Maine Maternal, Fetal, and Infant Mortality Review Panel (MFIMR)

Annual Report
July 1, 2021 – June 30, 2022

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To the Joint Standing Committee on
Health and Human Services

Maine Department of Health and Human Services
Maine Center for Disease Control and Prevention

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INTRODUCTION

The Maine Center for Disease Control and Prevention's (Maine CDC) Maternal, Fetal and Infant Mortality Review (MFIMR) Panel is a multidisciplinary group of health care and social service providers, public health officials, and other persons with professional expertise in maternal, fetal, and infant health and mortality. All Panel members are volunteers. The Panel's purpose is to gain an understanding of the factors associated with fetal, infant, and maternal deaths to expand the state's capacity to direct prevention efforts and to be able to take actions to promote healthy mothers and infants. Using a public health approach, the program's goal is to strengthen community resources and enhance state and local systems and policies affecting women, infants, and families to improve health outcomes in this population and prevent maternal and infant mortality and morbidity. This State Fiscal Year (SFY) 2022 report summarizes relevant data contributing to pregnancy outcomes.

HISTORY

In 2005, the 122nd Maine Legislature passed *An Act to Establish a Maternal and Infant Death Review Panel*, LD 1420. In 2010, the 124th Maine Legislature amended this statute to authorize the Maternal and Infant Death Review Panel to review fetal deaths occurring after 28 weeks gestation (stillborn infants).

The MFIMR Panel did not meet between SFY 2014 and SFY 2016. In 2016, records were reviewed on the few families with family consent and the Office of Child and Family Services (OCFS) conducted interviews with families interested in sharing their experiences with delivery of perinatal care. In 2017, an amendment to modify the MFIMR statute formally changed the name of the Maternal and Infant Death Review Panel to the Maternal, Fetal and Infant Mortality Review Panel. It also allowed the Panel Coordinator to obtain health information of a woman who died during pregnancy or within 42 days of giving birth, a child who died within one year of birth, including fetal deaths after 28 weeks of gestation, without family consent.

In SFY 2018, the MFIMR Panel was housed within the Division of Licensing and Certification (DLC). In July of 2018, the Panel was moved under Maternal and Child Health as part of Maine CDC's Division of Disease Prevention. Under the recommendations made by the Director of the Maine CDC, efforts were made to align the Panel and its mission, goals, and activities with those of the National Center for Fatality Review and Prevention (NCRFP). In addition to medical experts, multiple stakeholder state and public health organizations are represented on the Panel: Office of Child and Family Services (OCFS), Office of the Chief Medical Examiner (OCME), State Police, Public Health Nursing, Epidemiology, WIC, Perinatal Outreach, Maine Children's Trust, and Maine Families.

In the SFY 2019 Annual Report, the Panel recommended changes to the MFIMR legislation to include access by the Panel Coordinator to health care information for maternal deaths up to one year following the birth of a child, in accord with the guidance of the national CDC Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) program.

Due to the Covid-19 pandemic, the Panel met only 3 times, rather than the usual 4, in SFY 2020. In SFY 2021, additional members were added to the panel, including a Certified Professional Midwife, the coordinator for the Infant and Maternal Substance Use Prevention project within Maine CDC, and the Chair of the Emergency Medical Services for Children Committee. In SFY 2022, the Panel Coordinator and MFIMR Steering Committee, Division of Records and Vital Statistics (DRVS) staff and the CDC epidemiology team successfully utilized the new steps for extracting pregnancy-associated death data from birth and death certifications according to the expansion of the time frame post pregnancy for review.

See **Appendix A** for formalization of Maternal, Infant & Infant Mortality Review Panel MCH Roles & Responsibilities Guided by Title 22 MFIMR Statute Language.

MFIMR EPIDEMIOLOGY REPORT

In support of the MFIMR Panel, funding is provided for epidemiologic analyses of maternal, fetal, and infant mortality through the Maternal and Child Health Block Grant (MCHBG) to help the Panel understand patterns and trends associated with maternal, fetal, and infant deaths. In the current fiscal year, MFIMR epidemiologists provided quarterly analyses of provisional infant death data, and annual analyses of fetal death data and pregnancy-associated death data collected by DRVS.

Fetal Death Summary

A fetal death is the spontaneous death of a fetus in utero that occurs at 20 weeks of gestation or later. Early fetal deaths are those occurring between 20-27 weeks gestation; late fetal deaths are those occurring at 28 or later weeks gestation. In Maine, healthcare providers are required to complete a fetal death certificate and register any fetal death occurring at 20 weeks or later. While the following summary includes all 2021 fetal deaths registered with DRVS, the MFIMR Panel reviews only late fetal deaths.

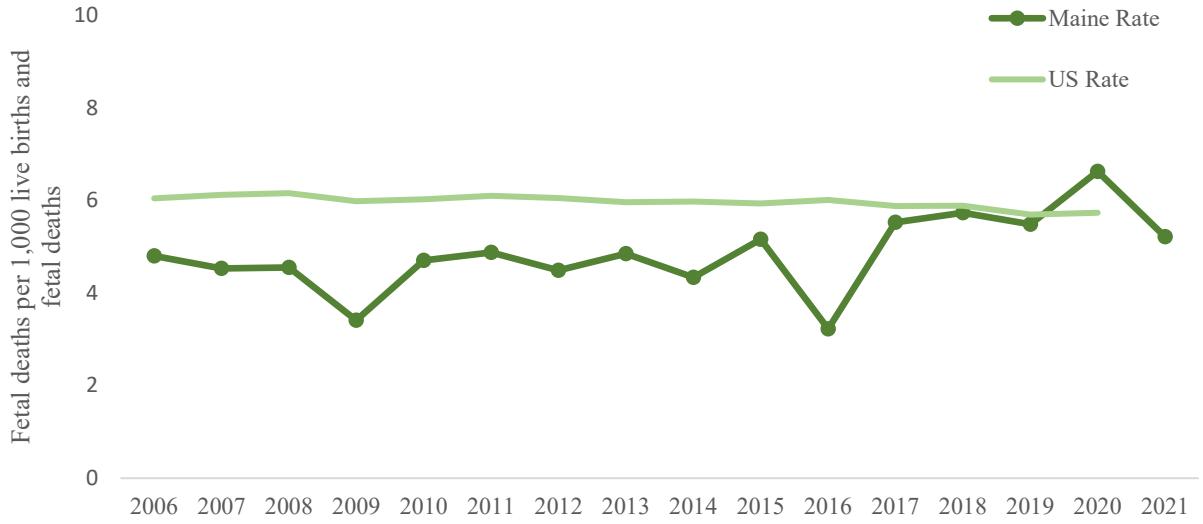
In calendar year 2021, there were 63 fetal deaths in Maine. The State's 2021 fetal mortality rate was 5.2 fetal deaths per 1,000 live births plus fetal deaths, a 21% decrease from the 2020 fetal mortality rate of 6.6. Maine's 2021 early fetal mortality rate was 2.2 per 1,000 live births plus fetal deaths, and the late fetal mortality rate was 2.3 per 1,000 live births plus fetal deaths.[1]

In 2020, the most recent year available for comparison, the U.S. total fetal mortality rate was 5.7 fetal deaths per 1,000 live births plus fetal deaths, the early fetal mortality rate was 3.0 and the late fetal mortality rate was 2.8.[2]

[1] Fetal deaths for which gestational age was unknown were excluded from both the numerator and denominator when calculating early and late fetal mortality rates.

[2] Gregory ECW, Valenzuela CP, Hoyert DL. Fetal mortality: United States, 2020. National Vital Statistics Reports; vol 71 no 4. Hyattsville, MD: National Center for Health Statistics. 2022.

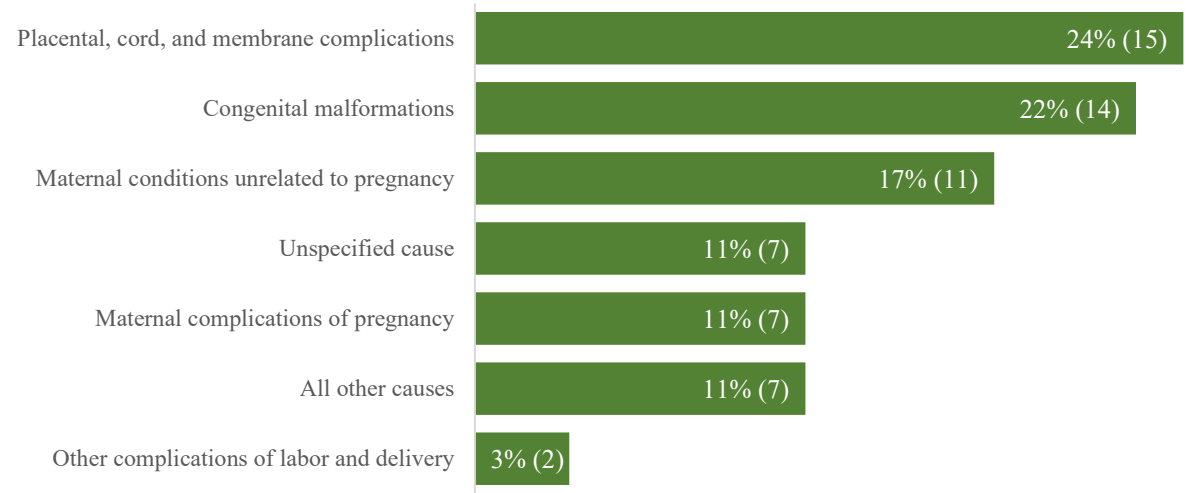
Figure 1. Fetal mortality rate, Maine and US, 2006 – 2021



Source(s): US: Birth and Fetal Death Records, CDC WONDER; ME 2021: Maine Fetal Death and Birth certificates, DRVS

Major causes of fetal death in the US include complications of the placenta or umbilical cord, complications of pregnancy, and congenital anomalies. Across the United States, a large proportion of fetal death certificates are registered with an unspecified cause.[3] In 2021, 24% of Maine fetal deaths were due to placental, cord, or membrane complications; 22% were due to congenital malformations; and 17% were due to maternal conditions unrelated to pregnancy. Eleven percent were reported with an unspecified cause (Figure 2).

Figure 2. Initiating causes of fetal deaths (ICD-10), Maine, 2021



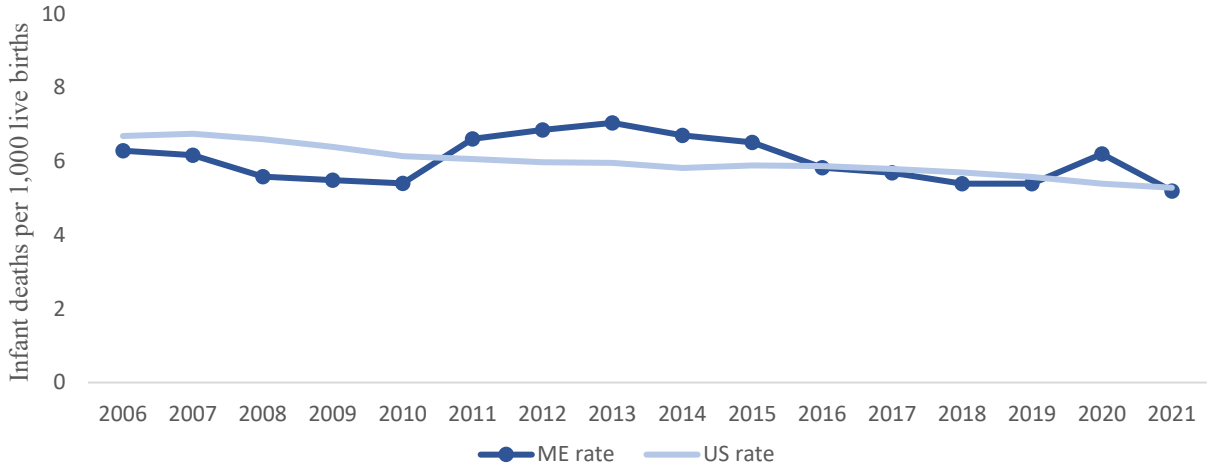
Source: Maine Fetal Death Certificates, DRVS

[3] Gregory ECW, Valenzuela CP, Hoyert DL. Fetal mortality: United States, 2020. National Vital Statistics Reports; vol 71 no 4. Hyattsville, MD: National Center for Health Statistics. 2022.

Infant Death Summary

Infant death is defined as any death to a live born infant prior to their first birthday. After declining for six years (2013-2019), Maine's infant mortality rate increased in 2020 and decreased again in 2021. In 2021 there were 62 deaths among Maine resident infants, and the State's infant mortality rate was 5.2 deaths per 1,000 live births (Figure 3). The US 2021 infant mortality rate slightly exceeded Maine's rate at 5.3 deaths per 1,000 live births.

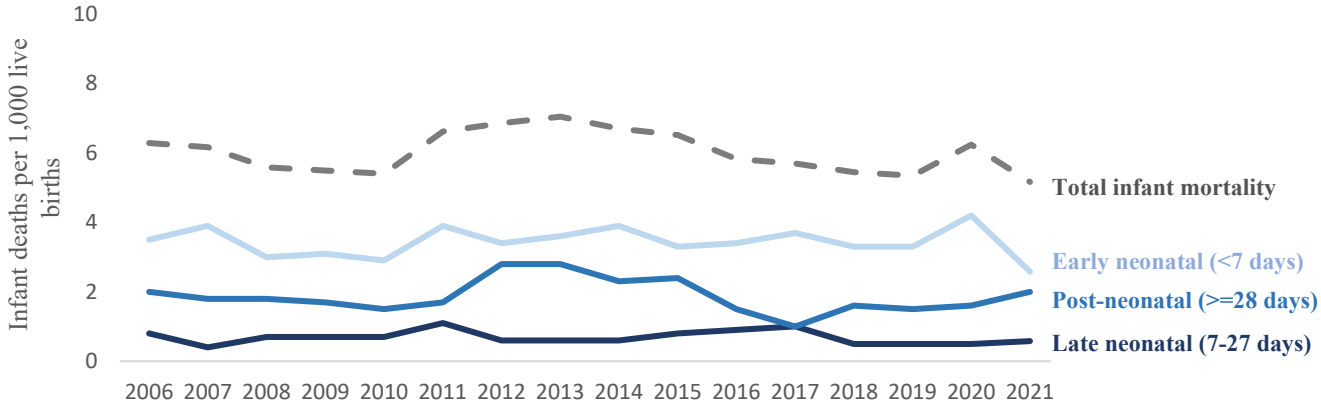
Figure 3. Infant mortality rate, Maine and US, 2006-2021



Source(s): US: Linked Birth / Infant Death Records, CDC WONDER; Maine: Death and Birth certificates, DRVS

A majority of Maine's infant deaths occur in the early neonatal period (i.e., between 0-6 days of life). In 2021, 50% of Maine infant deaths occurred during the early neonatal period. The decrease in Maine's total infant mortality rate between 2020 and 2021 was driven largely by the decrease in early neonatal mortality (Figure 4).

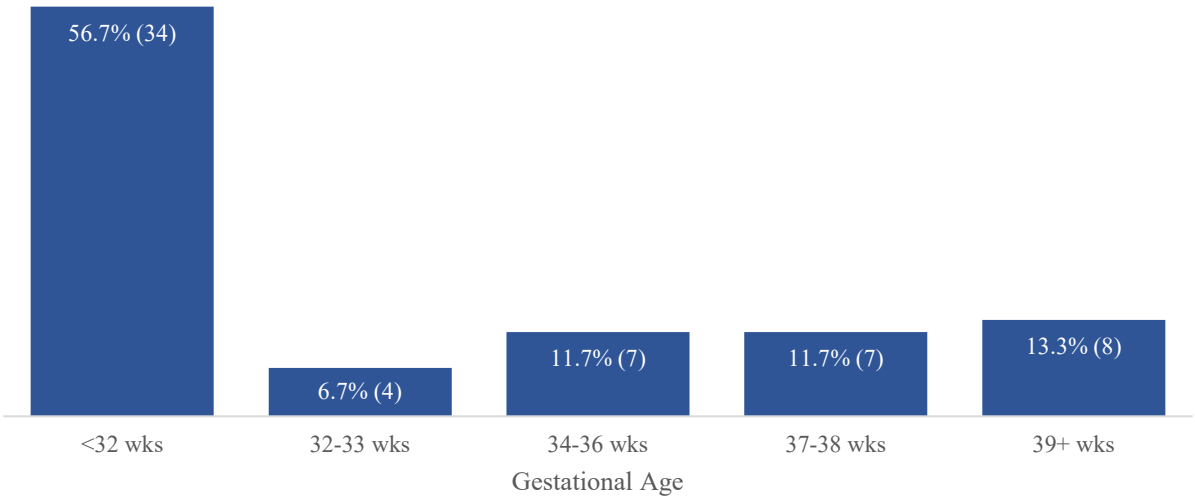
Figure 4. Infant mortality rate by age group, Maine, 2006-2021



Source: Maine CDC Death and Birth certificates

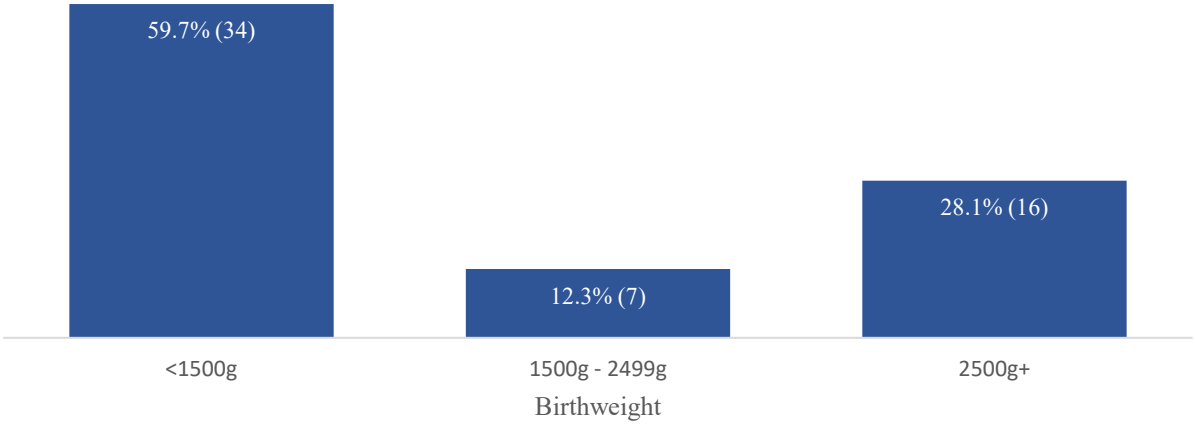
Low gestational age and low birthweight infants are at an increased risk of morbidity and mortality compared to their term and normal birthweight peers.[4] In 2021, more than one in two deaths occurred among infants born before 32 weeks gestation (Figure 5). Over half of infant deaths occurring in 2021 were among infants weighing less than 1,500 grams (g) at birth (Figure 6).

Figure 5. Proportion and count of infant deaths by gestational age at birth, Maine, 2021*



*Infant deaths for which gestational age was unknown were excluded from both the numerator and denominator of proportion calculations.
Source: Linked Birth-Death Certificates, DRVS

Figure 6. Proportion and count of infant deaths by weight at birth, Maine, 2021*

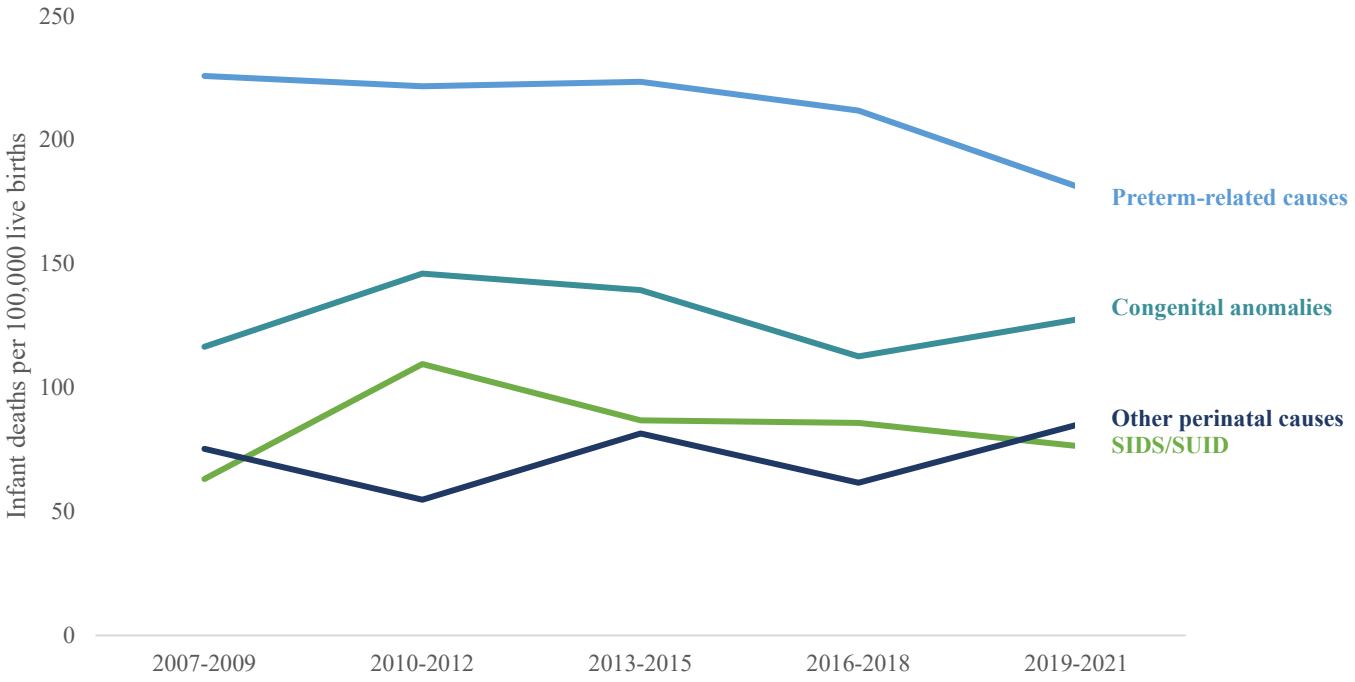


*Infant deaths for which birthweight was unknown were excluded from both the numerator and denominator of proportion calculations.
Source: Linked Birth-Death Certificates, DRVS

[4] Behrman RE and Butler AS, eds. Preterm Birth: Causes, Consequences and Prevention, National Academies Press: Washington, DC; 2007.

The most common causes of infant deaths in Maine are preterm related. These are deaths to infants born at less than 37 weeks of gestation in which the cause of death was a direct consequence of preterm birth. In 2021, 42% of deaths among infants born before 37 weeks gestation were due to a cause related to short gestation. Congenital anomalies (i.e., birth defects) and Sudden Infant Death Syndrome (SIDS)/Sudden Unexpected Infant Deaths (SUID) have historically been the second and third most common cause of infant death in Maine. In 2020, the SIDS/SUID mortality rate in Maine dropped to its lowest level since 2008, and in 2021, the SIDS/SUID rate remains relatively low compared to years prior. While the reasons for this decline are not certain, the drop in SIDS/SUID mortality coincided with a variety of efforts undertaken by Maine DHHS to promote safe infant sleep, including a social media marketing campaign targeted to new parents and caregivers, quality improvement efforts at Maine's birthing hospitals, and provision of cribettes to all families in need of an appropriate sleep space for their newborn.

Figure 7. Leading causes of infant mortality, Maine, 2006-2021



Source: Linked Birth-Death Certificates, DRVS

Infant mortality risk varies by demographic, geographic, socioeconomic, and maternal health factors. Smoking during pregnancy is associated with both preterm birth and low birthweight, as well as other poor birth outcomes and SIDS/SUID.[5] In 2017-2021, the mortality rate among infants born to Maine birthing persons who smoked during the last trimester of pregnancy was 8.9 deaths

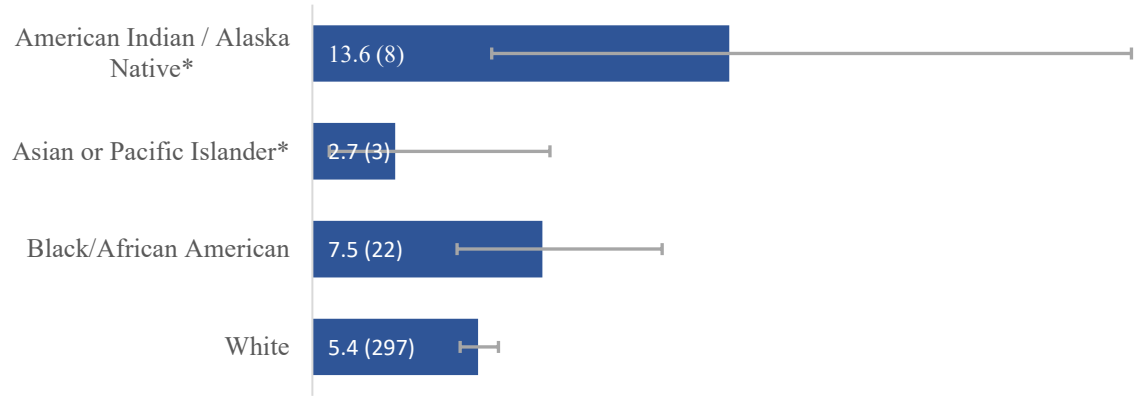
[5] U.S. Department of Health and Human Services. The Health Consequences of Smoking: 50 Years of Progress. A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014. Printed with corrections, January 2014.

per 1,000 births compared to the mortality rate among infants born to non-smoking birthing persons of 5.1 deaths per 1,000 births.

In Maine, some population groups experience a disproportionately high rate of infant mortality. In 2017-2021, infants born to birthing persons with a high school diploma/GED or less education died at almost two times the rate of infants born to birthing persons with at least some college education (8.2 deaths per 1,000 births versus 4.2 deaths per 1,000 births, respectively). Infants whose births were covered by MaineCare (Medicaid) also experience a significantly higher mortality rate compared to infants whose births were covered by other payer types. MaineCare coverage for birth may be an indication that a birthing person had a low income in the prenatal period. In 2017-2021, the mortality rate among infants whose births were covered by MaineCare was 6.9 deaths per 1,000 births compared to infants whose births were covered by other payer types at 4.7 deaths per 1,000 births.

Like the rest of the United States, infants born to Black/African American and Indigenous/American Indian/Alaska Native birthing persons in Maine experience a higher mortality rate compared to white infants. Disparities in infant mortality by race in Maine and the US are due to complex and interrelated factors, including challenges in accessing essential resources (e.g., healthcare, education, employment, housing) experienced by some racial subgroups, as well as issues of discrimination and structural racism.[6] In 2017-2021, the mortality rate among infants born to Maine resident Black/African American (alone or bridged) birthing persons was 7.5 per 1,000 live births; among infants born to Indigenous (alone or bridged) birthing persons it was 13.6 per 1,000 live births; among infants born to white (alone or bridged) birthing persons it was 5.4 per 1,000 live births; and among infants born to Asian or Pacific Islander (alone or bridged) birthing persons it was 2.7 per 1,000 live births (Figure 8).

Figure 8. Infant mortality rates per 1,000 live births and counts by maternal race (alone or bridged), Maine, 2017-2021



*Interpret with caution: rates calculated with less than 20 individuals in the numerator.
Note: Error bars represent 95% confidence interval.
Source: Linked Birth-Death Certificates, DRVS

[6] Artiga S, Pham O, Orgera K, Ranji U. Racial Disparities in Maternal and Infant Health: An Overview: Issue Brief, Kiser Family Foundation.https://www.kff.org/report-section/racial-disparities-in-maternal-and-infant-health-an-overview-issue-brief/. November 2020.

Additional data on the prevalence of select risk factors for infant mortality among Maine residents, and additional infant mortality data stratified by demographic, maternal health status, and geographic factors, are included in **Appendix B**.

Pregnancy-Associated Mortality Summary

There are three ways of conceptualizing deaths to birthing persons during or soon after the end of pregnancy:

- **Pregnancy-associated death:** A pregnancy-associated death is any death to a birthing person while pregnant or within one year of the end of pregnancy, regardless of cause.
- **Pregnancy-related death:** A pregnancy-related death is defined by the CDC as the death of a birthing person while pregnant or within one year of the end of a pregnancy -- regardless of the outcome, duration, or site of the pregnancy -- from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.
- **Maternal death:** A maternal death is defined by the World Health Organization as any death to a birthing person within 42 days of the end of her pregnancy due to causes related to or aggravated by pregnancy, excluding accidental or incidental causes.[7]

Pregnancy status at time of death has been captured on Maine death certificates since 2010; however, research conducted by the US CDC, as well as the work of multiple state Maternal Mortality Review Committees, has made clear that death certificate data alone are insufficient for full ascertainment of pregnancy-associated deaths.[8] Since 2018, DRVS has performed regular linkages of death certificates to birth and fetal death certificates to ensure all pregnancy-associated deaths in Maine are identified and can be reviewed by the Panel.

In 2021, there were 10 pregnancy-associated deaths among Maine birthing persons. Two deaths occurred while the birthing person was pregnant, two occurred between delivery and 42 days post-delivery, and six deaths occurred between 43 and 365 days after the end of the decedent's pregnancy (Table 1).

Table 1. Timing of pregnancy-associated deaths, Maine, 2018-2021

Pregnancy status at time of death	2018	2019	2020	2021	Total
Pregnant at time of death	1	2	1	2	6
Pregnant within 0-42 days of death	1	0	0	2	3
Pregnant within 43-365 days of death	4	7	5	6	22
Total	**6**	**9**	**6**	**10**	**31**

[7] Review to Action. Definitions. https://reviewtoaction.org/learn/definitions. Accessed December 3, 2022.
[8] Hoyert DL, Uddin SFG, Miniño AM. Evaluation of the pregnancy status checkbox on the identification of maternal deaths. National Vital Statistics Reports. 2020; vol 69 no 1. Hyattsville, MD: NCHS; Callahan T, et al. Enhancing Reviews and Surveillance to Eliminate Maternal Mortality. J Womens Health (Larchmt) 2021; 30(8):1068-1073

Based on the underlying cause of death data collected on Maine death certificates, in 2021, three of the 10 Maine pregnancy-associated deaths were due to motor vehicle accidents, three were due to an obstetric cause, two were due to drug overdose, one was due to suicide, and one was due to cancer. Causes of pregnancy-associated deaths for 2018–2021 are provided in Table 2.

Table 2. Causes of pregnancy-associated deaths, Maine, 2018-2021

Causes of pregnancy-associated deaths	2018	2019	2020	2021	Total
Direct or indirect obstetric causes	*2*	*3*	*1*	*3*	*9*
Motor vehicle accidents	1	1	2	3	7
Accidental poisoning (overdose)	0	2	1	2	5
Suicide	1	1	0	1	3
Cardiovascular diseases	1	0	1	0	2
Homicide	0	2	0	0	2
Cancer (malignant neoplasms)	0	0	0	1	1
Respiratory diseases	0	0	1	0	1
All other causes	1	0	1	0	2
Total	**6**	**9**	**6**	**10**	**31**

Substance use related deaths, including drug overdoses, account for a substantial proportion of pregnancy-associated mortality in the US.[9] In 2021, there were two pregnancy-associated deaths in Maine for which the underlying cause was a drug overdose. Other death certificate information suggest substance use may have contributed to an additional death in 2021. Future MFIMR Panel reviews of 2021 pregnancy-associated deaths may further clarify the extent to which substance use was a factor in any additional deaths.

Pregnancy-associated mortality is a rare event in Maine, making analyses of demographic factors, geographic factors, or health and behavioral risk factors challenging due to very low numbers. Many of the socioeconomic and demographic disparities and health status factors associated with fetal and infant mortality are also associated with pregnancy-associated mortality, however. According to linked vital records data, in 2018-2021:

- More than half of the 31 pregnancy-associated deaths occurred among decedents with a high school diploma or less education.
- The average age of decedents at the time of death was 31 years. Five of the 31 deaths were to pregnant or birthing people aged forty years or older.

[9] Campbell J, Matoff-Stepp S, Velez ML, Cox HH, Laughon K. Pregnancy-Associated Deaths from Homicide, Suicide, and Drug Overdose: Review of Research and the Intersection with Intimate Partner Violence. J Womens Health (Larchmt). 2021;30(2):236-244

- Twenty-eight of the 31 decedents were White and three were Black or African American. There were no deaths among individuals whose race was recorded on any vital records document as Asian, American Indian/Alaska Native, Native Hawaiian or Other Pacific Islander, or any other specified race.
- All 31 decedents were reported to be non-Hispanic.
- Among decedents for whom a birth certificate for the associated birth was identified by Maine DRVS (n=24), 19 appear to have been insured by MaineCare/Medicaid for the associated birth, and 19 were residing in a rural area at the time of the associated birth.

COVID-19 Among Fetal, Infant, and Pregnancy-associated Deaths

Information collected by DRVS on Maine birth and death certificates is the primary source of data on the COVID-19 status of decedents (and/or decedents' birthing parent) at this time. COVID-19 status for fetal, infant, and pregnancy-associated deaths is collected by DRVS in two ways: 1) as an underlying or contributing cause of death as identified by the medical certifier of the death or 2) through a checkbox on the Maine birth certificate (added June 2020). Additionally, during 2020 and 2021, DRVS linked birth certificates with records in Maine's COVID-19 registry to ascertain any additional births in which the birthing person tested positive for COVID-19 infection during pregnancy and conducted follow-up with birth certifiers as needed. A checkbox for prenatal maternal COVID-19 status was added to the fetal death certificate as of January 1, 2021.

According to data collected on Maine's fetal death certificates, two of the 63 fetal deaths in 2021 had maternal COVID-19 or suspected COVID-19 infection reported as an initiating cause/condition of death and two had maternal COVID-19 or suspected COVID-19 infection reported as a significant cause/condition of death. The fetal mortality rate for pregnant persons who had COVID-19 during pregnancy was 6.8 fetal deaths per 1,000 births plus fetal deaths. This was higher than the rate for pregnant persons who did not have COVID-19 during pregnancy, which was 5.7 fetal deaths per 1,000 births plus fetal deaths. Among Maine's infant deaths, one of the 62 infant deaths in 2021 was due to COVID-19. The infant death rate for among birthing persons who had COVID-19 during pregnancy was not higher than that for birthing persons who did not have COVID-19 during pregnancy. COVID-19 was recorded as a contributing cause to one pregnancy-associated death in 2021.

MFIMR PANEL ACTIVITIES IN STATE FISCAL YEAR 2022

Panel Meetings and Case Reviews

The Panel is required by statute to meet at least twice in a state fiscal year, however, the Panel members agreed upon meeting at least four times if possible. All meetings include a review of the previous meeting's minutes, a provisional report from the MCH Epidemiologist on most recent deaths (fetal and maternal deaths only provided on an annual basis, infant deaths reported quarterly), updates from the panel coordinator and panel members, and case reviews (usually three). Based on discussions held by a Case Selection sub-committee formed during SFY 2021,

case reviews at each meeting were grouped by various common characteristics relevant to public health initiatives.

The SFY 2022 meetings (held virtually due to Covid-19 precautions) took place as follows:

- July 20, 2021, 1-4pm Virtual Zoom meeting
- October 19, 2021, 1-4pm Virtual Zoom meeting
- January 18, 2022, 1-4pm Virtual Zoom meeting
- April 19, 2022, 1-4pm Virtual Zoom meeting

July Meeting

The Epidemiology update included a discussion of efforts to expand information about the location of death demographics (e.g., rurality, poverty, health care access). New "social vulnerability" indices are available to drill down further on these variables in data analyses. The Maternal and Child Health team, along with the DHHS Commissioner's Office and numerous field experts from MaineHealth and Northern Light, is completing its application of the CDC Levels of Care Assessment Tool (LOCATe) to the Maine hospitals providing maternal and neonatal care.

The CDC ERASE MM Review to Action database, the Maternal Mortality Review Information Application (MMRIA), was also reviewed at this meeting as the work on examining all pregnancy-associated deaths continued. The preliminary work on the identification of these deaths by the Panel coordinator, MCH epidemiology and DRVS for the years 2018-2020 was also presented. An additional overview of the criteria for determining whether a pregnancy-associated death was pregnancy-related due to behavioral health issues (including substance use) was provided. These criteria fall into three categories: 1) pregnancy complication (increased pain from pregnancy or non-pregnancy condition, traumatic events like a preterm or still birth, delivery complications or relationship destabilization), 2) "chain of events" (access to care issues, postpartum depression, medication assisted treatment adjustments or substance use relapse), or 3) aggravation of underlying behavioral, treatment or medical conditions.

The Panel was updated on the progress of the CDC/MCH Safe Sleep initiatives, including hospital certification of safe sleep measures and the Cribs for Kids project. The annual review at the OCME of all CY 2020 SUIDs was summarized (N=6). There was less information on these deaths than in previous years, potentially caused by resource issues due to COVID-19. All these deaths involved unsafe sleep factors (e.g., bedsharing). These deaths were also summarized by social determinants of health variables (obtained from birth and death certificates) for CY 2020 and provisional CY 2021 Q1 and Q2 (N=4) (see Table 3):

Table 3. Selected demographic and risk factors reviewed, Maine, 2020 and Q1, Q2 2021

Demographic and Risk Factors	2020	Q1Q2 2021
Married	1/6	1/4
HS Diploma or less	6/6	4/4
Enrollment in WIC	3/6	1/4
Enrollment in MaineCare	6/6	3/4
Substance Use	3/6	1/4
Smoking during pregnancy	4/6	2/4

At this meeting, two maternal pregnancy-associated deaths and one infant SUID death were reviewed. The reviews generated discussions around the following issues:

- For birthing persons insured by MaineCare, automatic enrollment of infant after birth and guaranteed continuation of maternal coverage to 12 months postpartum is critical to improvement in perinatal outcomes.
- Increased need for inpatient and outpatient substance-use treatment options, as well as better connections between outpatient services and inpatient and emergency room care for pregnant women with substance use disorder. The panel supports the pilot work on the distribution of naloxone post-delivery that is being conducted by the Maine Perinatal Quality of Care organization (PQC4ME).
- Additional medical provider education is needed to increase utilization of community and state resources like WIC, PHN, Home Visiting, the Maine Children's Trust, and the Front Porch Program. Exploration of how to support postpartum doula agencies in Maine was also discussed, as well as the impact of the Plan of Safe Care work on increased identification and provision of family support needs. Safe Sleep education should include a focus on addressing fatigue and safe infant care.
- Screening and follow-up for Hepatitis C should be conducted for all pregnant women.

October Meeting

The Epidemiology report at this meeting included discussion of concerns about the accuracy and reliability of fetal death certificates which continue to be submitted on paper in Maine, rather than electronically like birth and death certificates. Addition of a question about substance use on the fetal death certificate would also be useful. Practices related to the examination and documentation of fetal deaths are variable – many do not involve placental pathology or histology review.

Panel member updates were provided on the postnatal and prenatal Plan of Safe Care work, and the LOCATe levels of care assessment for Maine continues. The need for the right care at the right place at the right time has led to a detailed examination of the organization of the transport systems across the state. Preterm labor algorithms for escalation of care are also being developed by the PQC4ME and this group has chosen maternal hypertension as the focus for an Alliance for Innovation in Maternal Health (AIM) safety bundle of best practices. AIM is a cooperative agreement between the American College of Obstetricians and Gynecologists (ACOG) and the U.S. Health Resources and Services Administration (HRSA) section on Maternal and Child Health. Maine already has a highly regionalized system of health care (Northern Light and MaineHealth), where the expansion of telehealth, virtual presence, and simulation training is occurring. The need to bring more Nurse Practitioners and Physicians Assistants into perinatal routine care has also been identified with this work.

Reviews of two fetal and one infant death were conducted at this meeting. Discussion included:

- Hospitalization during higher risk pregnancies should be more available. Closer observation and care can lead to fewer poor outcomes like preventable c-sections and inadequate provision of substance use treatment during pregnancy. Hospitalization also provides additional assessment of social service needs, provision of trauma-informed care, and post-discharge planning to organize a plan of safe care.

- Increased discussions between OBGYNs, birth hospitals, the Indian Health Service and Maternal Fetal Medicine (MFM) specialists for determining care needs and best locations for delivery should be supported.
- Bereavement counseling should be provided outside of a hospital or prenatal location of care, as these are locations that are difficult for families.
- A greater focus on family challenges related to disparities is needed to address the impact of social histories, cultural factors, and environmental health determinants on birth outcomes.

January Meeting

The Epidemiology report at this meeting included a presentation of the racial and socioeconomic disparities in the Maine infant mortality rate across the years 2016-2020. These disparities also exist in maternal mortality. In addition, the new process for identification of pregnancy-associated deaths is working for more current data but will probably not be appropriate for trending for the years prior to 2018. Review of the current CDC surveillance definitions for SUIDs was provided, and trend data for the years 2000-2020 presented with the acknowledgement that the definitions have changed over time. The importance of adequate resources for SUID investigations and the accuracy and completeness of the SUID Investigation (SUIDI) form was highlighted.

Panel member updates included expansion of the Naloxone project to additional hospitals, and kick-off date of 1/26/22 for the PQC4ME AIM Hypertension Bundle Project.

Four infant deaths were reviewed at the January meeting. Discussion included:

- Additional outreach is needed for non-parent caregivers in the Safe Sleep Campaign. It also might be useful to provide feedback to a birth hospital and prenatal care provider after an unsafe sleep death. This would not involve HIPPA information specific to a given death, but recognition that a SUID occurred in their patient populations and reinforcement of the best practices for education and care (e.g., Safe Sleep toolkits, state SUID rates, the Cribs for Kids program).

April Meeting

The Epidemiology report included discussion of a change on the birth certificate wording from "drug dependence" to "substance use disorder" as a pregnancy risk factor in 2021 Maine DRVS.

One fetal death and two infant deaths were reviewed at this meeting. Discussion included:

- Transport documentation was reviewed, and it was noted that no documentation is provided by non-EMS providers prior to or when they accompany transport. Work is being conducted by PQC4ME on expanding a Home Birth Transfer form for transports from the home to a hospital. In addition, an interfacility transport review committee is examining all perinatal transfers.
- Increased need for postpartum education for parents on pregnancy spacing and contraception options.
- Need for better care coordination around access to appropriate medications and adequate transportation for medical appointments continues to be evident.

PANEL PLANS AND GOALS FOR SFY 2023

Listed below are activities carried over from SFY 2021 and new activities to be conducted during SFY 2023 that supplement the SFY 2022 Panel findings.

1. **Continue to advocate for a full time Panel Coordinator position.** The successful completion of all MFIMR actions depends heavily on increased Panel resources in the form of a full-time Panel Coordinator.
2. **Work will continue to adapt meeting case review discussions such that cases reviews follow the national standards for MFIMR Panels**. The Panel began to utilize case review forms developed by the national organizations that align with the maternal, fetal, and infant mortality review databases: ERASE MM MMRIA and NCFRP National Fatality Review-Case Reporting System (NFR-CRS), even though the Maine MFIMR is not currently participating in the national databases. The case summary format was amended to better allow for successful data collection in accordance with the forms.
3. **Explore the possibility of joint participation agreements between MFIMR and CDSIR.** Attempts to establish additional coordination and communication with the Office of Child and Family Services' Child Death and Serious Injury Review Panel (OCFS CDSIR) around infant deaths (to reduce duplication of effort in the provision of recommendations based on infant death reviews) will continue. The CDSIR conducts reviews of all death and serious injury cases where they were involved with the family. These cases could also be summarized and submitted using the national CFRP database.
4. **Obtain a Memorandum of Understanding/ Data Sharing Agreement** between the OCME and DHHS such that all information obtained during a medical examiner case (e.g., autopsy, medical records, police reports, investigations, and interviews) is provided to the Panel coordinator.
5. **Continue to recruit for and potentially retire members** of the Panel to ensure statewide representation of all stakeholders who provide services related to prevention and intervention efforts, especially with respect for disparities in outcomes.
6. **Continue to pursue expansion of information collected by the Panel Coordinator** to include records other than those obtained from hospital, OB/GYN, midwife, MFM, and OCME sources. Plans are in place to obtain information from two Maine CDC programs – Public Health Nursing and WIC for the SFY 2023 cases. Rather than a records request, a form will be used for data collection to be filled out by staff at these programs. Efforts will continue to obtain access to records beyond the CDC to Home Visiting, other non-profit social services organizations with government affiliations, behavioral health providers, substance use treatment providers, and MaineCare.

Appendix A. MFIMR/MCH Roles & Responsibilities

Maternal, Infant & Infant Mortality Review Panel
MCH Roles & Responsibilities
Guided by Title 22 MFIMR Statute Language
Updated February 2020

1. Meeting (review Panel) Membership: The Panel must consist of health care and social services providers, public health officials, law enforcement officials, and other persons with professional expertise on maternal/fetal/infant death and morbidity.

2. Panel Member Appointment: The Maine CDC Director appoints.

3. Panel Member Tracking and Communication: Panel Coordinator or designee.

4. Panel Coordinator: The Maine CDC Director appoints.

5. Panel Meetings: Shall meet at least twice per year.

6. Family Contact: No sooner than four months by letter from the State Health Officer with letterhead "of the center (Maine CDC)" and includes invitation to participate in review of death from MFIMR.

7. Panel Coordinator duties:
   - Closely examine DRVS data for the:
     - Deaths of all women during pregnancy or within one year of giving birth;
     - "Majority" of cases in which fetal death occurs after 28 weeks gestation;
     - "Majority" of deaths of infants under one year of age
   - Selection of cases of death based on the need to review causes of death; or to obtain a representative sample of deaths
   - Prepare a deidentified summary or abstract of relevant information regarding the case, as determined to be useful to the Panel

8. Access to death certificates for deceased persons and for fetal deaths occurring after 28 weeks; Panel Coordinator or designee * *Epidemiology with Data, Research & Vital Statistics (DRVS) staff*

9. Access to health care information: Granted to the Panel Coordinator or designee of support, staff assigned to abstraction and clinical staff assigned for review and summary documents for Panel review.

10. Permission to interview family: Panel Coordinator or designated qualified staff.

11. Voluntary family interview: To gather information or data for the purposes of Panel abstract or summary (deidentified). Interviewer must meet the qualifications for Panel Coordinator

and have professional training and experience in bereavement and may make referral to bereavement counseling.

12. Case Summary or abstraction (de-identified): Relevant information regarding the case, as determined to be useful by the Panel.

13. Panel Duties:
    - Comprehensive Multidisciplinary Review of data presented.
    - Annual report to the department and Joint Standing Committee of the Legislature having jurisdiction over Health and Human Services matters. The report must identify factors contributing to maternal, fetal, and infant mortality. In addition, it must identify strengths and weaknesses of the care delivery system and recommendations for improvement.
    - Offer report to the person or persons who grant permission for interviews.
    - Provide a copy of the report, data reviews, and recommendations to *the Child Death & Serious Injury Review Panel. * MFIMR Panel may request/review data from the Child Death & Serious Injury Review Panel.*

14. Confidentiality: All records are maintained as confidential.

15. Funding: The Department may accept any public and private funding to carry out duties.

16. Rulemaking: "The Department … "shall adopt rules to implement, inclusive of:
    - Collection of information and data
    - Selecting members of the Panel, collecting; use of individually identifiable information
    - Conducting reviews
    - Assure access to PHI is restricted
    - Establish protocols for confidentiality

**Current rules call for a central registry of statewide organizations dedicated to improving the health of mother and infants by preventing birth defects, premature births, and maternal and infant mortality. The rules also state access to the privileged medical information is limited to the Panel Coordinator and Designee and all Panel members will sign confidentiality statements. Areas in the rule that may need updating include reference to family unwillingness to participate. The rule currently indicates the department shall not gather data relative to such cases.*

Appendix B. Infant Mortality Detailed Tables

Table B-1. Prevalence of select risk factors associated with infant mortality, Maine and US

Risk factor	Maine (year)	US (year)
Percent of births to birthing persons who smoked during pregnancy[1]	10.0% (2021)	5.5% (2020)
Percent of births to birthing persons with diabetes[1]		
Pre-pregnancy diabetes	1.1% (2021)	1.1% (2020)
Gestational diabetes	9.6% (2021)	7.8% (2020)
Percent of births to birthing persons with hypertension[1]		
Preexisting hypertension	6.7% (2021)	2.7% (2021)
Gestational hypertension	9.7% (2021)	9.1% (2021)
Percent of birthing persons who received late or no prenatal care[1]	3.4% (2021)	6.2% (2020)
Percent of births to birthing persons with a pre-pregnancy BMI of 30.0+ [1]	32.6% (2021)	30.8% (2021)
Percent of infants born low birthweight (<2,500 grams)[1]	7.3% (2021)	7.4% (2020)
Percent of infants born very low birthweight (<1,500 grams)	1.1% (2021)	1.2% (2020)
Percent of infants born preterm (<37 weeks gestation) [1]	9.4% (2021)	10.1% (2020)
Percent of births to birthing persons with HS diploma/GED or less education[1]	30.5% (2021)	36.5% (2021)
Percent of birthing persons who received WIC during pregnancy[1]	23.0% (2021)	32.0% (2020)
Percent of new birthing parents who experienced depression during pregnancy [2]	20.2% (2020)	15.2% (2020)
Incidence of neonatal abstinence syndrome (rate per 1,000 birth hospitalizations)[3]	20.5 (2020)	6.8 (2018)
Percent of new birthing parents who report always/often placing infant on back to sleep[2]	89.9% (2020)	79.5% (2020)
Percent of new birthing parents whose prenatal care was covered by Medicaid[2]	34.7% (2020)	36.6% (2020)
Percent of new birthing persons who had no insurance coverage for prenatal care[2]	2.0% (2020)	2.8% (2020)

Sources:
[1]ME: birth certificates, DRVS; US birth certificates, National Vital Statistics Reports Volume 70, Number 17, US CDC WONDER
[2]ME: Maine Pregnancy Risk Assessment and Monitoring Survey (PRAMS); US: PRAMS, participating US states
[3]ME: Maine Health Data Organization Inpatient Encounters; US: USDHHS Agency for Healthcare Research and Quality

Table B-2. Maine resident infant deaths by select factors, 2021

Maine 2021 Infant deaths	Count*	Percent (%)*
Total infant deaths	**62**	**100%**
Demographics of birthing persons		
Age of birthing person		
Under 25	18	30.0%
25-34	30	50.0%
35 and over	12	20.0%
Education of birthing person		
HS diploma/GED or less	26	43.3%
Some college or higher	34	56.7%
Ethnicity of birthing person		
Non-Hispanic	0	0%
Hispanic	60	100%
Race of birthing person (bridged)		
White (alone or bridged)	49	83.1%
Black/African American (alone or bridged)	4	6.8%
American Indian/Alaska Native (alone or bridged)	3	5.1%
Asian or Pacific Islander (alone or bridged)	3	5.1%
Other race alone	0	0.0%
Birthing person's country of birth		
US state or territory	56	93.3%
Elsewhere	4	6.7%
Birthing person received WIC during pregnancy		
Yes	17	28.3%
No	43	71.7%
Birthing person health status and access-to-care factors		
Pre-pregnancy weight (4-level)		
Underweight (<18.5)	0	0.0%
Normal weight (18.5 - <25.0)	26	46.4%

Maine 2021 Infant deaths	Count*	Percent (%)*
Overweight (25.0 - <30.0)	15	26.8%
Obesity (30.0+)	15	26.8%
Smoked last trimester of pregnancy		
No	49	84.5%
Yes	9	15.5%
Adequacy of prenatal care		
Adequate and adequate plus	41	73.2%
Inadequate and intermediate	15	26.8%
Principal payer for delivery		
MaineCare/Medicaid	29	49.2%
Other payer	30	50.9%
Infant health factors		
Plurality		
Multiple birth	6	10.0%
Singleton birth	54	90.0%
Birthweight		
<1000 g	29	50.9%
1000-1499 g	5	8.8%
1500-2499 g	7	12.3%
2500+ g	16	28.1%
Gestational age at birth		
<32 weeks	34	56.7%
32-33 weeks	4	6.7%
34-36 weeks	7	11.7%
37-38 weeks	7	11.7%
39+ weeks	8	13.3%
Birth location		
Hospital	60	100.0%
Home	0	0.0%

Maine 2021 Infant deaths	Count*	Percent (%)*
Other	0	0.0%
Geographic Factors		
Urban-rural (2-level) residence at birth		
Urban	17	31.5%
Rural	37	68.5%

Source: Linked Death-Birth certificates, DRVS

*****Infant deaths are excluded from counts and precent calculation if stratification characteristic is missing/unknown; counts and precents may not sum to total.

Table B-3. Maine resident infant deaths, counts and rates per 1,000 live births, by select factors, 2017-2021

Maine 2017-2021 infant deaths	Count	Rate per 1,000 live births	95% CI
Total	334	5.6	5.00 – 6.20
Maternal Demographics of birthing persons			
Age of birthing person	85	6.8	5.44 - 8.43
Under 25	181	5.0	4.26 - 5.73
25-34	65	6.0	4.61 - 7.62
35 and over			
Education of birthing person			
HS diploma/GED or less	159	8.2	7.01 - 9.62
Some college or higher	169	4.2	3.58 - 4.87
Ethnicity of birthing person			
Non-Hispanic	327	5.6	4.99 - 6.22
Hispanic*	4	3.2*	0.86 - 8.08*
Race of birthing person (bridged)			
American Indian/Alaska Native (alone or bridged)*	8	13.6*	5.85 - 26.72*
Asian or Pacific Islander (alone or bridged)*	3	2.7*	0.55-7.75*
Black/African American (alone or bridged)	22	7.5*	4.72-11.41*
Other race alone	0	0	0
White (alone or bridged)	297	5.4*	4.82-6.07*
Birthing person's country of birth			
US state or territory	302	5.5	4.93 - 6.20
Elsewhere	30	5.6	3.80 - 8.05
Birthing person received WIC during pregnancy			
Yes	95	6.2	5.02 - 7.59
No	232	5.2	4.57 - 5.94
Birthing person health status and access-to-care factors			
Pre-pregnancy weight (4-level)			
Underweight (<18.5)*	8	6.5*	2.79 - 12.71*
Normal weight (18.5 - <25.0)	105	4.6	3.75 - 5.55
Overweight (25.0 - <30.0)	81	5.1	4.02 - 6.29
Obesity (30.0+)	122	6.5	5.42 - 7.80
Smoked last trimester			
No	274	5.1	4.51 - 5.74

Maine 2017-2021 infant deaths	Count	Rate per 1,000 live births	95% CI
Yes	54	8.9	6.65 - 11.56
Adequacy of prenatal care			
Adequate and adequate plus	251	4.9	4.32 - 5.55
Inadequate and intermediate	69	8.4	6.57 - 10.69
Principal payer for delivery			
MaineCare	159	6.9	5.85 - 8.03
Other payer	171	4.7	4.01 - 5.44
Infant health factors			
Plurality			
Multiple birth	43	21.6	15.62 - 29.08
Singleton birth	289	5.0	4.43 - 5.60
Birthweight			
<1000 g	155	513.3	435.63 - 600.70
1000-1499 g*	17	46.1*	26.84 - 73.76*
1500-2499 g	44	11.9	8.63 - 15.94
2500+ g	106	1.9	1.56 - 2.31
Gestational age at birth			
<32 weeks	185	233.9	201.39 - 270.12
32-33 weeks*	11	19.1*	9.55 - 34.23*
34-36 weeks	29	7.3	4.90 - 10.51
37-38 weeks	38	2.5	1.78 - 3.46
39+ weeks	68	1.7	1.34 - 2.19
Birth location			
Hospital	320	5.5	4.90 - 6.11
Home*	10	7.8	3.76 - 14.41
Other*	2	9.3*	1.12 - 33.45*
Geographic Factors			
Urban-rural (2-level) residence at birth			
Urban	109	5.3	4.38 - 6.44
Rural	216	5.8	5.03 - 6.60
Urban-rural (4-level) = residence at birth			
Metro	109	5.3	4.38 - 6.44
Large rural	115	5.4	4.47 - 6.49
Small rural	41	5.2	3.69 - 6.98
Isolated rural	60	7.4	5.61 - 9.46

Maine 2017-2021 infant deaths	Count	Rate per 1,000 live births	95% CI
Birthing person's county of residence			
Androscoggin	26	4.5	2.90 - 6.51
Aroostook	21	6.7	4.15 - 10.25
Cumberland	61	4.4*	3.40 - 5.71*
Franklin*	9	7.9*	3.62 - 15.01*
Hancock*	10	4.8	2.32 - 8.91
Kennebec	36	6.5	4.54 - 8.97
Knox*	8	5.4*	2.34 - 10.67*
Lincoln*	10	7.5*	3.59 - 13.75*
Oxford*	17	7.0*	4.08 - 11.21*
Penobscot	37	5.6	3.97 - 7.77
Piscataquis	DSP	DSP	DSP
Sagadahoc*	9	5.9*	2.68 - 11.14*
Somerset*	15	6.6*	3.67 - 10.82*
Waldo	9	5.15*	2.36 - 9.79*
Washington	DSP	DSP	DSP
York	53	5.9	4.39 - 7.66

Source: Linked Death-Birth certificates, DRVS

*Interpret with caution; rates calculated with less than 20 individuals in the numerator.

DSP: Data suppressed for privacy

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