

Background

Maternal mortality is a critical public health issue, and it is an often-used indicator of health care quality in the United States. Maternal mortality in the U.S., defined as deaths of pregnancy-related causes while pregnant or within one year postpartum, has more than doubled in the past 28 years from 7.2 deaths per 100,000 births in 1987 to 17.2 deaths per 100,000 births in 2015.¹ Missouri ranked 44th in the U.S. for maternal mortality in 2019.² This represents an increase of 42.8% – from 28.5 to 40.7 deaths per 100,000 live births – since 2016 (Figure 1).³

Even more concerning, Black, American Indian, and Alaska Native women are two to three times more likely to die from pregnancy-related causes than white women in the U.S.; this disparity increases with age.⁴ There is a significant correlation between state maternal mortality ranking and the percentage of non-Hispanic black women in the delivery population.⁵ In Missouri, black women have nearly three times the maternal mortality rate of white women—91.9 and 32.9 deaths per 100,000 respectively – compared to 63.8 and 26.1 deaths per 100,000 nationally.

Figure 1: Maternal Mortality Data from 2016-19 Rankings

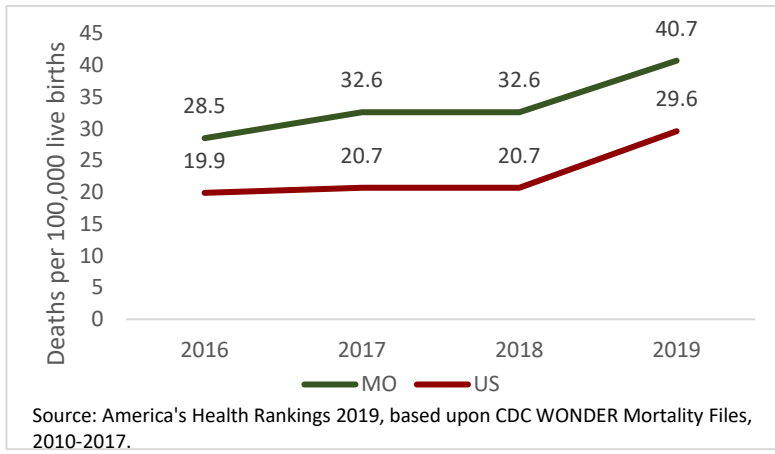
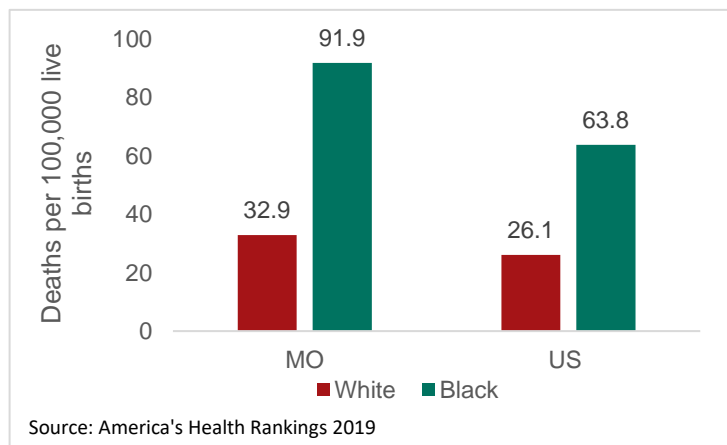


Figure 2: Maternal Mortality in Missouri and the U.S. by Race (2013-17)



of non-Hispanic black women in the delivery population.⁵ In Missouri, black women have nearly three times the maternal mortality rate of white women—91.9 per 100,000 and 32.9 per 100,000 respectively.² This disparity is larger than at the national level, where maternal mortality for black and white women is 63.8 per 100,000 and 26.1 per 100,000, respectively (Figure 2).

Risk Factors for and Causes of Maternal Mortality

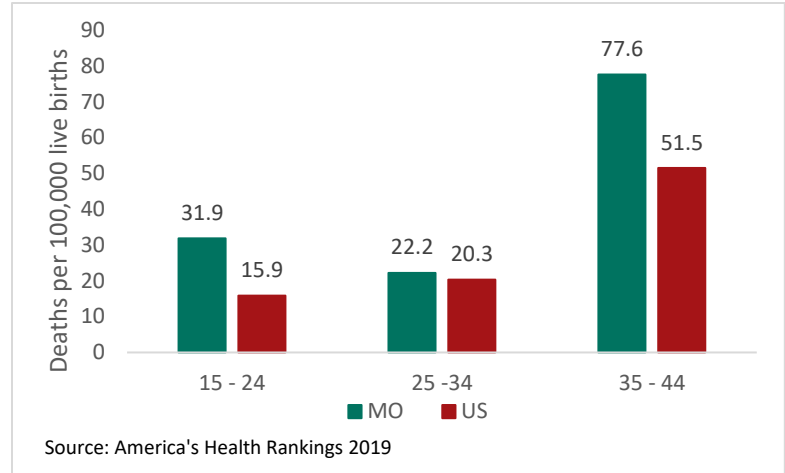
As noted above, race is a powerful risk factor for maternal mortality. In addition, the presence of chronic health conditions, such as hypertension, diabetes, and chronic heart disease, increases the risk of complications for pregnant women.^{1,6} Other risk factors for a greater risk of maternal mortality include: older maternal age (Figure 3), multiparity (having given birth to 5 or more children), obesity, and lacking health insurance coverage.² The increased usage of C-sections in the U.S. has also been linked to higher maternal mortality rates, but many studies demonstrate weak correlation of mortality with cesarean delivery.^{5,6,7,8}

Key Findings

- Missouri ranks 44th in the U.S. for maternal mortality in 2019.
- In Missouri, black women have nearly three times the maternal mortality of white women—91.9 and 32.9 deaths per 100,000 respectively – compared to 63.8 and 26.1 deaths per 100,000 nationally.
- MO HealthNet (Medicaid) pays for 38% of all births in Missouri.
- Expanded access to data from the Maternal Mortality Review Committees (MMRC) in Missouri could be used to target interventions to address causes of maternal mortality.
- Expanded access to health insurance coverage for low-income women could improve access to needed preventative health care services and reduction in adverse health outcomes before, during and after pregnancy.

In terms of causes, obstetric hemorrhage (severe bleeding) is the leading cause of severe maternal morbidity and of preventable maternal mortality in the United States. Collectively, major complications that account for nearly 75% of all maternal deaths include: hemorrhage; infections (usually after childbirth); high blood pressure during pregnancy (pre-eclampsia and eclampsia); and complications from delivery.⁹ Trends differ across these groups. Hemorrhage, hypertensive disorders of pregnancy (i.e., preeclampsia and eclampsia), and anesthesia contributions to pregnancy-related deaths have declined; however, cardiovascular, cerebrovascular, and other complications have increased.¹ When combined, cardiovascular conditions (i.e., cardiomyopathy, other cardiovascular conditions, and cerebrovascular accidents) were responsible for more than one-third of pregnancy related deaths in 2011–2015.¹

Figure 3: Maternal Mortality in Missouri and the U.S. by Age (2013-17)



Systems and care delivery issues also impact maternal outcomes. Poor practice methods, lack of high-quality care, and lack of standard protocols for pregnancy-related emergencies are among the most cited causes of higher U.S. maternal mortality when compared with other developed nations.^{10,11,12} Clinicians may fail to screen for or assess symptoms or complications. Patients and families may also receive inadequate information on symptoms for which to watch. Failure to recognize early warning signs of complications, whether by clinicians or patients, can lead to delays in diagnosis and treatment.¹³ Many of the top causes of maternal death, such as hemorrhage and preeclampsia, can be prevented with a greater understanding of health issues, better prenatal care, and more appropriate recognition and handling of emergency situations.^{8,10,14}

In response to the concerning trends in maternal mortality, the American College of Obstetricians and Gynecologists (ACOG) revised recommendations for postpartum care in 2018. Previously, ACOG recommended that a comprehensive postpartum visit take place within the first six weeks after birth. ACOG now recommends that postpartum care should be an ongoing process, rather than a single encounter, and that all women have contact with their OB/GYNs or other obstetric care providers within the first three weeks postpartum.¹⁵ However, there are as yet no data on whether this recommendation has led to better care or better outcomes.

Barriers to Accessing Care

Maternal mortality is impacted by the ability of expectant and new mothers to access health care services and health insurance. One key resource in accessing such care is Medicaid. Medicaid benefits cover approximately 45% of births in the U.S. and 32% of births in Missouri.¹⁶ In Missouri, women with family incomes below 200% of the FPL become eligible for Medicaid when they are pregnant and are covered for six weeks after childbirth.^{8,17} In addition, under the MO HealthNet for Pregnant Women Program, pregnant women with family incomes between 201% and 305% of the federal poverty level (FPL) qualify for pregnancy-related services including 60-day postpartum coverage.¹⁶ However, because Missouri is a non-Medicaid expansion state, low-income women of childbearing age are not eligible for Medicaid coverage before their pregnancy unless they are already parents with dependent children and have family incomes below approximately 22% of FPL, and they are not eligible past 60 days postpartum unless they meet the same income cutoff. Therefore, for many low-income women in Missouri, health needs are not met prior to pregnancy or past 60 days postpartum because of limited access to health care services.

Maternal Mortality Review Committees

An often-reported barrier to addressing the problem of maternal mortality is the lack of accurate reporting and measurement tools.^{6,11,18} When a woman dies during childbirth the death certificate reflects the proximate cause of death; the underlying cause(s) remain unreported. Inadequate evaluation and lack of standardized variables and aggregated data at the national level hinder progress toward understanding key causes and solutions to maternal mortality. As a result, there is a lack of protocols for doctors to use when a pregnancy-related emergency occurs.¹⁴

A key component to addressing the lack of information has been the establishment of maternal mortality review committees by states across the country and an increased focus on data surveillance surrounding maternal deaths.

There are two national systems of maternal mortality surveillance, both administered by the Centers for Disease Control: Pregnancy Mortality Surveillance System (PMSS) and the National Center for Health Statistics (NCHS).¹⁴ The systems aggregate data into a maternal mortality rate and provide basic information about the causes of death during pregnancy and postpartum. This national-level surveillance drawn from death certificate data does not identify specific factors that contributed to individual deaths. Therefore, the CDC works with state and local MMRCs to perform comprehensive reviews of deaths among women within a year of the end of a pregnancy.

State-run MMRCs identify, review, and analyze maternal deaths and disseminate and act on findings. MMRCs have access to clinical and non-clinical information (e.g., vital records, medical records, social service records) to more fully understand the circumstances surrounding each death.^{14,19} There are 33 states with established MMRCs in the United States. The CDC is working with state MMRCs to adopt a common case review data system called MMRIA (Maternal Mortality Review Information Application), with the goal of expanding to a national maternal mortality surveillance system.²⁰ Although MMRCs differ from state to state, most follow the Review to Action MMRC Logic Model that promotes best practices in maternal mortality review. Members of MMRCs typically represent public health, obstetrics and gynecology, maternal-fetal medicine, nursing, midwifery, forensic pathology, mental health, behavioral health, social workers, patient advocates, and other relevant multidisciplinary stakeholders.¹⁹

Data suggest that states with MMRCs are better able to address the top causes of maternal mortality and have seen a reduction in deaths.²¹ California's Maternal Quality Care Collaborative (CMQCC) cut the state maternal mortality rate by half in three years by addressing the leading causes of maternal death. CMQCC created toolkits to successfully intervene with hemorrhages and preeclampsia.^{8,14,21} Similarly, Illinois formed a MMRC that set standards as a result of information from previous cases thereby enhancing the quality of care provided to pregnant women and new mothers.²² These states acknowledged the lack of protocols for pregnancy and labor emergencies and decided to take action. Once the CMQCC noticed that a local hospital had a higher than average C-section rate, the CMQCC instituted an evaluation and created an administrative intervention for doctors.⁷ As a result, doctors became aware of the increasing C-section rate, patients became risk-informed, and the intervention decreased the C-section rate, leading to better health outcomes and an approximately \$8,000 reduction in costs associated with each delivery.⁷

Missouri MMRC

In 2011, the Missouri Department of Health and Senior Services (MO DHSS) Division of Community and Public Health chose to establish a Pregnancy-Associated Mortality Review (PAMR) program, which reviews cases each year.²³ The MO PAMR Board analyzes all maternal deaths that occur while a woman is pregnant or within one year of the end of her pregnancy. Members conduct an in-depth medical and social review to look into the factors that contribute to, or directly cause the death, and to prevent future occurrences. In 2015, PAMR completed a historical analysis of maternal deaths from 1999-2008. MO DHSS conducted three town hall meetings in 2015 to share findings and gather qualitative data from health care providers. Community feedback was consistent with the MO MMRC findings: limited access to care, unhealthy lifestyles, prevalence of chronic conditions and substance use, poor health literacy, and inadequate provider knowledge of contributors to maternal mortality were all challenges that community members felt required greater attention.²⁴

The 2015 Missouri PAMR Town Hall comprehensive review of maternal deaths found embolism and cardiovascular diseases to be the leading causes of maternal death in Missouri from 1999 to 2008.²⁵ Following the Town Hall, PAMR implemented a marketing campaign targeting women of childbearing age to increase their awareness of maternal mortality and morbidity risks and expanded Missouri Hospital Association (MHA) initiatives (preeclampsia and hemorrhage toolkits) to birthing hospitals in Missouri.²⁶

During the 2018-2019 session, the Missouri legislature passed Senate Bill 514 in order to strengthen the PAMR by codifying it into statute.²⁷ Governor Mike Parson signed the legislation on July 11, 2019. The law stipulates that the PAMR Board consist of 18 members appointed by the DHSS Director and offers certain privacy and legal protections to those supplying the data.

The Alliance for Innovation on Maternal Health and Safety

The U.S. Health Resources & Service Administration (HRSA)'s Alliance for Innovation on Maternal Health and Safety (AIM) Initiative, administered by the ACOG, is a national effort aimed at improving maternal outcomes. Missouri's involvement in the AIM initiative began as a collaboration between MO DHSS and the Missouri Hospital Association (MHA). Following the application submission by MO DHSS and MHA, Missouri was accepted into the AIM Initiative in April 2019. AIM involves a broad multidisciplinary alliance working within state teams. The AIM collaborative delivers sets of recommendations developed from evidence-based best practices in maternal care grouped according to risk factors and situations to health care providers in the form of "maternal safety bundles."²⁸

The goal of the AIM bundles is to move established guidelines into practice, provide a standard approach for institutions, represent best practices for implementation, and provide links to key resources. The Council on Patient Safety in Women's Health Care disseminates patient safety bundles to facilitate the standardization process.²⁹ AIM maternal safety bundles have been developed to address the top complications that occur in pregnancy.³⁰

The AIM "Severe Hypertension in Pregnancy" patient safety bundle will be the first AIM initiative in Missouri.³¹ This initiative will involve emergency rooms and clinics as well as labor and delivery, as hypertension is often treated in these settings as well. Missouri will be the first state to deploy the AIM Severe Hypertension in Pregnancy bundle in areas outside of the labor and delivery floor. The MHA is currently registering hospitals for the AIM collaborative.²³

Recommendations

Interventions to reverse concerning trends in maternal mortality are urgently needed. At the federal level, the creation of a national MMRC would create momentum to reduce maternal mortality across the country and support state and national efforts to standardize data to enable state-to-state and national comparisons, learning, and data sharing. Addressing the U.S. maternal mortality rate within each state will continue to be an inefficient and slow process without a cohesive and open platform to share findings nationwide.^{6,11}

State-level innovations are also crucial. The Missouri MMRC should examine previous research and reports from other states for effective strategies and interventions, and research suggests that sharing findings from the review of recent maternal deaths in Missouri would be helpful. Investment into additional AIM bundles should also be a priority, particularly if early experience with the severe hypertension bundle shows that it is improving outcomes. Quality improvement efforts such as the AIM bundles have promise in reducing maternal mortality at the state level as well as reducing persistent and striking disparities in maternal outcomes for racial minorities and low-income women. Research has suggested that health disparities in maternal mortality are deeply ingrained in health care and social service delivery; however, policies are needed to address inequality and create conditions that support whole health and positively affect outcomes. Improving comprehensive practitioner training, cultural competency training, clear practitioner and patient communication, and policies on prevention initiatives are the most prevalent and practical ways to address the high and increasing maternal mortality rate in the U.S.¹⁰

Increased access to health care services and health insurance would also likely have a positive impact on maternal health in Missouri. Medicaid coverage for low-income women past 60 days postpartum, and for all women of childbearing age, has the potential to generate long-term cost savings via preventative care (i.e., dedicated health care provider, well-woman visits, birth control, postpartum care). Many states have expanded their Medicaid programs and provide continuous Medicaid coverage and access to preventative health care for low-income women. This has been associated with reductions in racial disparities in birth outcomes in these states.³²

Ultimately, a multi-faceted approach is needed to reduce maternal mortality and improve maternal health for all women in Missouri. A data-driven approach using the findings of the MMRC and informed by the work of local maternal health organizations should guide prevention efforts in Missouri, coupled with expanded access to health care services and early prenatal care.

References

- ¹ CDC. (2019). Mortality Pregnancy Surveillance System. U.S. Department of Health & Human Services. Retrieved from <https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-mortality-surveillance-system.htm>
- ² United Health Foundation (2019). CDC WONDER. 2019 Health of Women and Children Report. Retrieved from https://www.americashealthrankings.org/explore/health-of-women-and-children/measure/maternal_mortality_a/state/MO
- ³ United Health Foundation (2019). CDC WONDER. 2018 Health of Women and Children Report. Retrieved from https://www.americashealthrankings.org/explore/health-of-women-and-children/measure/maternal_mortality_a/state/MO
- ⁴ CDC. (2019). Racial and Ethnic Disparities Continue in Pregnancy-Related Deaths. Retrieved from <https://www.cdc.gov/media/releases/2019/p0905-racial-ethnic-disparities-pregnancy-deaths.html>
- ⁵ Amirhossein, M., Dildy, G.A, Brown, H.L., Bateni, Z.H., Belfort, M.A., Sangi-Haghpeykar, H. & Clark, S. (2018, April). Health care disparity and pregnancy-related mortality in the United States, 2005-2014. *Obstetrics & Gynecology*, 131(14): 707-712. doi: 10.1097/AOG.0000000000002534
- ⁶ Hirshberg, A., & Srinivas, S. K. (2017). Epidemiology of maternal morbidity and mortality. *Seminars in Perinatology*, 41(6), 332-337. doi:10.1053/j.semper.2017.07.007.
- ⁷ Gorman, A. (2015, May 11). How one hospital brought its c-sections down in a hurry. Kaiser Health News. Retrieved from <https://khn.org/news/how-one-hospital-brought-its-c-sections-down-in-a-hurry/>
- ⁸ Martin, N. & Montagne, R. (2017, May 12). Focus on infants during childbirth leaves U.S. moms in danger. NPR. Retrieved from <https://www.npr.org/2017/05/12/527806002/focus-on-infants-during-childbirth-leaves-u-s-moms-in-danger>
- ⁹ World Health Organization. (2019, September 19). Maternal mortality. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality>
- ¹⁰ Brantley et al. (2017). Report from nine maternal mortality review committees. Retrieved from https://reviewtoaction.org/sites/default/files/national-portal-material/Report%20from%20Nine%20MMRCs%20final_0.pdf
- ¹¹ Clark, S. L., & Belfort, M. A. (2017). The case for a national mortality review committee. *Journal of Obstetrics & Gynecology*, 130(1), 198-202. doi: 10.1097/AOG.0000000000002062
- ¹² Marso, A. (2018, June 4). Missouri among worst nationally in maternal deaths. Reps. say no to study on issue. The Kansas City Star. Retrieved from <https://www.kansascity.com/news/business/health-care/article212186624.html>
- ¹³ CMQCC. (2013). Introduction and Historical Perspective. California Department of Public Health. Retrieved from <https://www.cmqcc.org/resource/2835/download>
- ¹⁴ Gravitz, L. (2017). The United States is failing its mothers. *Women's Health*, 550, 520-523. doi: 10.1038/550S20a
- ¹⁵ American College of Obstetricians and Gynecologists. (2018). ACOG redesigns postpartum care. Retrieved from <https://www.acog.org/About-ACOG/News-Room/News-Releases/2018/ACOG-Redesigns-Postpartum-Care?IsMobileSet=false>
- ¹⁶ Missouri Foundation for Health. (2019). Missouri Medicaid basics. Retrieved from <https://mffh.org/wp-content/uploads/2019/01/2018-Missouri-Medicaid-Basics-web.pdf>
- ¹⁷ Prabu, A., & Shah, I. (2018, February 7). Missouri needs to help its physicians prevent mothers from dying. St. Louis Post-Dispatch. Retrieved from http://www.stltoday.com/opinion/columnists/missouri-needs-to-help-its-physicians-prevent-mothers-from-dying/article_053781ce-f0b2-5f10-925e-33324128b65d.html
- ¹⁸ Missouri Foundation for Health. (2019). Missouri Medicaid basics. Retrieved from <https://mffh.org/wp-content/uploads/2019/01/2018-Missouri-Medicaid-Basics-web.pdf>
- ¹⁹ Ollove, M. (2016, May 9). States urged to reduce pregnancy-related deaths. Kaiser Health News. Retrieved from <https://khn.org/news/states-urged-to-reduce-pregnancy-related-deaths/>
- ²⁰ CDC Foundation (2017). Report from Maternal Mortality Review Committees: A view into their critical role. Retrieved from <https://www.cdcfoundation.org/sites/default/files/files/MMRIReport.pdf>
- ²¹ Lu, M. (2018, September 25). JAMA. Reducing maternal mortality in the United States. 320(12):1237-1238 doi:10.1001/jama.2018.11652 Retrieved from <https://jamanetwork.com/journals/jama/article-abstract/2702413>
- ²² Edwards, J. E., & Hanke, J. C. (2013). An update on maternal mortality and morbidity in the United States. *Nursing for Women's Health*, 17(5), 377-389. doi: 10.1111/1751-486X.12061
- ²³ Kilpatrick, S. J., Prentice, P., Jones, R. L., & Geller, S. (2012). Reducing maternal deaths through state maternal mortality review. *Journal of Women's Health*, 21(9), 905-909. doi:10.1089/jwh.2011.3398
- ²⁴ Otto, A., personal communication, October 11, 2019.
- ²⁵ Review to Action. (2015). State Profiles. Retrieved from <https://reviewtoaction.org/content/missouri>
- ²⁶ Garikapaty, V. (2014, March 18). Pregnancy Associated Mortality Review (PAMR), Missouri, 1999-2008. Retrieved from <https://health.mo.gov/data/pamr/pdf/pamr-town-hall.pdf>
- ²⁷ Missouri Department of Health & Senior Services. (2019). Pregnancy-Associated Mortality Review (PAMR). Retrieved from <https://health.mo.gov/data/pamr/index.php>
- ²⁸ Missouri Senate Bill 514. Retrieved from <https://legiscan.com/MO/text/SB514/2019> .
- ²⁹ Missouri Hospital Association. (2019, April 30). AIM collaborative brings new tools to reduce maternal mortality in Missouri. Retrieved from <https://web.mhanet.com/article/7260/AIM-Collaborative-Brings-New-Tools-To-Reduce-Maternal-Mortality-In-Missouri.aspx?articlegroup=2662>
- ³⁰ Council on Patient Safety in Women's Health Care. (2019). Severe hypertension in pregnancy. Retrieved from https://safehealthcareforeverywoman.org/patient-safety-bundles/severe-hypertension-in-pregnancy/#link_acc-1-5-d
- ³¹ American College of Obstetricians and Gynecologists. (2019). Alliance for Innovation on Maternal Health. Retrieved from <https://www.acog.org/About-ACOG/ACOG-Departments/Patient-Safety-and-Quality-Improvement/What-is-AIM>
- ³² Missouri Department of Health & Senior Services. (2019, Sept. 12). DHSS is awarded grant from CDC to improve maternal health in Missouri. Retrieved from <https://health.mo.gov/news/newsitem/uuid/35a60075-c388-4a30-881e-a7602adb209e/dhss-is-awarded-grant-from-cdc-to-improve-maternal-health-in-missouri>
- ³³ Brown, C.C., Moore, J.E., Felix, H.C., et al. Association of State Medicaid Expansion Status With Low Birth Weight and Preterm Birth. *JAMA*. 2019;321(16):1598–1609. doi:10.1001/jama.2019.3678 <https://www.ncbi.nlm.nih.gov/pubmed/31012935>