Janet T. Mills
Governor

Jeanne M. Lambrew, Ph.D.
Commissioner

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March 8, 2021

Senator Ned Claxton, Chair
Representative Michele Meyer, Chair
Members, Joint Standing Committee on Health and Human Services
#100 State House Station
Augusta, Maine 04333-0100

Dear Senator Claxton, Representative Meyer and Members of the Joint Standing Committee on Health and Human Services:

Enclosed please find the 2020 Annual Report to the Legislature by the Maine Center for Disease Control and Prevention's Maternal, Fetal and Infant Mortality Review Panel. The Department of Health and Human Services submits this report as required under Title 22 of the M.R.S.A., Chapter 101, Section 261. It summarizes relevant data contributing to perinatal outcomes, and presents recommendations, plans, and identified needs for SFY 2021.

Thank you for the opportunity to provide the Joint Committee on Health and Human Services with a report on the activities and accomplishments of the Maine CDC Maternal, Fetal and Infant Mortality Review Panel.

Sincerely,

Jeanne M. Lambrew, Ph.D.
Commissioner

JML/klv

Enclosure

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

Maine CDC/DHHS

July 1, 2019 - June 30, 2020

Submitted to the Joint Standing Committee on Health and Human Services SFY2020

Annual Report

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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) 2020 report summarizes relevant data contributing to perinatal outcomes, and outlines challenges, activities, and future plans for the MFIMR Panel.

HISTORY

In 2005, the 122nd Maine Legislature passed *An Act to Establish a Maternal and Infant Death Review Panel*. 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 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.

In order 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, CDC Substance Abuse 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 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 benchmark 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.

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

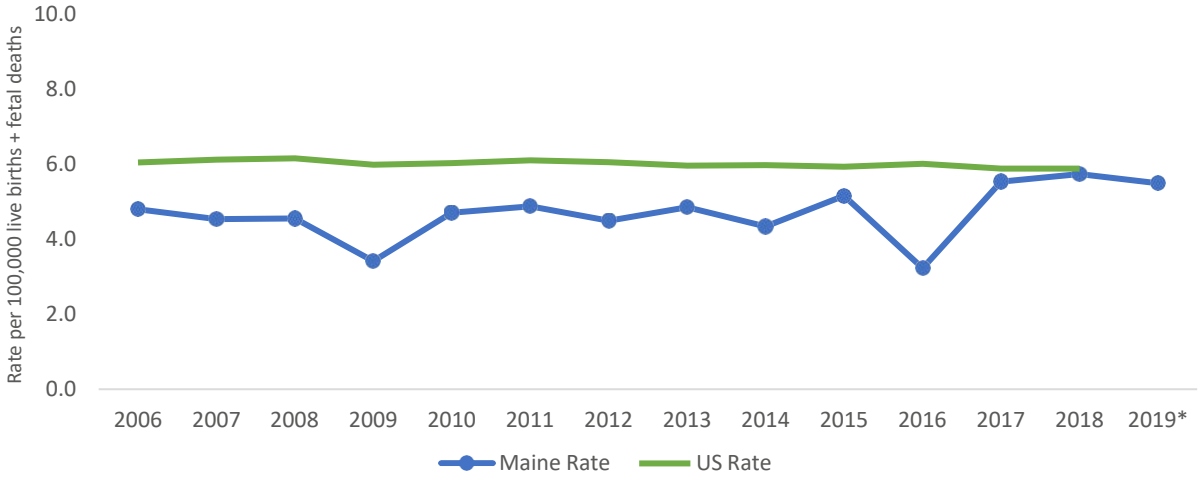
In support of the MFIMR Panel, funding is provided for epidemiologic analyses of maternal, fetal, and infant mortality through the Maternal and Child Health Block Grant (MCHBG) to help the Panel understand patterns and trends associated with maternal, fetal, and infant deaths. In the current fiscal year, MFIMR epidemiologists provided quarterly analyses of provisional birth data, fetal death data, infant death data, and pregnancy associated death data from 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 greater. Major causes of fetal death include maternal health conditions, complications of the placenta or umbilical cord, other complications of pregnancy, fetal anomalies, and fetal injury. Maine's fetal death data are maintained by Maine CDC's DRVS program. Maine's 2019 fetal death rate was 5.6 fetal

deaths per 1,000 live births plus fetal deaths (65 fetal deaths); the U.S. fetal death rate in 2018 was 5.9 fetal deaths per 1,000 live births plus fetal deaths.[1]

Figure 1. Fetal mortality rate, Maine and US, 2006 – 2019.

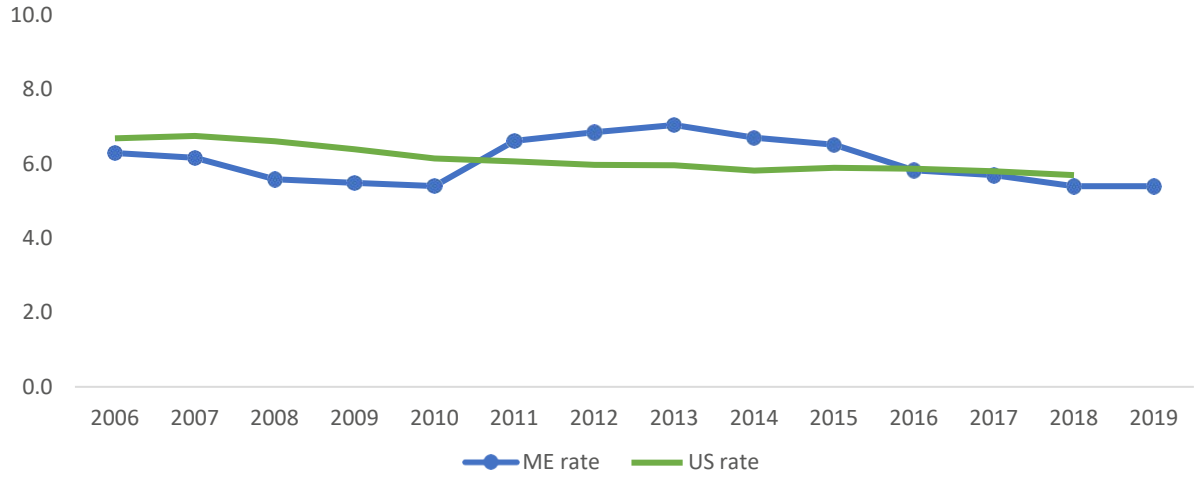


Source(s): US CDC WONDER Birth and Fetal Death Records; *ME 2019: Maine CDC Fetal Death and Birth certificates.

Infant Death Summary

An infant death is defined as any death to a live born infant prior to their first birthday. Maine's infant mortality rate peaked in 2013 but has been declining since that time. In 2019, there were 63 deaths among Maine resident infants, and the State's infant mortality rate was 5.4 deaths per 1,000 live births (Figure 2). In 2018, Maine's infant mortality rate was the 16th lowest in the U.S.[2]

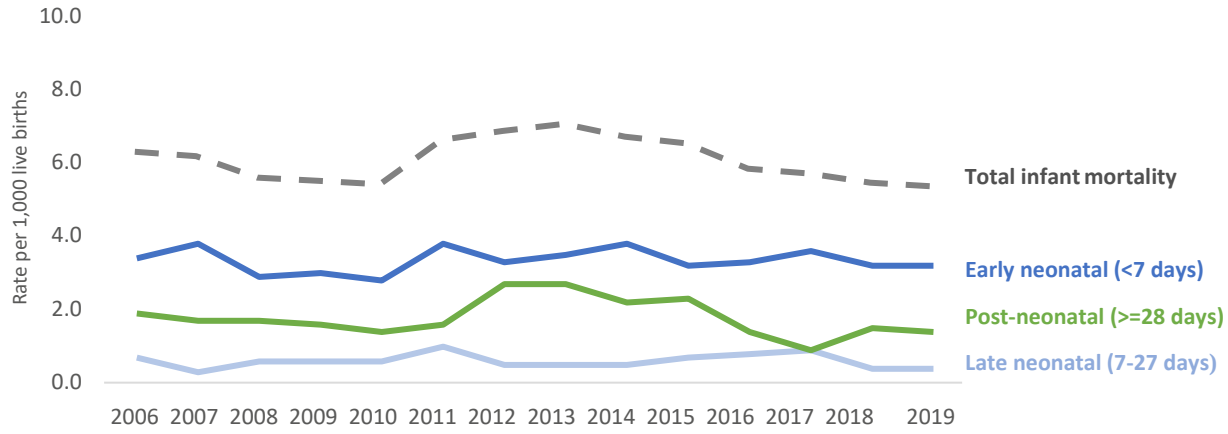
Figure 2. Infant mortality rate, Maine and US, 2010 – 2019.



Sources: US: 2006-2018 Linked Birth / Infant Death Records, CDC Wonder; Maine: 2006-2019 Maine CDC Death and Birth certificates

A majority of Maine's infant deaths occur in the early neonatal period (i.e., the first seven days of life) followed by the post-neonatal period (Figure 3). In 2019, more than 60 percent of deaths to Maine infants occurred during the early neonatal period.

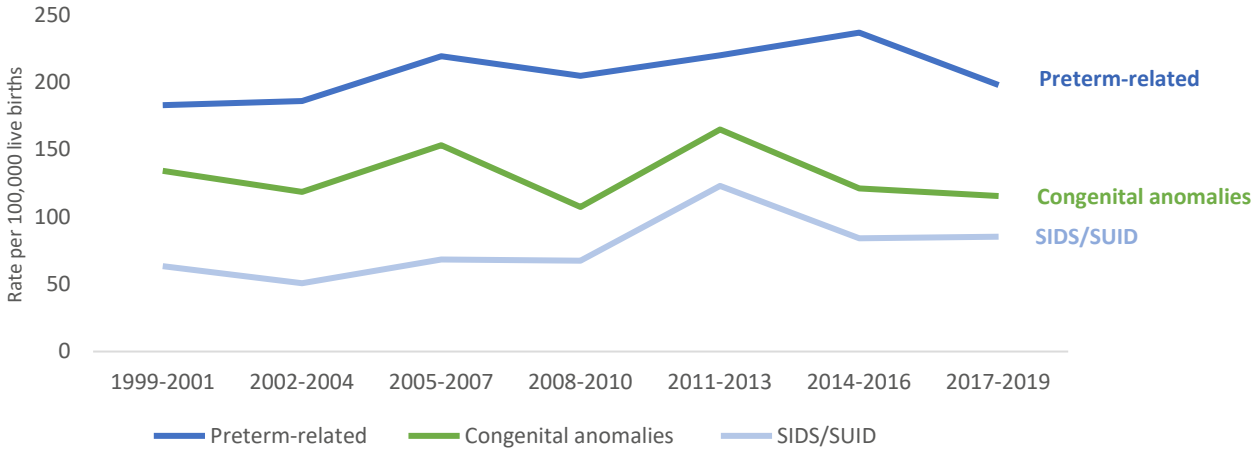
Figure 3. Infant mortality by age group, Maine, 2006 – 2019



Source: Maine CDC Death and Birth certificates.

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. Congenital anomalies (i.e., birth defects) and Sudden Infant Death Syndrome (SIDS)/Sudden Unexpected Infant Deaths (SUID) were the second and third leading causes, respectively (Figure 4).

Figure 4. Leading causes of infant mortality, Maine, 1999 – 2019.

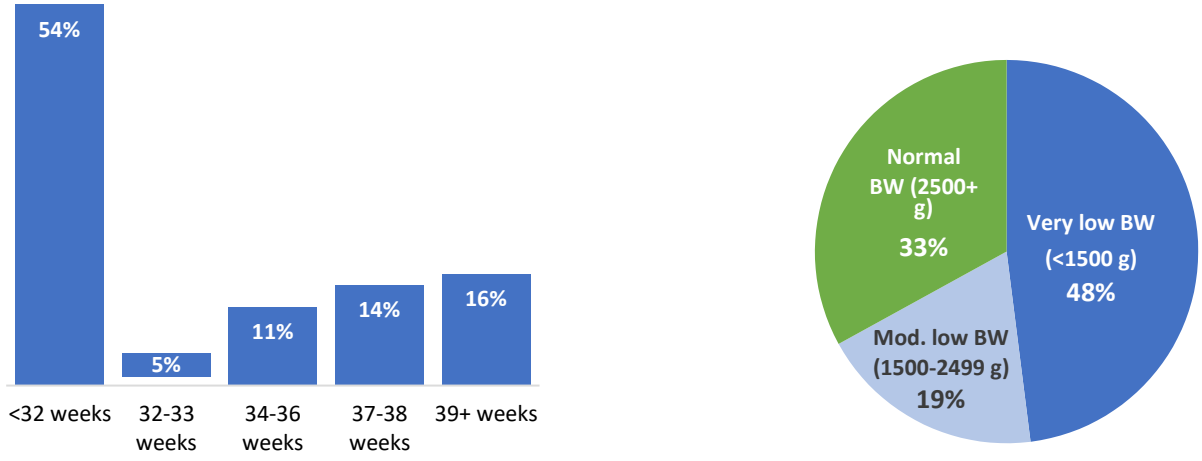


Source: Maine CDC Linked Birth-Death certificates

Preterm and low birthweight infants are at much higher risk of death compared to their term and normal birthweight peers. In 2019, 54% of infant deaths occurred among babies born before reaching 32 weeks

gestation, and close to half (48%) occurred among babies born very low birthweight (<1500g) (Figure 5).

Figure 5. Infant deaths by birthweight and gestational age at birth, Maine 2019



Source: Maine CDC Linked Birth-Death certificates

Infant mortality risk varies by certain maternal health, demographic, geographic and other factors. Several health challenges prevalent among Maine residents, including tobacco use, obesity and lack of access to health care, are also known risk factors for infant mortality.

- During 2015-2019, 12% of Maine women with a live birth **smoked during the last trimester of their pregnancy** [3] In the same time period, the IMR among infants born to women who smoked during the last trimester of pregnancy was 10.3 deaths per 1,000 births, compared to 5.5 deaths per 1,000 among women who did not smoke (see Appendix B, Table 2).
- Maine mothers with a **high school diploma/GED education or less ed** are significantly more likely to experience an infant death compared to mothers with at least some college. In 2015-2019, infants born to mothers with a HS diploma or less education died at 1.9 times the rate of infants born to mothers with at least some college (see Appendix B, Table 1).
- Similar to the US as a whole, **Black/African-American mothers** in Maine experience a higher rate of infant death compared to white mothers, although the Back-White infant mortality disparity has decreased somewhat over the past decade. In 2005-2009 Maine's Black-White infant mortality ratio was 1.63, while in 2015-2019 it was 1.25.

Maternal 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.[4]

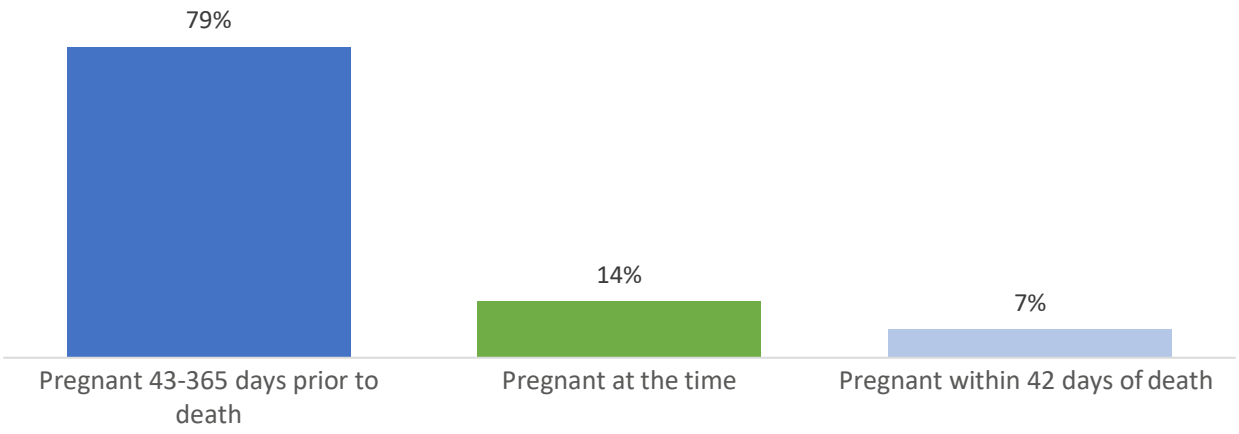
- **Pregnancy-related death:** A pregnancy-related death is defined by the CDC as the death of a woman while pregnant or within one year of the end of a pregnancy -- regardless of the outcome, duration or site of the pregnancy -- from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.[5]

- **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.[6]

Pregnancy status at time of death has been captured on Maine death certificates since 2010. Recent research conducted by the US CDC National Center for Health Statistics has revealed that death certificate data alone are insufficient for full ascertainment of pregnancy-associated deaths.[7]

In 2018, Maine CDC's DRVS program conducted a pilot linkage of death records of women of childbearing age to birth and fetal death records in an effort to more completely ascertain pregnancy-associated deaths in the State. Following this successful pilot linkage, in 2019 the Maine CDC DRVS program began providing annual and quarterly linked data for pregnancy associated deaths to MFIMR's panel coordinator and epidemiologist.

Figure 6. Deaths to Maine women during pregnancy and up to one year postpartum, by time of death 2018-2019.



Source: Maine CDC Linked Birth-Death-Fetal Death certificates

In 2018-2019, there were 14 pregnancy-associated deaths among Maine women. The majority (77%) of these deaths occurred 43-365 days after the end of pregnancy (figure 6). Close to 2 in 3 deaths occurred among women with a high school diploma or less education (63.3%) and 18.2% of deaths occurred among Black/African-American women. In the US, Black/African-American women are 2-

3 times more likely to die from a pregnancy-related cause than white women.[8]

Close to two-thirds (64%) of the pregnancy-associated deaths in 2018-2019 were due to injury-related causes, including overdoses, homicides, suicides, car accidents. Just over one-third (36%) were due to a cause related to or aggravated by pregnancy. These types of deaths are often related to cardiovascular diseases, infections, hemorrhages, cardiomyopathy, and embolisms.[9]

MFIMR PANEL ACTIVITIES IN STATE FISCAL YEAR 2020

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. Due to the Coronavirus Pandemic, the panel met only 3 times during SFY2020. The meetings typically include review of at least 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. The SFY2020 meetings took place as follows:

- July 23, 2019, 1-4pm at 286 Water Street, Room 16, Maine CDC
- October 22, 2019, 1-4pm at 286 Water Street, Room 16, Maine CDC
- January 21, 2020, 1-4pm at 286 Water Street, Room 16, Maine CDC

Reviews of one fetal and one infant death were conducted at the July meeting of the Panel. Based on these reviews, working recommendations included:

- additional investigation of the resources, processes, and procedures for families after an infant death (e.g., memory-making activities, bereavement counselors and support groups)
- inclusion of infants with special needs in Safe Sleep education
- request information on the regulations for minimum heat levels in a rental unit
- consistent message from experts on weeks of gestation and resuscitation measures
- increased involvement of the Panel with Public Health Nursing in reviewing autopsy reports with families to ensure they understand the information and to answer any questions the family may have
- examination of AAP recommendations regarding the use of H2 blockers which are used for reflux/stomach acid/stomach ulcer issues
- making Narcan available prenatally

Reviews of one fetal, one infant, and a secondary review of one maternal death were conducted at the October meeting of the Panel. Communications with providers about the Cribs for Kids Program was discussed and an update was provided on the Certified Professional Midwife legislation being developed. Other topics and working recommendations included:

- further discuss the threshold for viability and possible need to adjust the low end of the range for review of fetal deaths
- clarify vital statistics processes/procedures/policies/law around stillbirth and fetal demise
- recruit a parent member who has experienced a stillbirth
- recruit a Certified Nurse Midwife and Certified Professional Midwife to the panel
- continue planning for contact with family members following a death to request an interview – research resources from the national MFIMR groups, including the March of Dimes
- need to work with OCFS around infant deaths, e.g., deaths while infant was in state custody

- investigate national recommendations for maintaining up-to-date EMS Protocols and PALS Algorithms for remote areas
- use categories of Maine counties by population/remoteness/poverty levels rather than county name to enhance confidentiality of information on case summaries
- investigate the possibility of initiating parent bereavement support with an education and information card for State Police to use at a death scene
- better understand how community providers (including pediatricians, birth hospitals, public health nurses), are debriefing after Sudden Unexpected Infant Deaths (SUIDs)
- investigate current status of recommendations in other states and at the national level about the provision/distribution of Narcan
- explore access to mental health records for panel review

One fetal death, and one infant death, were reviewed at the January meeting and additional discussions and decisions were made about processes and review materials for maternal death cases. Amy Belisle, Maine State DHHS Chief Child Health Officer, provided an overview of the Qualdigm Infant Mortality Project and its findings. An update on the Safe Sleep Initiative included discussion of efforts focused on sustainability and continuity of programs – webinars, certifications, in-hospital audits of sleep practices, education for all community-contact-level personnel (e.g., PHN, WIC, Home Visiting, MaineCare eligibility specialists). Other topics discussed and working recommendations based on the reviews:

- addition of rate of deaths per month by births to be added to the epidemiology update
- evaluations of the "perinatal system of care" ongoing to 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
- the structure of meetings and case reviews will be re-organized so that someone is designated to take minutes and the panel coordinator will have the identified medical record information available on their computer to address issues that are unclear from the case summaries
- update on work with DRVS to procure individual and summary data for past two years on fetal and maternal deaths
- investigate who might be able to conduct home interviews with family members after a perinatal death – social workers, bereavement specialists, hospice personnel and continuing research on best practices for the "initial ask" for these interviews
- complete national FIMR data registry Data Use Agreement in conjunction with the Maine State Child Death and Serious Injury Review Panel (CDSIR) (conducted out of the OCFS)

The April meeting was canceled due to COVID-19 and preparations were made to conduct the July meeting (first meeting of SFY2021) of the panel virtually over Zoom.

Expansion of Reviews of Maternal Deaths

With the legislative amendment to include maternal deaths up to one year after a birth (rather than up to 42-days only), efforts were made to gain a better understanding of the causes of these deaths based on previous and current work from the national MFIMR and CDC groups. Multiple factors have been identified by national organizations as risk factors for maternal or pregnancy-related mortality: [5, 10, 11, 12, 13] [7]Chronic medical conditions (e.g. hypertension, diabetes, obesity, mental health, substance use disorder)

- Patient lack of knowledge of warning signs and non-adherence to medical regimens

- Unstable housing
- Limited access to transportation
- Misdiagnosis and delays in diagnosis and effective treatment (inadequate provider training, lack of coordination between providers, health facility lack of experience with obstetric emergencies and appropriate personnel or services)
- Failure to screen and failure in follow-up
- Inadequate or absent systems of care policies and procedures

Approximately three in five pregnancy-related deaths in the U.S. are preventable.[5] Maine's rates of maternal chronic health and behavioral issues, poverty, and provider, institutional, community, and state systems of care, are areas for potential prevention and intervention efforts, and will be examined in all future maternal death reviews. Coordination with other state agencies on maternal death concerns related to the social determinants of health were initiated.

The Maine Panel Coordinator and Sub-Committee, DRVS staff and the CDC epidemiology team worked to establish the necessary steps in extracting maternal death data from birth and death certifications for pregnancy-associated deaths. The MFIMR panel was provided with a presentation on these steps, the distinction between pregnancy-associated and pregnancy-related mortality, and how the maternal death data summaries will be presented going forward.

Case Summary Preparation

Processes and procedures were adapted and streamlined to ensure expanded, efficient capture of medical records for perinatal deaths by the Panel Coordinator. In order to provide a more integrated summary of all perinatal deaths in Maine, tracking of additional population health related DRVS information, records request tracking, and scrubbing of DRVS data were enhanced. Regular meetings of the panel sub-committee were held to guide these efforts.

RECOMMENDATIONS, PLANS, AND IDENTIFIED NEEDS FOR FY2021

In addition to reviewing three cases at each meeting, the Panel Coordinator will continue to 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 policy more effectively.

Other activities carried over from SFY2020 and new activities to be conducted during SFY2021 include:

1. Finalize a data use agreement 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 data and recommendations of the Panel.
2. Establish additional coordination and communication with the CDSIR panel around infant deaths to reduce duplication of activities and effort in the provision of recommendations based on death reviews.
3. Continue to recruit members for the Panel to ensure statewide representation of all stakeholders who provide services related to prevention and intervention efforts and

complete an orientation guide for new members. New members to be sought include a parent who has experienced a stillbirth, a Certified Professional Midwife, and a Certified Nurse Midwife.

4. Update listings of bereavement resources and coordinate with first responders and care providers for fetal, infant, and maternal deaths to expedite the quick and complete referral of families to bereavement resources with follow-up, and to introduce the work of the MFIMR panel.
5. Begin planning for a statewide bereavement conference to be held in 2022.
6. Continue work on developing a robust home interview program, to include 1) introduction of the work of the MFIMR Panel at the time of death by first responders and care providers, 2) revision of outreach letters of invitation for home interviewing, 3) determination of appropriate personnel for conducting interviews, and 4) training of interviewers in the fetal, infant, and maternal death interview process. We plan to work closely with the Maine OCFS CDSIR Panel in this effort.
7. Pursue expansion of information collected by the Panel Coordinator to include records other than those obtained from hospital, OB/GYN, midwife, Maternal-Fetal Medicine, and Office of the Medical Examiner sources. These include access to Public Health Nursing, Home Visiting, WIC, mental health providers, substance use treatment providers, and EMS records. While these additional records are accessible per the MFIMR statute, they have not been regularly sought in past case reviews. The panel would also like to pursue access to non-medical information across Maine DHHS.

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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 (8/18 need updates): "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. Maine infant death and infant mortality rates

Table 1. Maine resident infant death counts and rates per 1,000 live births by select demographic, geographic and risk factors, 2005-2009, 2010-2014, 2015-2019 *

	2005-2009	2010-2014	2015-2019
	Count Rate per1,000	Count Rate per 1,000	Count Rate per1,000
Total infant deaths	423 6.1	413 6.5	356 5.8
Maternal age			
Under 25	164 7.1	142 7.5	90 6.3
25-34	180 4.9	207 5.7	197 5.3
35 and over	58 5.9	53 6.0	65 6.4
Maternal education			
HS diploma/GED or less	231 7.5	205 8.0	170 8.2
Some college or higher	176 4.6	199 5.3	177 4.4
**Maternal ethnicity ** **			
Non-Hispanic	406 5.9	301 6.0	347 5.8
Hispanic	5 4.9	5 6.1	7 5.9
**Maternal race (bridged) ** **			
White (alone or bridged)	391 5.9	284 5.9	327 5.7
Black (alone or bridged)	16 9.6	12 7.2	19 7.1
AIAN (alone or bridged)	2 3.5	3 5.9	5 7.6
API (alone or bridged)	5 4.3	8 8.8	2 1.9

alone or bridged	0 0.0	1 9.9	0 0.0
Maternal place of birth			
US state or territory	376 5.9	370 6.4	319 5.6
Elsewhere	26 5.8	33 7.2	35 6.8
Urban-rural (2-level) maternal residence at birth			
Urban	147 6.3	142 6.4	131 6.2
Rural	252 5.7	257 6.4	221 5.7
Urban-rural (4-level) maternal residence at birth			
Metro	147 6.3	142 6.4	131 6.2
Large rural	154 6.2	135 6.0	112 5.1
Small rural	88 5.4	105 7.2	85 6.2
Isolated rural	10 3.0	17 5.5	24 8.0
Maternal county of residence at birth			
Androscoggin	49 7.0	47 7.2	30 4.9
Aroostook	24 6.7	26 7.9	25 7.7
Cumberland	89 6.0	75 5.4	73 5.3
Franklin	4 2.8	10 7.6	9 7.6
Hancock	9 3.5	14 6.0	10 4.5
Kennebec	31 5.0	46 7.8	27 4.7
Knox	12 5.9	11 6.3	12 7.5

Lincoln	3 1.9	10 7.3	10 7.1
Oxford	17 6.0	14 5.4	10 4.0
Penobscot	51 6.4	53 7.2	40 5.7
Piscataquis	4 5.0	10 14.4	2 3.0
Sagadahoc	11 5.5	7 4.1	11 6.9
Somerset	19 7.1	16 6.6	19 8.3
Waldo	12 5.8	15 8.0	9 5.2
Washington	8 4.8	8 5.3	9 6.2
York	56 5.5	37 4.0	56 6.0
Plurality			
Multiple birth	73 32.7	69 31.9	43 21.2
Singleton birth	345 5.1	341 5.5	312 5.2
Birthweight			
VLBW (<1500g)	235 294.5	210 290.5	183 262.6
MLBW (1500-2499g)	48 12.7	46 12.6	45 12.1
NBW (2500+g)	128 2.0	152 2.6	114 2.0
Birthweight (4 groups)			
<1000g	217 502.3	188 526.6	164 520.6
1000-1499g	18 49.2	22 60.1	19 49.7
1500-2499g	48 12.7	46 12.6	45 12.1

2500+g	128 2.0	152 2.6	114 2.0
Gestational age			
<32 weeks	237 252.4	208 256.8	195 237.2
32-33 weeks	11 14.6	12 19.2	13 22.6
34-36 weeks	36 7.9	35 9.4	22 5.6
37-38 weeks	47 3.0	46 3.5	44 3.1
39+ weeks	83 1.7	102 2.3	80 1.9
Birth location			
Hospital	417 6.1	401 6.4	345 5.7
Home	1 1.3	7 6.5	7 5.8
Other	0 0.0	1 13.5	2 11.5
Hospital level			
Level III	261 12.4	236 11.2	214 9.6
Critical access	32 3.5	26 3.6	28 4.6
Other hospital	101 2.8	126 3.8	85 2.8

* Totals within each strata may not equal total infant deaths due to missing data.
** 2013 infant deaths are excluded from race and ethnicity stratifications due to incomplete data
Source: Maine CDC Linked Birth-Death certificates

Table 2. Maine resident infant death counts and rates per 1,000 live births by select demographic, geographic and risk factors, 2010 – 2019*

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
	Count Rate	Count Rate	Count Rate	Count Rate	Count Rate	Count Rate	Count Rate	Count Rate	Count Rate	Count Rate
Total infant deaths	67 5.2	84 6.6	87 6.9	90 7.0	85 6.7	82 6.5	74 5.8	70 5.7	67 5.4	63 5.4
Maternal age										
Under 25	35 8.4	27 6.8	30 8.0	24 6.6	26 7.7	18 5.6	23 7.5	18 6.3	17 6.3	14 5.8
25-34	23 3.3	44 6.3	43 5.9	52 7.1	45 6.1	49 6.5	33 4.3	42 5.6	35 4.7	38 5.3
35 and over	8 4.6	11 6.5	10 5.9	11 6.1	13 6.8	13 7.0	17 8.6	10 5.0	14 6.7	11 5.1
Maternal education										
HS diploma/GED or less	42 7.5	43 8.0	45 8.6	38 7.7	37 8.2	37 8.2	34 7.9	36 8.6	28 6.8	35 9.5
Some college or higher	25 3.4	40 5.5	38 5.1	51 6.6	45 5.6	43 5.4	36 4.3	32 4.0	38 4.7	28 3.5
Marital status										
Married					42 5.6	38 5.1	27 3.6	29 3.9	32 4.3	27 3.8
Not married					40 7.9	43 8.5	41 8.2	40 8.4	33 6.9	33 7.3
Maternal place of birth										
US state or territory	64 5.4	77 6.7	74 6.4	82 7.2	73 6.3	75 6.4	63 5.4	63 5.6	63 5.6	55 5.1
Elsewhere	2 2.3	5 5.7	9 9.8	6 6.4	11 11.1	7 7.7	9 9.3	7 6.4	4 3.7	8 7.5

Pre-pregnancy weight (4-level)										
Underweight (<18.5)					3 9.4	2 8.0	1 3.2	1 3.7	1 3.5	2 7.9
Normal weight (18.5 - <25.0)					33 6.1	31 5.9	26 5.1	24 4.8	19 4.0	22 4.9
Overweight (25.0 - <30.0)					18 5.4	22 6.7	20 5.9	18 5.4	20 6.2	13 4.1
Obesity (30.0+)					26 7.4	24 6.4	25 6.6	27 7.4	24 6.1	25 6.9
Pre-pregnancy weight (6-level)										
Underweight (<18.5)					3 9.4	2 8.0	1 3.2	1 3.7	1 3.5	2 7.9
Normal weight (18.5 - <25.0)					33 6.1	31 5.9	26 5.1	24 4.8	19 4.0	22 4.9
Overweight (25.0 - <30.0)					18 5.4	22 6.7	20 5.9	18 5.4	20 6.2	13 4.1
Obesity class 1 (30.0 - <35.0)					10 5.5	7 3.6	10 5.0	13 7.1	11 5.4	16 8.8
Obesity class 2 (35.0 - <40.0)					8 8.4	9 8.3	9 9.0	6 5.7	6 5.6	4 4.0
Obesity class 3 (40.0+)					8 10.6	8 10.4	6 7.5	8 10.4	7 8.3	5 6.2
Smoked last trimester										
No					70 6.5	62 5.7	49 4.4	59 5.4	58 5.3	52 4.9
Yes					11 6.0	19 11.2	24 15.2	11 7.9	9 6.9	10 8.1

Adequacy of prenatal care										
Adequate and adequate plus					66 6.0	70 6.3	56 5.1	55 5.2	54 5.2	50 4.9
Inadequate and intermediate					14 9.3	10 7.0	14 8.5	15 9.1	10 6.2	13 9.2
Plurality										
Multiple birth	17 42.9	5 12.2	9 21.5	15 31.8	23 48.8	8 20.6	10 25.1	11 28.4	6 14.1	8 18.7
Singleton birth	50 4.0	78 6.3	78 6.4	74 6.0	61 5.0	74 6.1	63 5.1	59 5.0	61 5.1	55 4.8
Birth weight										
VLBW (<1500 g)	37 276.1	48 333.3	38 285.7	37 240.3	50 316.5	39 246.8	45 346.2	39 261.7	32 258.1	28 205.9
MLBW (1500-2499 g)	9 13.3	9 12.7	14 19.6	7 9.2	7 8.8	10 14.0	6 7.8	10 13.7	8 10.5	11 15.0
NBW (2500+ g)	20 1.6	26 2.2	35 3.0	44 3.7	27 2.3	29 2.5	20 1.7	21 1.8	25 2.2	19 1.7
Birth weight (4 groups)										
<1000 g	35 555.6	39 600.0	35 500.0	34 453.3	45 535.7	32 463.8	41 602.9	35 564.5	29 527.3	27 442.6
1000-1499 g	2 28.2	9 113.9	3 47.6	3 38.0	5 67.6	7 78.7	4 64.5	4 46.0	3 43.5	1 13.3
1500-2499 g	9 13.3	9 12.7	14 19.6	7 9.2	7 8.8	10 14.0	6 7.8	10 13.7	8 10.5	11 15.0
2500+ g	20 1.6	26 2.2	35 3.0	44 3.7	27 2.3	29 2.5	20 1.7	21 1.8	25 2.2	19 1.7

Gestational age										
<32 weeks	38 258.5	49 308.2	39 237.8	34 202.4	48 279.1	39 204.2	45 277.8	43 260.6	34 242.9	34 207.3
32-33 weeks	2 16.8	3 21.9	3 24.0	3 25.2	1 7.9	6 55.6	1 8.8	1 8.3	2 16.1	3 27.3
34-36 weeks	4 5.1	5 6.6	8 11.5	12 16.1	6 8.0	4 5.3	2 2.5	3 3.9	6 7.6	7 8.9
37-38 weeks	6 2.2	6 2.3	14 5.4	6 2.3	14 5.2	9 3.3	11 3.9	8 2.8	7 2.3	9 3.0
39+ weeks	15 1.6	20 2.2	23 2.5	31 3.4	13 1.5	23 2.6	14 1.6	15 1.8	18 2.2	10 1.3
Birth location										
Hospital	67 5.3	83 6.7	86 6.9	83 6.6	82 6.6	79 6.4	72 5.8	68 5.7	64 5.3	62 5.4
Home	0 0.0	0 0.0	1 4.9	6 24.8	0 0.0	2 7.9	1 3.8	2 8.2	1 4.3	1 4.5
Other	0 0.0	0 0.0	0 0.0	0 0.0	1 32.3	0 0.0	0 0.0	0 0.0	2 37.0	0 0.0
Hospital level										
Level III	42 10.3	53 12.7	45 10.7	46 10.6	50 11.8	52 12.0	48 10.8	45 9.9	37 8.2	32 7.1
Critical access	3 2.0	4 2.7	8 5.6	7 4.7	4 2.9	4 3.0	3 2.3	5 4.2	8 6.7	8 7.2
Other hospital	21 3.1	25 3.8	28 4.2	27 4.3	25 3.8	18 2.8	18 2.9	13 2.2	16 2.7	20 3.6
Principal payer for delivery										
MaineCare					34 6.1	42 8.0	39 7.8	29 6.0	32 6.6	36 8.2
Other payer					47 6.7	39 5.4	34 4.5	41 5.5	35 4.7	27 3.7

Urban-rural (2-level) maternal residence at birth										
Urban	25 5.6	34 7.7	25 5.6	29 6.4	29 6.5	36 8.2	28 6.4	20 4.8	22 5.3	25 6.2
Rural	41 5.0	48 6.0	58 7.2	57 7.2	53 6.7	44 5.6	44 5.6	50 6.5	45 5.9	38 5.2
Urban-rural (4-level) maternal residence at birth										
Metro	25 5.6	34 7.7	25 5.6	29 6.4	29 6.5	36 8.2	28 6.4	20 4.8	22 5.3	25 6.2
Large rural	16 3.5	25 5.6	37 8.2	31 7.1	26 5.9	21 4.7	21 4.7	28 6.3	20 4.6	22 5.3
Small rural	24 8.0	19 6.6	19 6.6	22 7.5	21 7.4	19 6.8	18 6.4	14 5.2	21 7.7	13 4.9
Isolated rural	1 1.7	4 6.6	2 3.2	4 6.4	6 9.7	4 6.4	5 7.9	8 12.9	4 6.7	3 5.9

* Totals within each stratum may not equal total infant deaths due to missing data. Maine's birth certificate was substantially revised in 2013; not all stratifications are available prior to 2013.
Source: Maine CDC Linked Birth-Death certificates

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