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

July 1, 2020 – June 30, 2021

Submitted to the Joint Standing Committee on Health and Human Services

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

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INTRODUCTION

The Maine Center for Disease Control and Prevention's (Maine CDC) Maine Maternal, Fetal and Infant Mortality Review Panel (MFIMR) 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 in order 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) 2021 report summarizes relevant data contributing to pregnancy outcomes, and outlines challenges, activities, and plans for the MFIMR Panel.

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). With this change, the Panel was referred to as the Maternal, Fetal and Infant Mortality Review Panel. The Legislature also repealed the Panel's sunset provision allowing the Panel to continue its work beyond the original end date of January 1, 2011.

The MFIMR Panel did not meet between SFY 2014 and SFY 2016. In 2016, the following areas were modified to improve the function of the MFIMR Panel process:

- The process of contacting families for interviews and consent for record reviews was revamped and families were contacted.
- Records were reviewed on the few cases with family consent.
- The Office of Child and Family Services (OCFS) was tasked with conducting interviews for families interested in sharing their experience with delivery of care, challenges, and recommendations.
- In 2017, an amendment to modify the MFIMR statute was approved and went into effect November 1, 2017. The changes to the statute were as follows:
- It formally changed the Maternal and Infant Death Review Panel to the Maternal, Fetal and Infant Mortality Review Panel.
- It provides that "director" in the laws governing the Panel refers to the medical director of the Maine Center for Disease Control and Prevention.
- It allows the Panel Coordinator to obtain, without the individual's or family's consent, the 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.
- It provides that the Panel is required to meet at least twice per year.

In SFY18, 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. In addition to this change, DHHS appointed a new Director for Maine CDC in October 2017. The new Director identified a misalignment with the current process and the national standards. The National FIMR provided technical assistance and efforts were placed on reconstituting the Maine MFIMR Panel to adopt standards that align with national standards and to become more systems focused. The Panel also began review of maternal deaths.

To efficiently implement recommendations and to ensure that the guidance provided by the national program is followed, Maine CDC made two structural changes to the MFIMR Panel. First, Dr. Alan Picarillo became chair of the Panel. Dr. Picarillo is board-certified in Neonatal-Perinatal Medicine and is affiliated with Maine Neonatal Associates and Maine Medical Center in Portland. He has been a very active member of Maine's MFIMR Panel. Secondly, a subcommittee was created to help plan Panel meetings and advise on topics to be discussed at meetings, including case selection.

The Panel officially added fourteen new members during SFY2019. Some of the new members had been attending the meeting as guests but received official designation by the CDC Director. In addition to several medical experts in the area (physicians and nurses), multiple stakeholder organizations are represented on the Panel: Office of Child and Family Services (OCFS), Medical Examiner's Office, State Police, Substance Use and Prevention, Public Health Nursing, Epidemiology, WIC, Perinatal Outreach, Maine Children's Trust, and Maine Families.

In the SFY2019 Annual Report, the MFIMR 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. Review of Maine CDC's Data, Records, and Vital Statistics Program (DRVS) maternal death data revealed several deaths that occurred after 43 days following the birth of a child when the cause of death was listed as obstetric. In addition, the national standards for maternal death reviews is up to one year following the birth of a child. The legislation governing the MFIMR Panel was amended on February 25, 2020, to require the Panel to review deaths within one year following birth. Due to the COVID-19 pandemic, the Panel met only 3 times, rather than the usual 4, in SFY2020.

In SFY2021, several guests attended meetings and will be considered for membership, 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 (EMS) for Children Committee within Maine EMS. Also, in SFY2021, the Panel Coordinator and MFIMR Steering Committee, DRVS staff and the Maine CDC epidemiology team worked to establish the necessary steps in extracting maternal death data from birth and death certifications according to the expansion of the time frame post pregnancy for review. The MFIMR Panel was provided with a presentation on these steps, the distinction between pregnancy-associated and pregnancy-related mortality (see below for a discussion), and how the maternal death data summaries will be provided to the Panel going forward.

Finally, in SFY2021, processes and procedures were adapted and streamlined to ensure expanded, efficient capture of medical records for pregnancy-associated deaths, fetal deaths greater than 28 weeks gestation and infant deaths up to one year of age by the Panel Coordinator. To provide a more integrated summary of all such deaths in Maine, tracking of additional population health related DRVS information, records request tracking, and scrubbing of DRVS data were enhanced.

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 Maine CDC's Data Research and Vital Statistics program (DRVS).

Fetal Death Summary

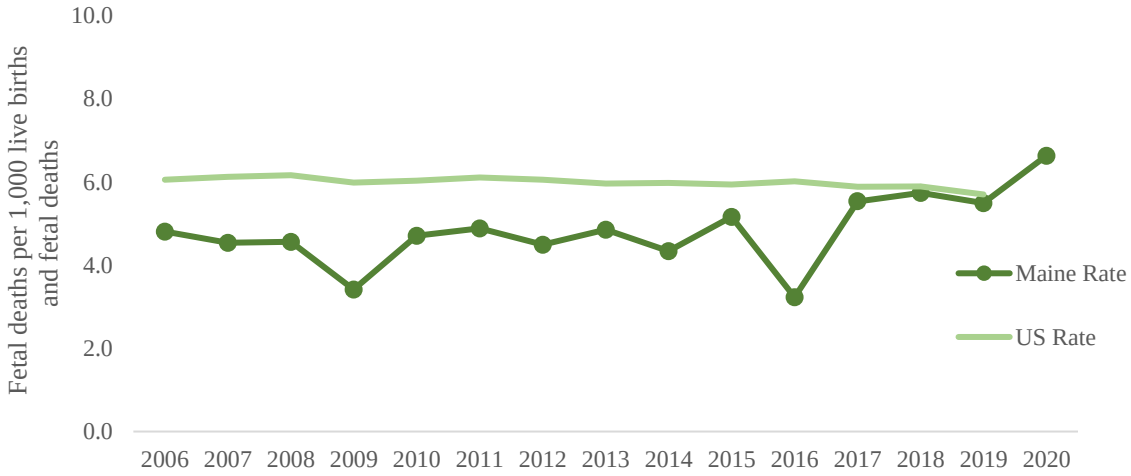
A fetal death is the spontaneous death of a fetus in utero that occurs at 20 weeks of gestation or later. Early fetal deaths are those occurring between 20-27 weeks gestation; late fetal deaths are those occurring at 28 or later weeks gestation. In Maine, healthcare providers are required to complete a fetal death certificate and register any fetal death occurring at 20 weeks or later. While the following summary includes all 2020 fetal deaths registered with DRVS, the MFIMR Panel reviews only late fetal deaths.

In 2020, there were 77 fetal deaths in Maine. The State's 2020 fetal mortality rate was 6.6 fetal deaths per 1,000 live births plus fetal deaths, a 19% increase over the 2019 fetal mortality rate of 5.5. Maine's 2020 early fetal mortality rate was 3.8 per 1,000 live births plus fetal deaths, and the late fetal mortality rate was 2.4 per 1,000 live births plus fetal deaths.

In 2019, the most recent year available for comparison, the US 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 2.7.[1]

[1] Gregory ECW, Valenzuela CP, Hoyert DL. Fetal mortality: United States, 2019. National Vital Statistics Reports. 2021; vol 70 no 11. Hyattsville, MD: National Center for Health Statistics.

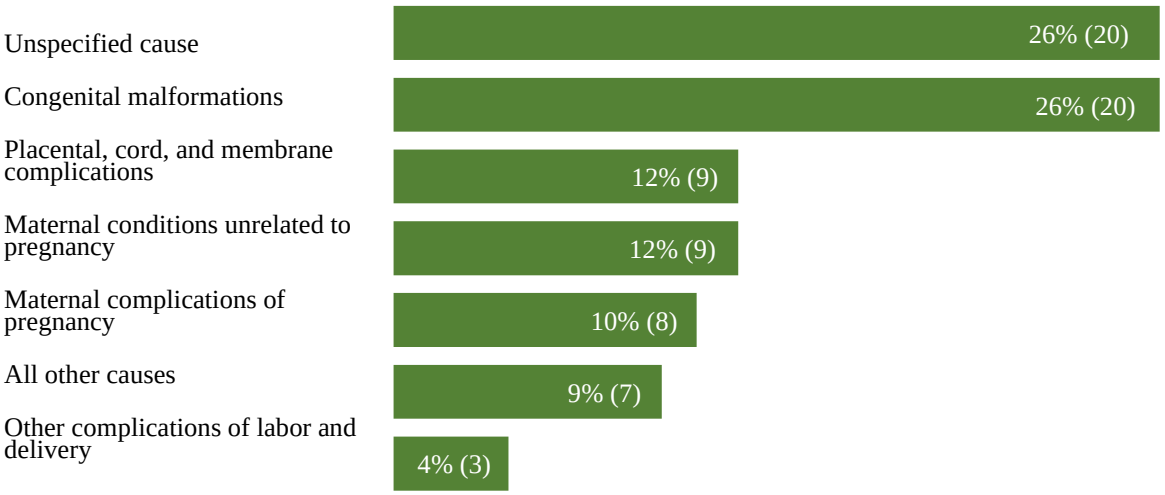
Figure 2. Fetal mortality rate, Maine and US, 2006 – 2020.



Source(s): US: Birth and Fetal Death Records, CDC WONDER; ME 2020: 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.[2] In 2020, 26% of Maine fetal deaths were due to a congenital anomaly; 12% were due to placental, cord, and membrane complications; and 12% were due to maternal health conditions unrelated to pregnancy. One in four fetal deaths were reported with an unspecified cause (Figure 3).

Figure 3. Initiating causes of fetal deaths (ICD-10), Maine, 2020



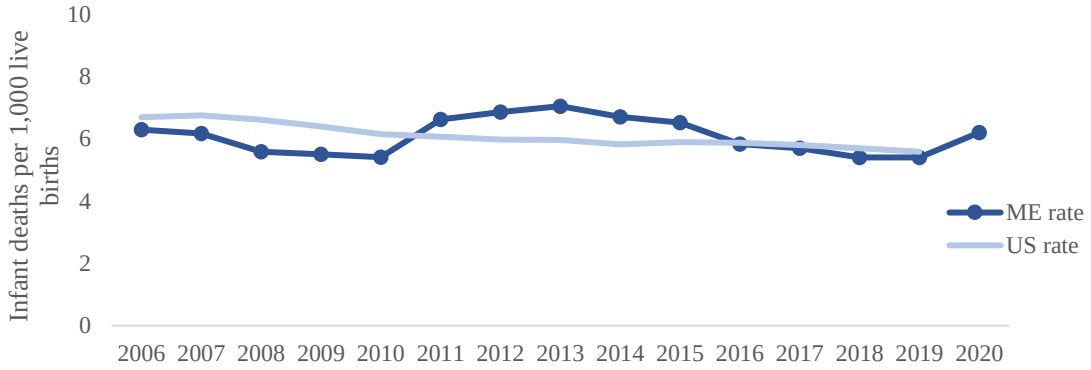
Source: Maine Fetal Death Certificates, DRVS

[2] Hoyert DL, Gregory ECW. Cause of fetal death: Data from the Fetal Death Report, 2014. National Vital Statistics Reports. 2016; vol 65 no 7. Hyattsville, MD: National Center for Health Statistics.

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. In 2020 there were 72 deaths among Maine resident infants, and the State's infant mortality rate was 6.2 deaths per 1,000 live births (Figure 4). The US 2020 infant mortality rate was not available at the time of writing; however, provisional 2020 quarterly estimates produced by the US CDC's National Vital Statistics System suggest that Maine's 2020 rate will exceed the US rate for the first time since 2015.[3]

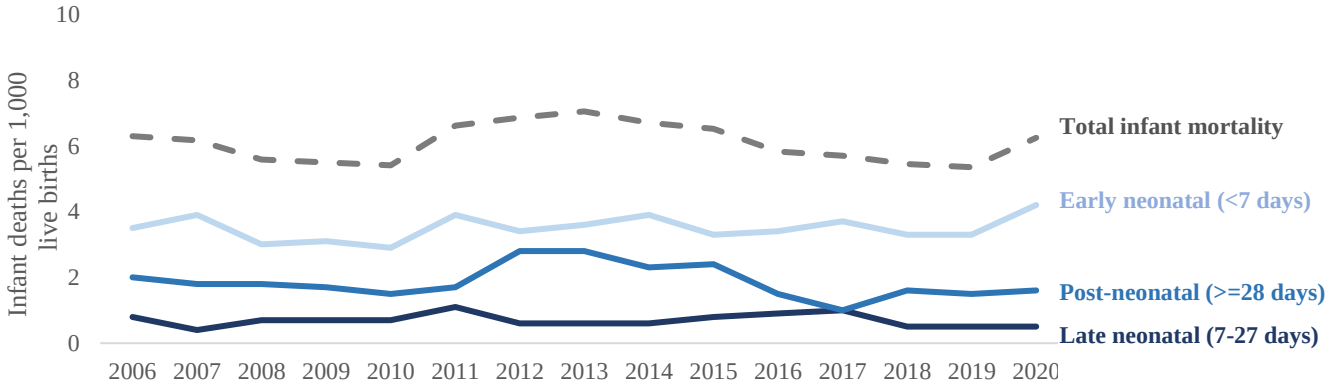
Figure 4. Infant mortality rate, Maine and US, 2006 – 2020



Sources: 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., the first seven days of life). In 2020, two in three of Maine infant deaths occurred during the early neonatal period. The increase in Maine's total infant mortality rate between 2019 and 2020 was driven largely by the increase in early neonatal mortality (Figure 5).

Figure 5. Infant mortality by age group, Maine, 2006 – 2020

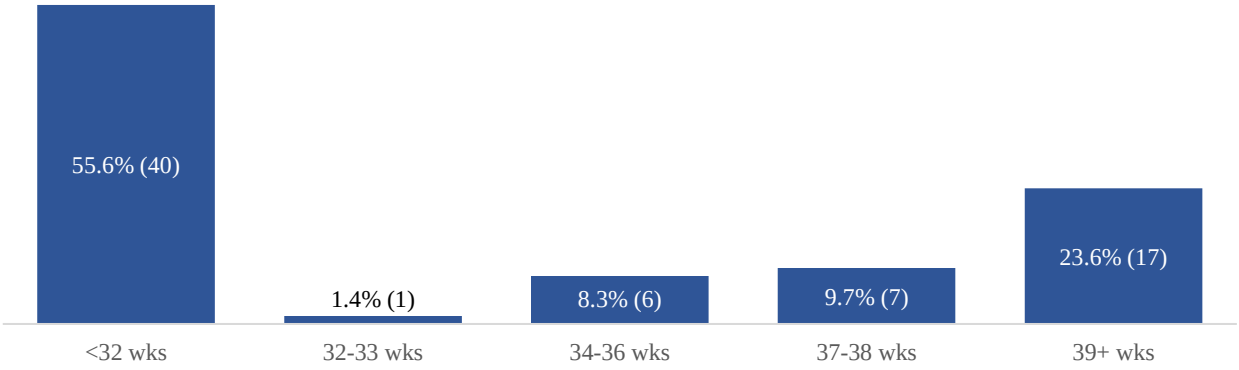


Source: Maine CDC Death and Birth certificates.

[3] Driscoll AK, Ely, DM. Quarterly provisional estimates for infant mortality, 2018-Quarter 4, 2020. National Center for Health Statistics, National Vital Statistics System, Vital Statistics Rapid Release Program; 2021.

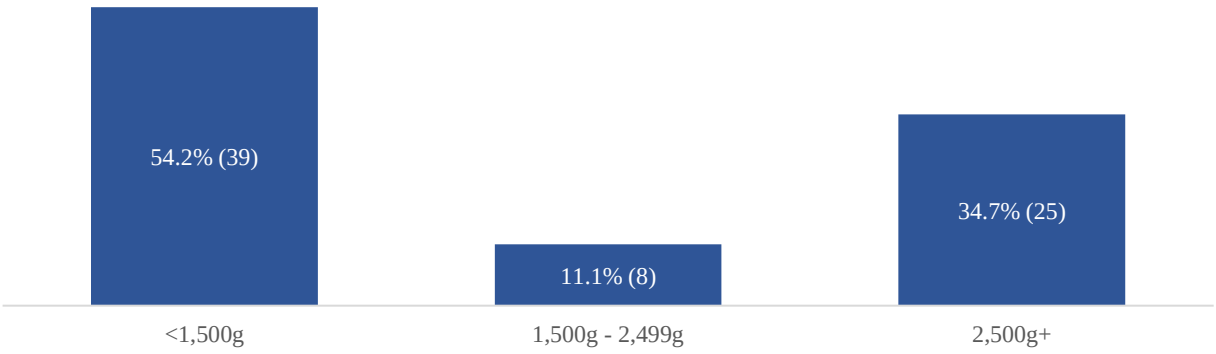
Preterm and low birthweight infants are at increased risk of morbidity and mortality compared to their term and normal birthweight peers.[4] In 2020, more than one in two deaths occurred among infants born before 32 weeks gestation (Figure 6). Over half of infant deaths occurring in 2020 were among infants weighing less than 1,500g at birth (Figure 7).

Figure 6. Proportion and count of infant deaths by gestational age at birth, Maine, 2020



Source: Linked Birth-Death Certificates, DRVS

Figure 7. Proportion of infant deaths by weight at birth, Maine, 2020



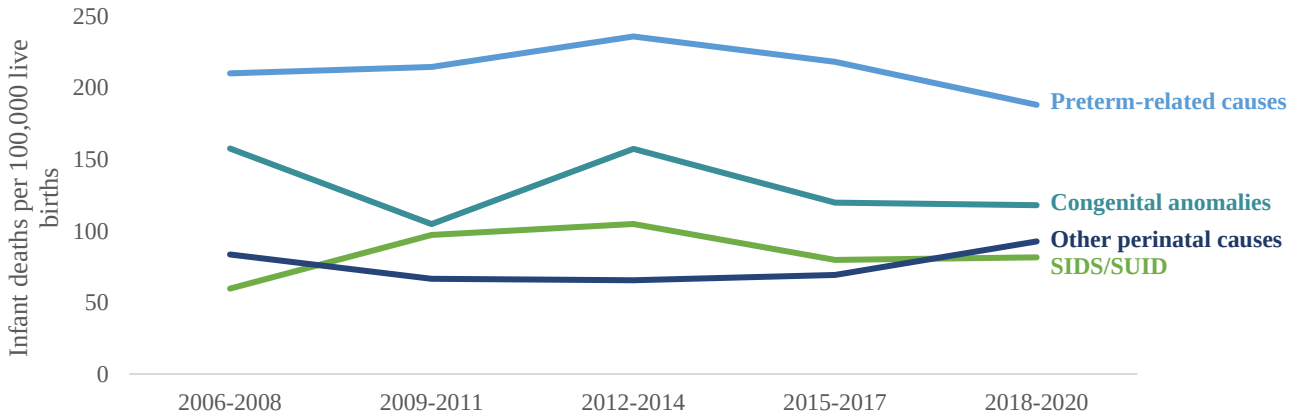
Source: Linked Birth-Death Certificates, DRVS

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 2020, 49% of deaths among infants born at 37 weeks gestation or earlier 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. While the reasons for this decline are not certain, the drop in SIDS/SUID mortality coincided

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

with a variety of efforts undertaken by Maine DHHS to promote safe infant sleep, including a social 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 8. Leading causes of infant mortality, Maine, 2006 – 2020.



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 2016-2020, the mortality rate among infants born to Maine women who smoked during the last trimester of pregnancy was double the rate among infants born to non-smoking mothers (10.3 deaths per 1,000 births versus 5.1 deaths per 1,000 births, respectively).

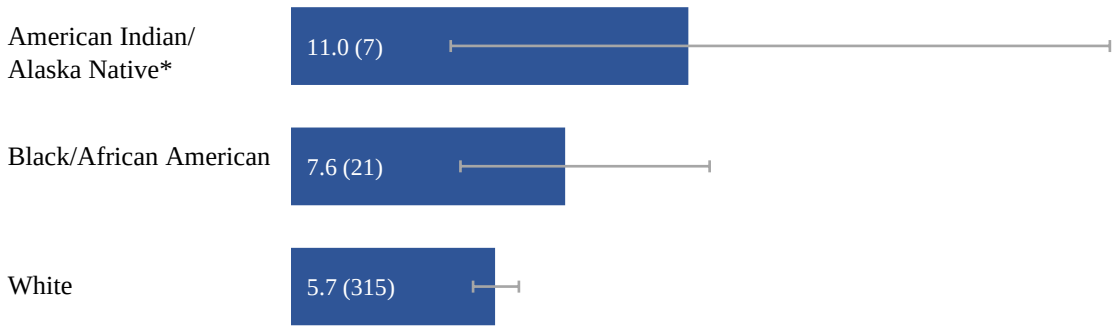
In Maine, some population groups experience a disproportionally high rate of infant mortality. In 2016-2020 infants born to mothers with a high school diploma/GED or less education died at two times the rate of infants born to mothers with at least some college (8.4 deaths per 1,000 births vs 4.2 deaths 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. In 2016-2020, the mortality rate among infants whose births were covered by MaineCare was 1.5 times higher than those covered by all other payers (7.2 deaths per 1,000 births versus 4.8 deaths per 1,000 births, respectively).

Like the rest of the United States, infants born to Black/African American and Indigenous/American Indian/Alaska Native mothers in Maine experience a higher mortality rate compared to white infants. Disparities in infant mortality by race in Maine and the US are

[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.

due complex and interrelated factors, including challenges in accessing essential resources (e.g., healthcare, education, employment, housing) for some racial subgroups, as well as issues of discrimination, structural racism, and colonialism.[6] In 2016-2020 the mortality rate among infants born to Maine resident Black/African American mothers was 7.6 per 1,000 live births; among infants born to Indigenous mothers it was 11 per 1,000; and among infants born to white mothers it was 5.7 per 1,000 (Figure 9). In 2016-2020 there were no deaths among infants born to Maine resident Asian or Pacific Islander mothers.

Figure 9. Infant mortality rates per 1,000 live births and counts by maternal race, Maine, 2016-2020



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

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 women during or soon after the end of pregnancy:

- **Pregnancy-associated death:** A pregnancy-associated death is any death to a woman while pregnant or within one year of the end of pregnancy, regardless of cause.[7]
- **Pregnancy-related death:** A pregnancy-related death is defined by the CDC as the death of a woman 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.[7]

[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. Accessed December 3, 2021.
[7] Review to Action. Definitions. https://reviewtoaction.org/learn/definitions. Accessed December 3, 2021.

- **Maternal death:** A maternal death is defined by the World Health Organization as any death to a woman 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, recent research conducted by the US CDC's National Center for Health Statistics has revealed 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 2020, there were six pregnancy-associated deaths among Maine women. One death occurred to a woman who was pregnant at the time of death; five deaths occurred between 43 and 365 days after the end of the decedent's pregnancy. None of the pregnancy-associated deaths in 2020 occurred between the end of pregnancy and 42 days post-pregnancy (Table 1).

Table 1. Timing of pregnancy associated deaths, Maine, 2018-2020

Pregnancy status at time of death	2018	2019	2020	Total
Pregnant at time of death	0	2	1	3
Pregnant within 0-42 days of death	1	0	0	1
Pregnant within 43-365 days of death	4	7	5	16
Total	**5**	**9**	**6**	**20**

Based on the underlying cause of death data collected on Maine death certificates, in 2020, three of Maine's six pregnancy-associated deaths were due to an injury or accident, including two motor vehicle related accidents and one death due to an accidental poisoning (drug overdose). The remaining three deaths were due to cardiovascular disease (1), respiratory disease (1), and obstetric causes (1) (Table 2).

Table 2. Causes of pregnancy associated deaths, Maine, 2018-2020

Causes of pregnancy associated deaths	2018	2019	2020	Total
Accidental poisoning (overdose)	0	2	1	3
Cardiovascular diseases	0	0	1	1
Direct obstetric causes	0	0	1	1
Homicide	0	2	0	2
Other accidents or injuries	1	1	2	4
Other or unspecified obstetric causes	2	3	0	5
Suicide	1	1	0	2
All other causes	1	0	1	2
Total	**5**	**9**	**6**	**20**

[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.

Substance use related deaths, including drug overdoses, account for a substantial proportion of pregnancy-associated mortality in the US.[9] In 2020, there was one pregnancy-associated death in Maine due to drug overdose; however, a preliminary review of additional death certificate data, linked birth certificate data, and medical record information (where available), suggest that an additional three decedents may have experienced some substance use related challenges during the prenatal, perinatal, or postpartum period.

Pregnancy-associated mortality is a rare event in Maine, making analyses of risk factors challenging due to very low numbers; however, many of the socioeconomic and demographic disparities and health status factors associated with fetal and infant mortality are also associated with pregnancy-associated mortality. In 2018-2020, half of the pregnancy-associated deaths in 2018-2020 occurred among decedents with a high school diploma or less education. Eighteen of the 20 pregnancy-associated deaths in 2018-2020 occurred to White decedents; two occurred to Black/African American decedents. Fourteen of the 17 decedents whose deaths occurred after the end of their pregnancy appear to have been covered by MaineCare/Medicaid for their most recent birth.

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

The MFIMR Panel has paid special attention to the potential impacts of the COVID-19 pandemic on fetal, infant, and pregnancy-associated mortality in Maine during this fiscal year. 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' mothers) at this time. COVID-19 status for fetal, infant, and pregnancy-associated deaths is collected by DRVS in two ways: 1) as 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 mother tested positive for COVID-19 infection during pregnancy, and conduct follow-up with birth certifiers as needed.

The COVID-19 status of women experiencing a fetal loss was not collected on Maine's Certificate of Fetal Death in 2020, but 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 birth and death certificates, there were no fetal, infant, or pregnancy-associated deaths for which the cause of death was COVID-19 infection. Among the 72 infant deaths occurring in 2020, one infant was born to a mother who tested positive for COVID-19 infection during her pregnancy. Among the five 2020 pregnancy-associated deaths for which birth certificate data are available for the associated birth, no decedents appear to have contracted COVID-19 during their pregnancies. The COVID-19 status of women experiencing a fetal death in 2020 is currently unknown.

[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

Given the importance of accurate and complete ascertainment of COVID-19 infection history among pregnant women and infants to numerous Maternal and Child Health priorities, the CDC's MCH epidemiologists are currently engaged in an on-going effort to evaluate the effectiveness of Maine's COVID-19 registry at capturing pregnancy status in COVID-19 cases. In the summer of 2021, a linkage was conducted between the registry's records and Maine birth certificates. COVID-19 registry records were limited to confirmed and probable COVID-19 infections among women of reproductive age reported between March 1, 2020, and May 31, 2021 and were matched to birth certificate records of births between January 1, 2020, and July 15, 2021. This linked dataset was used to quantify the sensitivity and specificity of the pregnancy status field in the COVID-19 registry and will be used in future analyses to explore the association between COVID-19 during pregnancy and various birth outcomes such as low birthweight, prematurity, and mortality.

MFIMR PANEL ACTIVITIES IN STATE FISCAL YEAR 2021

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. The SFY2021 meetings (held virtually due to COVID-19 precautions) took place as follows:

- July 21, 2020, 1-4pm Virtual Zoom meeting
- October 20, 2020, 1-4pm Virtual Zoom meeting
- January 19, 2021, 1-4pm Virtual Zoom meeting
- April 20, 2021, 1-4pm Virtual Zoom meeting

The meetings typically included review of one fetal, infant, and maternal death, as well as a presentation summarizing the Division of Records and Vital Statistics perinatal data provided by Maine CDC Epidemiology. During SFY21, a Case Selection sub-committee was formed, and alternatives were proposed that involved grouping case reviews by various common characteristics.

July Meeting

With the expansion of review criteria for inclusion of pregnancy-associated deaths up to 1-year postpartum, preliminary data from SFY19 and SFY20 were briefly summarized and discussion of the ramifications of the change occurred. This discussion specifically focused on the role of the Panel in determining pregnancy relatedness. According to the Federal CDC Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) project (which supports maternal mortality review Panels in 31 states with funding), the mission of Maternal Mortality Review Committees is to identify and review pregnancy-associated deaths, identify the factors contributing to the deaths, determine pregnancy-relatedness, and recommend public health and clinical interventions that may reduce these deaths and improve systems of care.

The Panel Coordinator provided preliminary information on a death involving the postpartum drowning of a woman with Substance Use Disorder (SUD) and significant issues with social determinants of health as an example of the expanded definition of pregnancy-relatedness. The

Panel has primarily focused on a definition of a maternal death as only related to strictly OB/GYN, MFM, or NICU issues and provider/caregiver education strategies in its previous reviews.

A presentation was also given on Maine's new Plan of Safe Care (POSC) for substance exposed infants: All states are required by the Child Abuse Prevention and Treatment Act Legislation (CAPTA) and the Comprehensive Addiction Recovery Act Amendments (CARA) (2016) to collect data connected to substance use during pregnancy and its impact on infants. Specified federal data requirements include: the number of infants identified as affected by or in withdrawal (states have varying definition for these terms), the number of infants for whom a POSC was developed, and the number of infants who received referrals.

Short-Term Plan: Maine's POSC will initially be created at birth for all substance-exposed infants, mothers, and their families by OCFS (short-term plan). The short-term POSC document is on target to be in September 2021.

Long-Term Plan: Maine's POSC becomes a universal plan, initiated, and created prenatally, by providers and/or supporting medical or social serviced staff, for all pregnant women. This universal plan is designed to gather federally required data along with additional specified data relevant to substance exposed infants and women in Maine. This work will continue through SFY22 and beyond.

The Panel discussed this work, asking questions about preparations for an electronic version, expressing concerns about OCFS involvement given the fear women have of losing custody of their infants and the requirement that the mothers consent to the plan, the utility of the plan for MFIMR given that SUD is not always mentioned in the DRVS mortality database, and the benefits of enhanced screening for social service needs for public health policy MFIMR recommendations.

The Panel was also updated on the work being completed on state certification of professional midwives (CPMs). Historically, the MFIMR Panel has championed this certification. There will continue to be uncertified midwives in some of our religious communities, but the new CPM program will provide many opportunities for the OB/GYNs, birthing hospitals, and EMS transport services to build a very strong network of support for home births.

At this meeting, two fetal deaths and one infant death were reviewed. Based on these reviews, issues discussed, working recommendations, and any follow-up included:

- Efforts to improve Maternal Fetal Medicine (MFM) providers' involvement in care periconceptually, throughout pregnancy, and postpartum should be undertaken. Steps to ensure the level of care escalation for MFM consultations be well published and presented to all birthing providers in Maine so that women receive risk-appropriate care.

October Meeting

At this meeting, a first attempt was made to document the case reviews using materials that accord with the standards of the two national organizations for the prevention of fetal, infant, and maternal deaths: the HRSA-funded National Center for (Infant and Child) Fatality Review

and Prevention, and the federal CDC Enhancing Reviews and Surveillance to Eliminate (ERASE) Maternal Mortality. The databases of these organizations are designed to collect detailed information surrounding fetal, infant, and maternal deaths, and MFIMR Panel recommendations and actions, by state. The Panel Coordinator and Maternal and Child Health epidemiologists continue to be in contact with these groups to explore beginning Maine's participation.

Reviews of one fetal, one infant, and one maternal death were conducted at this meeting. Topics discussed, working recommendations, and follow-up from the case reviews included:

- Recommendation that a MFM fetal echocardiogram be done for all IVF pregnancies.
- More extensive Intrauterine Fetal Death investigations should be conducted by birth hospitals to include autopsy, histological examination, blood work, and prenatal history. To this end, a presentation to Maine birth unit RN managers on stillbirth was scheduled and stillbirth guidelines were updated by MMC Maternal-Fetal Medicine and placed on the Perinatal Outreach website.
- Investigate how to get consensus on "cause of death" entries on death certificates.
- Improve access to prenatal care around MAT and SUD through investigation of collaborations with OBs and recruit an MAT provider to the Panel.
- Increase involvement of Public Health Nursing (PHN) for perinatal mental health issues.
- Ensure the acquisition of EMS records for any home births requiring hospital transfer and the building of more routine communication between home birth midwives and local EMS.

January Meeting

The Panel had a conversation about pregnancy outcomes around the age of viability. A live birth includes any babies born if they take a breath or have a heartbeat at delivery even if they are born below the age of viability. This distinguishes a live birth from a stillbirth. The difficulty with understanding the difference between a stillbirth or live birth around the age of viability is complicated by terms used on death certificates. "Extreme prematurity" as a cause of death correlates with a parental decision for a Do Not Resuscitate (DNR) order and "respiratory distress syndrome correlates" with no DNR. The rate of deaths per month by births around the age of viability will be added to the epidemiology quarterly report. In terms of the MFIMR Panel reviews, preventing prematurity for live births as well as stillbirths falls within its mission and goal.

Two infant deaths and one maternal death were reviewed at the January meeting based on review of DRVS data points by the case selection subcommittee. Topics discussed, working recommendations, and follow-up from the case reviews included:

- The Panel supports ongoing evaluations of the "perinatal system of care" within DHHS that include rural health "listening" sessions on access to OB/GYN services, assessment of birth hospital level of care designations, EMS/Trauma services, Home Visiting Programs and WIC services.

April Meeting

Panel member updates included: 1) all Maine birth hospitals have achieved Safe Sleep Certification from the Cribs for Kids program. Maine is the 2nd state to reach this goal; 2) a pilot project has been initiated by the Perinatal Quality Care for Maine (PQC4ME) group regarding provision of a Naloxone First Aid Kit to all postpartum discharge patients; 3) in January of 2021, after the hospital postpartum process was rolled out, 55% of substance-exposed infants received a POSC. An 80% level was achieved in March. Plans are underway and pilot projects being conducted for the introduction of the prenatal POSC.

Three infant death cases were reviewed at this meeting. Topics discussed, working recommendations, and follow-up from the case reviews included:

- Clarification is needed from OCME on what materials will be provided to the MFIMR Panel Coordinator for review as autopsy report has been the only document provided in recent cases. The Panel Coordinator requires access to OCME/police/Sudden Unexpected Infant Death investigations and transport information in order to prepare case summaries.
- Reach out to the Maine Association of Certified Profession Midwives to assist in development of peer review of all home birth mortalities.
- Investigate the status of peer review, mortality, and morbidity conferences, and reporting of sentinel events across all Maine birthing hospitals.
- Review use of Certified Professional Midwife continuum of care home birth guidelines in consideration of recommendations for the expansion of perinatal care for mothers and infants in all settings over a longer period (e.g., MaineCare coverage up to one year postpartum).
- Recommend expansion of initiation of treatment for SUD and completion of a POSC (if not already in place) prior to a discharge from an ED visit as standard of care for pregnant women and women up to one year postpartum. Consider creation and submission of a brief case summary of perinatal SUD-related fetal, infant, maternal deaths for submission to the DHHS Commissioner's office, the Maine Opioid Summit Task Force, the MoM grant program, or as an ECHO with the Opioid Clinical Advisory Group.
- Engage with Maine American Association of Pediatricians on primary care provider technical assistance to develop better coordination with SUD MAT providers.
- Reach out to coordinate efforts of the MFIMR Panel and the MCH hypertension AIM bundle project, with specific attention to the contribution of multiple social determinants of health (e.g., access to care, healthy food options, stress reduction).

RECOMMENDATIONS, PLANS, AND IDENTIFIED NEEDS FOR FY2022

Listed below are activities carried over from SFY2020 and new activities to be conducted during SFY22 that supplement the SFY21 Panel findings. The successful completion of all MFIMR actions depends heavily on increased Panel resources in the form of a full-time Panel Coordinator.

1. The Panel Coordinator will investigate ways to review and summarize all fetal, infant, and maternal deaths, and report to Panel members on themes of like cases. This will enable the Panel to identify any consistencies between cases to help inform public policy for population health goals more effectively. Case reviews may also be grouped by themes.
2. In 2020, there were three infant deaths involving a planned home birth, and an emergent home birth involving a woman with substance use disorder and homelessness. One death to an infant born at home was of undetermined etiology and occurred in a religious community that often eschews mainstream medical intervention, one involved an undiagnosed critical congenital heart defect, and the third led to investigations by multiple groups, including MFIMR and a peer review, and ended up with a censure by the Board of Complementary Health Providers of the delivering midwife due to multiple issues with her care. The Panel continues to review any fetal, infant, or maternal mortality related to a home birth, and will continue to work with the CPMs on peer review practices and Panel recommendations.
3. Work toward transitioning the fetal death records from a paper format to an electronic system similar to the infant death records in order to standardize the process for hospitals so that all birth and death certificates are filed in the same manner and information is legible and captured completely. In addition, electronic forms can be changed to reflect emerging issues when they are identified and allow quicker abstract and/or collation of data for case review and report purposes.
4. Explore an MOU with the National FIMR data repository (involving coordination with the Maine Child Death and Serious Injury Review Panel - CDSIR) and investigate use of the CDC's Maternal Mortality Review Information Application (MMRIA) to help track pregnancy-associated mortality data and recommendations of the Panel.
5. Work to establish additional coordination and communication with the OCFS CDSIR Panel around infant deaths to reduce duplication of effort in the provision of recommendations based on infant death reviews.
6. 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. In addition, update the orientation guide for new members that emphasizes the importance of consideration of medical provider independent factors and social determinants of health in case review and Panel work to be in line with national standards.
7. Plan for a statewide conference on perinatal bereavement to be held in 2022.
8. Consider options for conducting individual home interviews given their time-intensive and sensitive nature. Best practices will involve coordination with social services personnel who are known to the family and training for the interviewer(s) in accordance with national

standards.

9. 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. These additional sources include non-profit social services organizations with government affiliations, behavioral health providers, and substance use treatment providers. In pursuit of this goal, work will be conducted to establish clarity in the types of information from these sources covered by the MFIMR statute and assess whether modifications to the statute should be proposed. The Panel plans to pursue access to non-medical information that might be available from other DHHS offices that would provide additional insights to allow for enhanced recommendations.
10. Engage with the new Maine CDC Office of Population Health Equity for assistance with prioritizing health equity in MFIMR Panel case reviews and work.

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 mortality.

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:
   - Review 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 infant death based on the need to review causes of death; or
   - Obtain a representative sample of all 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 1. Prevalence of select risk factors associated with infant mortality, Maine and US

Risk factor	Maine (year)	US (year)
Percent of births to mothers who smoked during pregnancy[1]	12.8% (2020)	6.0% (2019)
Percent of births to mothers with diabetes[1]		
Pre-pregnancy diabetes	1.0% (2020)	1.0% (2019)
Gestational diabetes	9.2% (2020)	6.9% (2019)
Percent of births to mothers with hypertension[1]		
Preexisting hypertension	4.8% (2020)	2.2% (2019)
Gestational hypertension	9.0% (2020)	7.8% (2019)
Percent of mothers who received late or no prenatal care[1]	3.4% (2020)	6.4% (2019)
Percent of births to mothers with a pre-pregnancy BMI of 30.0+ [1]	32.7% (2020)	29.0% (2019)
Percent of infants born low birthweight (<2,500 grams)[1]	7.5% (2020)	8.3% (2019)
Percent of infants born very low birthweight (<1,500 grams)	1.1% (2020)	1.4% (2019)
Percent of infants born preterm (<37 weeks gestation) [1]	8.9% (2020)	10.1% (2020)
Percent of births to mothers with HS diploma/GED or less education[1]	32.1% (2020)	38.4% (2019)
Percent of mothers who received WIC during pregnancy[1]	24.4% (2020)	33.9% (2019)
Percent of new mothers who experienced depression during pregnancy [2]	19.9% (2019)	14.8% (2019)
Incidence of neonatal abstinence syndrome (rate per 1,000 birth hospitalizations)[3]	20.5 (2020)	6.8 (2018)
Percent of new mothers who report always/often placing infant on back to sleep[2]	91.4% (2019)	79.6% (2019)
Percent of new mothers whose prenatal care was covered by Medicaid[2]	36.5% (2019)	36.2% (2019)
Percent of new mothers who had no insurance coverage for prenatal care[2]	2.2% (2019)	2.8% (2019)

Sources:
[1]ME: birth certificates, DRVS; US birth certificates, 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 2. Maine resident infant deaths by select factors, 2020

Maine 2020 Infant deaths	Count*	Percent (%)*
Total infant deaths	**72**	**100%**
Maternal demographics		
Maternal age		
Under 25	18	25.0%
25-34	36	50.0%
35 and over	18	25.0%
Maternal education		
HS diploma/GED or less	34	47.2%
Some college or higher	37	51.4%
Maternal ethnicity		
Non-Hispanic	71	98.6%
Hispanic	1	1.4%
Maternal race (bridged)		
White (alone or bridged)	62	86.1%
Black/African American (alone or bridged)	6	8.3%
American Indian/Alaska Native (alone or bridged)	3	4.2%
Asian or Pacific Islander (alone or bridged)	0	0.0%
Other race alone	0	0.0%
Maternal place of birth		
US state or territory	65	90.3%
Elsewhere	7	9.7%
Mother received WIC during pregnancy		
Yes	19	27.1%
No	51	72.6%
Maternal health status and access-to-care factors		
Pre-pregnancy weight (4-level)		
Underweight (<18.5)	4	5.6%
Normal weight (18.5 - <25.0)	14	19.4%
Overweight (25.0 - <30.0)	15	20.8%
Obesity (30.0+)	31	43.1%
Smoked last trimester of pregnancy		
No	56	77.8%
Yes	15	20.8%

Maine 2020 Infant deaths	Count*	Percent (%)*
Adequacy of prenatal care		
Adequate and adequate plus	51	70.8%
Inadequate and intermediate	16	22.2%
Principal payer for delivery		
MaineCare/Medicaid	33	45.8%
Other payer	38	52.8%
Infant health factors		
Plurality		
Multiple birth	12	16.7%
Singleton birth	60	83.3%
Birthweight		
<1000 g	35	48.6%
1000-1499 g	4	5.6%
1500-2499 g	8	11.1%
2500+ g	25	34.7%
Gestational age at birth		
<32 weeks	40	55.6%
32-33 weeks	1	1.4%
34-36 weeks	6	8.3%
37-38 weeks	7	9.7%
39+ weeks	17	23.6%
Birth location		
Hospital	66	91.7%
Home	6	8.3%
Other	0	0.0%
Geographic Factors		
Urban-rural (2-level) maternal residence at birth		
Urban	25	34.7%
Rural	47	65.3%

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 3. Maine resident infant deaths, counts and rates per 1,000 live births, by select factors, 2016-2020

Maine 2016-2020 infant deaths	Count	Rate per 1,000 live births	95% CI
Total	346	5.7	5.13 – 6.34
Maternal demographics			
Maternal age			
Under 25	90	6.8	5.43 - 8.30
25-34	184	5.0	4.30 - 5.78
35 and over	70	6.7	5.23 - 8.47
Maternal education			
HS diploma/GED or less	168	8.4	7.14 - 9.73
Some college or higher	171	4.2	3.63 - 4.93
Maternal ethnicity			
Non-Hispanic	340	5.7	5.14 - 6.38
Hispanic	5	4.16*	1.35 - 9.70*
Maternal race (bridged)			
White (alone or bridged)	315	5.7	5.05 - 6.32
Black/African American (alone or bridged)	21	7.6	4.70 - 11.61
American Indian/Alaska Native (alone or bridged)	7	11.0*	4.43 - 22.71*
Asian or Pacific Islander (alone or bridged)	0	0.0	0
Other race alone	0	0.0	0
Maternal place of birth			
US state or territory	309	5.6	4.98 - 6.24
Elsewhere	35	6.7	4.64 - 9.27
Mother received WIC during pregnancy			
Yes	109	6.7	5.52 - 8.11
No	230	5.2	4.55 - 5.92
Maternal health status and access-to-care factors			
Pre-pregnancy weight (4-level)			
Underweight (<18.5)	9	6.8*	3.09 - 12.85*
Normal weight (18.5 - <25.0)	105	4.4	3.64 - 5.38
Overweight (25.0 - <30.0)	86	5.3	4.25 - 6.57
Obesity (30.0+)	132	7.1	5.92 - 8.39
Smoked last trimester			
No	274	5.1	4.50 - 5.72

Maine 2016-2020 infant deaths	Count	Rate per 1,000 live births	95% CI
Yes	69	10.3	8.05 - 13.09
Adequacy of prenatal care			
Adequate and adequate plus	266	5.1	4.52 - 5.77
Inadequate and intermediate	68	8.4	6.55 - 10.69
Principal payer for delivery			
MaineCare	169	7.2	6.14 - 8.34
Other payer	175	4.8	4.08 - 5.51
Infant health factors			
Plurality			
Multiple birth	47	23.3	17.10 - 30.94
Singleton birth	298	5.1	4.53 - 5.70
Birthweight			
<1000 g	167	535.3	457.15 - 622.88
1000-1499 g	16	44.5*	25.47 - 72.38*
1500-2499 g	43	8.0	8.35 - 15.53
2500+ g	110	2.0	1.61 - 2.36
Gestational age at birth			
<32 weeks	196	251.9	217.89 - 289.77
32-33 weeks	8	14.1*	6.10 - 27.85*
34-36 weeks	24	6.1	3.90 - 9.05
37-38 weeks	42	2.9	2.07 - 3.88
39+ weeks	74	1.8	1.43 - 2.29
Birth location			
Hospital	332	5.6	5.03 - 6.24
Home	11	8.0*	4.14 - 16.99
Other	2	10.9*	0.35 - 6.81
Geographic Factors			
Urban-rural (2-level) maternal residence at birth			
Urban	120	5.8	4.79 - 6.91
Rural	224	5.9	5.17 - 6.75
Urban-rural (4-level) maternal residence at birth			
Metro	120	5.8	4.79 - 6.91
Large rural	115	5.4	4.41 - 6.42
Small rural	88	6.6	5.27 - 8.09

Maine 2016-2020 infant deaths	Count	Rate per 1,000 live births	95% CI
Isolated rural	21	7.2	4.45 - 11.00
Maternal county of residence			
Androscoggin	28	4.7	3.11 - 6.77
Aroostook	26	8.3	5.41 - 12.14
Cumberland	68	5.0	3.86 - 6.30
Franklin	10	8.7*	4.17 - 15.98*
Hancock	7	3.2*	1.30 - 6.65*
Kennebec	33	5.9	4.04 - 8.25
Knox	11	7.1*	3.54 - 12.69*
Lincoln	11	8.1*	4.05 - 14.50*
Oxford	14	5.6*	3.08 - 9.44*
Penobscot	36	5.3	3.74 - 7.39
Piscataquis	DSP	DSP	DSP
Sagadahoc	10	6.4*	3.08 - 11.82*
Somerset	15	6.6*	3.68 - 10.84*
Waldo	DSP	DSP	DSP
Washington	7	5.0*	2.02 - 10.35*
York	61	6.7	5.13 - 8.62

Source: Linked Birth-Death Certificates, DRVS
**Interpret with caution; rates calculated with less than 20 individuals in the numerator.*
DSP: Data suppressed for privacy

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