000 delivery hospitalizations - 75.0% higher than the rate for non-Hispanic White women (60.4), 35.5% higher than the rate for Hispanics (78.0), and 32.8% higher than the rate for non-Hispanic Asian/Pacific Islanders (79.8). The SMM rate for ***non-Hispanic Black women was significantly higher than that of non-Hispanic Whites and Hispanics***. Note: The number of non-Hispanic Native Americans was too small to calculate a SMM rate.

- Women enrolled in ***Medicaid*** or residing in ***low-income ZIP Codes*** were more likely to experience SMM compared to those with other deliveries.

Maternal Mortality: Analysis of the KMMRC data showed that, of the 195 identified deaths that occurred in Kansas (regardless of residency) in 2016-2022, 153 were determined to be pregnancy-associated.

- A pregnancy-associated death refers to the death of a woman while pregnant or anytime within one year of pregnancy regardless of the cause.[9] Pregnancy-associated deaths make up the universe of maternal mortality; within that universe are pregnancy-related deaths and pregnancy-associated, but not related deaths.
    - ***Pregnancy-related death.*** The death of a woman during pregnancy or within one year of the end of pregnancy from a pregnancy complication, a chain of events initiated by pregnancy or the aggravation of an unrelated condition by the physiologic effects of pregnancy.
    - ***Pregnancy-associated, but not related death.*** The death of a woman during pregnancy or within one year of the end of pregnancy from a cause that is not related to pregnancy.
    - ***Pregnancy-associated but unable to determine pregnancy relatedness.*** The death of a woman while pregnant or within one year of pregnancy, due to a cause that could not be determined as pregnancy-related or not pregnancy-related.

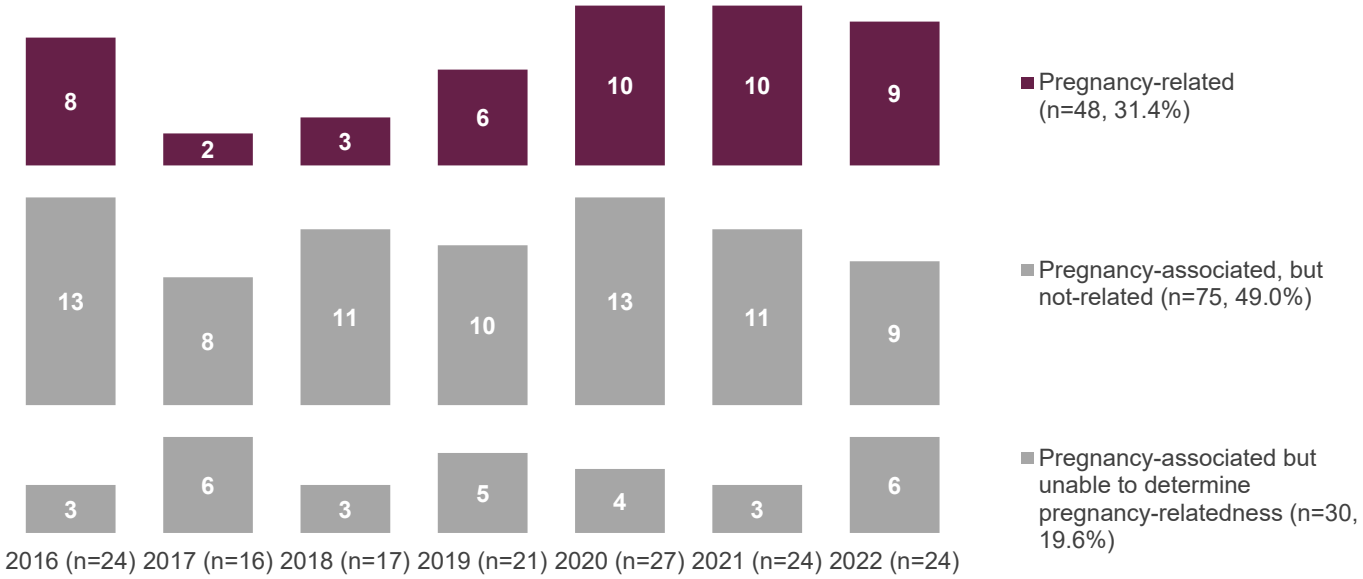
Of the 153 pregnancy-associated deaths reviewed, the KMMRC determined that (Figure 1):

- 48 deaths (31.4%) were pregnancy-related.
- 75 deaths (49.0%) were pregnancy-associated, but not-related.
- 30 deaths (19.6%) were pregnancy-associated but unable to determine pregnancy-relatedness.

Figure 1. Pregnancy-related deaths steadily increased from 2017 to 2020 but have remained stable since then.

Number of pregnancy-associated deaths by pregnancy-relatedness, Kansas, 2016-2022

Source: Kansas Maternal Mortality Review Committee



From 2016 to 2022, there were 153 pregnancy-associated deaths. This translated to a pregnancy-associated mortality ratio (PAMR) of ***59 deaths per every 100,000 live births that occurred in Kansas***. Based on the three-year rolling average, the PAMRs significantly increased from 49.5 in 2016-2018 to 69.1 per 100,000 live births in 2020-2022, with an APC of 10.3%.

- Timing of death:
  - ***69.9%*** of pregnancy-associated deaths occurred during the ***postpartum period***.
    - 35 deaths (22.9%) occurred during pregnancy.
    - 11 deaths (7.2%) occurred on the day of delivery.
    - 10 deaths (6.5%) occurred 1-6 days after the end of pregnancy.
    - 18 deaths (11.8%) occurred 7-42 days after the end of pregnancy.
    - 79 deaths (51.6%) occurred 43 days to one year after the end of pregnancy.
- The leading causes of death were motor vehicle crashes, followed by homicide, poisoning/overdose, cardiovascular conditions, and malignancies.
- Over one fourth ***(27.7%)*** were caused by homicide, suicide, mental health conditions, or unintentional poisoning/overdose.
- KMMRC determinations on circumstances surrounding death:
  - ***Obesity contributed to approximately one in four*** (36 deaths, 23.5%), including 7 deaths where it was probably a contributing factor.
  - ***Mental health conditions contributed to one in four*** (38 deaths, 24.8%), including 14 deaths where they were probably a contributing factor.
  - ***Substance use disorder contributed to approximately one in three*** (47 deaths, 30.7%), including 7 deaths where it was probably a contributing factor.
  - ***More than two-thirds (32 deaths, 68.1%)*** that noted ***substance use disorder*** as a contributing factor also had ***co-occurring mental health conditions*** as a contributing factor.
  - ***Discrimination contributed to approximately one in ten*** (11 deaths, 10.8%) of the 102 pregnancy-associated deaths reviewed after May 29, 2022, when the CDC added a discrimination field to the Committee Decisions Form. Of these, 9 deaths were determined to have probably been influenced by discrimination.

From 2016 to 2022, 48 deaths (31.4%) were determined to be pregnancy-related. This translated to a pregnancy-related mortality ratio (PRMR) of 18 deaths per every 100,000 live births that occurred in Kansas. Based on the five-year rolling average, the PRMRs significantly increased from 2016-2020 to 2018-2022, with an APC of 16.2%.

- Timing of death:
  - ***56.3%*** of pregnancy-related deaths occurred during the ***postpartum period***.
    - 13 deaths (27.1%) occurred during pregnancy.
    - 8 deaths (16.7%) occurred on the day of delivery.
    - 6 deaths (12.5%) occurred 1-6 days after the end of pregnancy.
    - 12 deaths (25.0%) occurred 7-42 days after the end of pregnancy.
    - 9 deaths (18.8%) occurred 43 days to one year after the end of pregnancy.
- The leading causes of death were cardiovascular conditions, followed by mental health conditions, infections, embolism-thrombotic (non-cerebral), and hypertensive disorders of pregnancy.
- Committee determinations on circumstances surrounding death:
  - ***Obesity contributed to nearly half*** (22 deaths, 45.8%), including 1 death where it was probably a contributing factor.
  - ***Mental health conditions contributed to approximately one in five*** (11 deaths, 22.9%).

    - ***Substance use disorder contributed to approximately one in three*** (14 deaths, 29.2%).
    - ***Approximately two-thirds*** (9 deaths, 64.3%) that noted ***substance use disorder*** as a contributing factor also had ***co-occurring mental health conditions*** as a contributing factor.
    - ***Discrimination probably contributed to approximately one in four*** (8 deaths, 22.2%) of the 36 pregnancy-related deaths reviewed after May 29, 2022, when the CDC added a discrimination field to the Committee Decisions Form.
- 37 (***77.1%***) of the 48 deaths ***were preventable**** with 20 deaths (54.1%) showing a good chance of prevention and 17 deaths (45.9%) showing some chance. *A death is considered preventable if there was at least some chance of the death being prevented by one or more reasonable changes to patient, family, provider, facility, system, and/or community factors. This definition is used by MMRCs to determine if a death they review is preventable.[5]
- ***Racial and ethnic minorities were disproportionately affected.*** More than half (25 deaths, 52.1%) of the women were racial and ethnic minorities and 23 (47.9%) were non-Hispanic White women.
- ***The majority of deaths*** (38 deaths, 79.2%) *occurred among women aged* ***25 to 39 years.***
- Half of the women (24 deaths, 50.0%) had ***either completed high school or obtained a General Educational Development (GED) certificate, or had less than a high school education.***
- Nearly two-fifths of the women (19 deaths, 39.6%) had private insurance, ***while the remaining 60.4% had Medicaid, no insurance, or an unknown insurance status.***

Factors that Contributed to *Preventable* Pregnancy-Related Deaths

Contributing factors are defined as factors identified by KMMRC that contributed to pregnancy-related deaths. These are steps along the way that, if altered, may have prevented the woman's death. The factors may be related to the patient, health care providers, facilities/hospitals where the woman sought care, or to the systems that influence the lifestyle, care, and health services for the woman.

A total of 155 contributing factors were identified during review (Figure 2). These factors related to the systems that influence the lifestyle, care, and health services for the woman (42, 27.1%), health care providers (40, 25.8%), the patient/family (36, 23.2%), facilities/hospitals where the woman sought care (26, 16.8%), or community (11, 7.1%) were identified by the KMMRC as contributing to pregnancy-related deaths. While system, provider and patient/family level factors were the most common, it is important to acknowledge they were often dependent on facility and community level factors.

Key KMMRC Recommendations for Action for *Preventable* Pregnancy-Related Deaths

The key KMMRC recommendations based on 37 preventable pregnancy-related deaths are as follows:

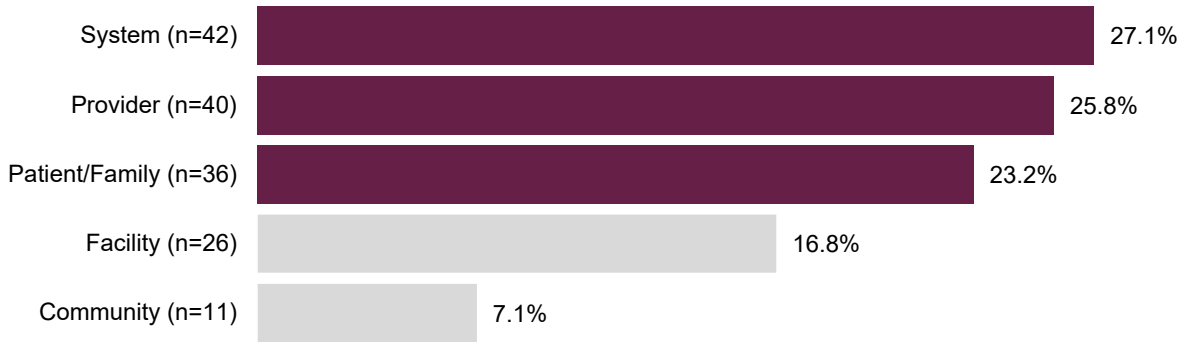
- ***Patient education and empowerment.***
- ***Screen, brief intervention, and referrals to treatment*** (SBIRT) for:
    - Comorbidities and chronic illness,
    - Intimate partner violence,
    - Pregnancy intention,
    - Mental health conditions (including postpartum anxiety and depression),
    - Substance use disorder – alcohol, illicit, or prescription drugs,
    - Social determinants of health.
- Better ***communication and multi-disciplinary collaboration*** between providers, including referrals.

- Obstetric providers and facilities should implement and follow ***Alliance for Innovation on Maternal Health (AIM) patient safety bundle*** recommendations for critical clinical events.
- Promote and support culturally congruent, holistic care coordination for ***all*** birthing persons using midwives, doulas, community health workers (CHWs) and home visiting services as the standard of perinatal care in Kansas.

Figure 2. The largest proportion of contributing factors were at the provider, system, and patient/family levels.

Distribution of Levels of Contributing Factors Among Preventable Pregnancy-Related Deaths, Kansas, 2016-2020

Source: Kansas Maternal Mortality Review Committee



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