Maternal Mortality and Severe Maternal Morbidity in New York City
September 30, 2019

The New York City Department of Health and Mental Hygiene (Health Department) is responsible for ongoing surveillance of pregnancy-associated deaths in New York City in close collaboration with Office of the Chief Medical Examiner (OCME). This report is responsive to Local Law 188 of 2018, which requires annual reporting on maternal mortality and severe maternal morbidity (SMM), recommendations to improve maternal health and reduce maternal mortalities, and an update on the implementation of recommendations from previous reports. Data are disaggregated by information about the pregnant person or mother where such data are available and statistically reliable.

Data Summary:
In 2016, there were 120,367 live births and 37 pregnancy-associated deaths identified in New York City. The pregnancy-associated mortality ratio was 30.7 deaths per 100,000 live births. Of these deaths, 15 were pregnancy-related and the pregnancy-related mortality ratio was 12.5 deaths per 100,000 live births. Cardiovascular conditions including cardiomyopathy were the most common causes of pregnancy-related death) followed by hemorrhage. Overdose/substance use disorder was the most common cause of pregnancy-associated death followed by cancer.

Technical note:
Maternal deaths are identified from multiple sources: vital records, autopsy reports and hospital discharge data. Severe maternal morbidity (SMM) data are derived from linking NYC birth certificates for births occurring at NYC facilities with the mother's delivery hospitalization record from the Statewide Planning and Research Cooperative System. SMM is identified using an established algorithm developed by the Centers for Disease Control and Prevention (CDC) that identifies 18 indicators that represent diagnoses of serious complications of pregnancy or delivery or procedures used to manage serious conditions.

Definitions:
Pregnancy-Associated Death: Death of a woman from any cause during pregnancy or within one year from the end of pregnancy. Pregnancy-associated deaths are further categorized based on whether they are causally related to the pregnancy or not.
Pregnancy-Related Death: Death of a woman during pregnancy or within one year from the end of pregnancy that is due to a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.
Pregnancy-Associated but Not-Related Death: Death of a woman during pregnancy or within one year from the end of pregnancy due to a cause not related to the pregnancy.
Pregnancy-Related Mortality Ratio (PRMR): Number of pregnancy-related deaths per 100,000 live births.
Pregnancy-Associated Mortality Ratio (PAMR): Number of pregnancy-associated deaths per 100,000 live births. This ratio is typically higher than the PRMR because it includes both pregnancy-related and not pregnancy-related deaths.
Severe maternal morbidity (SMM): Life-threatening complications of labor and delivery that result in significant short- or long-term consequences to a woman's health, such as heavy bleeding, blood clots, serious infections or kidney failure.

Table 1. Causes of pregnancy-associated death, New York City, 2016

Cause of death	2016 n	%*
Pregnancy-related		
Cardiovascular conditions	6	40.0
Cardiomyopathy (3)		
Other cardiovascular conditions (3)		
Hemorrhage	4	26.7
Pregnancy-induced hypertension	2	13.3
Other pregnancy-related causes	3	20.0
Subtotal pregnancy-related	**15**	**40.5**
Pregnancy-associated but not related		
Overdose/substance use disorder	6	35.3
Cancer	5	29.4
Cardiovascular conditions	2	11.8
Infection/sepsis	2	11.8
Other not pregnancy-related causes	2	11.8
Subtotal pregnancy-associated but not related	**17**	**45.9**
Unable to determine relation to pregnancy		
Homicide	3	60.0
Suicide	1	20.0
Overdose	1	20.0
Subtotal unable to determine relation to pregnancy	**5**	**13.5**
Total pregnancy-associated deaths	**37**	**100.0**

* Percent of each category; subtotal percentages are percent of total pregnancy-associated deaths.

Table 2. Characteristics of pregnancy-associated deaths, New York City, 2016

Characteristic	Pregnancy-associated deaths n	Pregnancy-related deaths n	
Total	**37**	**15**	
Race/ethnicity			
White non-Latina	8	1	
Latina	10	6	
Black non-Latina	15	6	
Asian/Pacific Islander	4	2	
Borough of residence			
Manhattan	4	4	
Bronx	5	1	
Brooklyn	12	5	
Queens	9	3	
Staten Island	5	2	
Non-resident of NYC	2	0	-

Table 3. Characteristics of persons who experienced severe maternal morbidity events, New York City, 2016

Characteristic	Severe maternal morbidity n	Rate per 10,000 live births
Total	**2,875**	257.3
Race/ethnicity		
White non-Latina	603	160.8
Latina	919	288.3
Black non-Latina	898	428.6
Asian/Pacific Islander	431	207.9
Other/multiple/not reported	24	354.5
Maternal education		
Less than high school	586	306.7
High school graduate/equivalent	708	280.3
Some college	705	292.4
College graduate or higher	861	200.3
Not reported	15	-
Borough of residence		
Manhattan	345	219.9
Bronx	616	337.1
Brooklyn	930	251.3
Queens	599	238.5
Staten Island	126	246.6
Non-resident of NYC	259	245.5
Place of birth		
Foreign-born	1,579	270.0
US-born (including territories)	1,292	242.8
Not reported	4	-
Age group		
19 years or less	103	321.4
20-24 years	421	245.0
25-29 years	702	240.7
30-34 years	788	230.2
35-39 years	608	279.0
40 or more years	253	409.3
Insurance coverage for delivery		
Medicaid	1,913	288.3
Private	876	203.0
Uninsured	37	322.0
Trimester of prenatal care entry		
First trimester	1,982	239.7
Second trimester	542	280.2
Third trimester	226	323.1
No prenatal care	24	586.8
Not reported	101	437.8

Table 3. Characteristics of persons who experienced severe maternal morbidity events, New York City, 2016 (continued)

Characteristic	Severe maternal morbidity n	Rate per 10,000 live births
Total	**2,875**	257.3
Pre-pregnancy diabetes mellitus		
Yes	56	514.7
No	2,819	254.7
Pre-pregnancy hypertension		
Yes	179	632.5
No	2,696	247.5
Heart disease		
Yes	21	801.5
No	2,854	256.0
Worked during pregnancy		
Yes	1,427	234.9
No	1,439	283.0
Not reported	9	-
Previous miscarriages or stillbirths		
Yes	716	281.8
No	2,159	250.0
Pregnancy resulted in first live birth		
Yes	1,270	262.4
No, person had previous live birth	1,604	253.2

Recommendations:

In July 2018, New York City's first comprehensive plan to reduce maternal deaths (maternal mortality) and life-threatening complications of childbirth (severe maternal mortality) among women of color was announced. This plan, with a $12.8 million City investment, includes the following initiatives by both the Health Department and NYC Health and Hospitals (H+H):

- Creating a new citywide maternal hospital quality improvement network;
- Creating comprehensive maternity care at H+H;
- Enhancing data quality and timeliness; and
- Launching a public awareness campaign on pregnancy-related health risks.

Through the plan, the Health Department has begun implementing several key recommendations related to maternal health, including:

Supporting private and public hospitals to enhance data tracking and analysis of severe maternal morbidity (SMM) and maternal mortality (MM) events to improve quality of care and eliminate preventable complications

- In early 2019, the Health Department launched the Maternal Hospital Quality Improvement Network (the Network). The Network will support quality improvement efforts and data collection in hospitals.
- Case reviews have already started at three hospitals. To date, we have identified 66 SMM cases; 44 of these have been abstracted; and 24 have been discussed and reviewed by the three hospital Quality Improvement (QI) committees.
- As a result of the reviews, hospitals have standardized their case definitions of SMM and continue to strengthen and transform their Quality Improvement (QI) processes, including:
    - Providing more regular feedback to their attending clinicians in the form of coaching meetings
    - Making their QI and Quality Assurance committees more interdisciplinary by inviting representatives from social work, blood transfusion, nursing, electronic medical records and residents to participate.
    - Revising protocols for how to transfer patients between providers within the hospital with the goal of better communication and continuity of care.
    - Holding education sessions on special topics, such as the Maternal Early Warning System.
    - Hospitals will also gear their simulation drills, which are practice drills on handling the most common life-threatening complications of pregnancy, based on the causes of SMM. This helps to prepare staff to handle these life-threatening, but rare events and dedicate funding to QI projects on SMM.

Addressing implicit bias to reduce maternal mortality and severe maternal morbidity citywide

- In 2019, the Health Department began engaging hospitals participating in the Network in adopting trainings to identify and address implicit bias. Implicit bias includes the unconscious attitudes or stereotypes that can affect behaviors, decisions and actions in the treatment of people of color who are pregnant.
- To date, we have trained over 250 staff across 14 hospitals in Trauma-and-Resilience-Informed Systems (TRIS) which integrates implicit bias with trauma informed training and content and includes tools to develop a strategy for institutional transformation at hospitals.
- The Health Department will continue working with each facility to embed on-site trainers using a train-the-trainer model to support the ongoing process of training everyone in the maternity care system.

Expanding public education in partnership with community-based organizations and residents

- In December 2018, the Health Department the Standards for Respectful Care at Birth (the Standards) were launched. The Standards focus on six areas of respectful care at birth: education; informed consent; decision making; quality of care; support; and dignity and non-discrimination.
- The Standards is a feature component of the Health Department's Reproductive Justice Community Engagement Group's Birth Justice campaign, which asserts that everyone has the human right to respectful, safe and quality care with the freedom and support to make decisions about pregnancy, childbirth and postpartum care with dignity.
- The Health Department will engage the hospitals in the Maternal Health Quality Improvement Network to develop and implement policies around respectful care at birth. Fourteen hospitals in this cohort are currently in this work, and additional hospitals will be engaged going forward.

- The Standards have also been distributed on posters and brochures to hospitals and other clinical settings, community-based organizations and neighborhood health action centers citywide. To date, more than 27,000 posters and brochures about the Standards have been distributed. Hospitals and organizations can order materials via 311 and the DOHMH call center.

Enhancing maternal care at H+H facilities

- The Health Department is enhancing maternal care at H+H facilities by including H+H facilities in the Maternal Hospital Quality Improvement Network. The MHQIN is enhancing New York City hospitals' Quality Improvement reviews of Severe Maternal Morbidity cases and providing support for these activities in the form of chart abstractors.
- The Health Department is bringing training in Implicit Bias and Respectful Care at Birth to Health + Hospitals and all New York City hospitals. With the Institute for Medical Simulation and Advanced Learning, the Health Department is helping hospitals to form simulation programs in obstetrics.

Previous Recommendations – Implementation Update:

In the 2017 report, the Health Department recommended that a Maternal Mortality and Morbidity Review Committee (M3RC) be established for NYC in accordance with the CDC guidance and tools for maternal mortality review committees. The M3RC was established in 2017, and is a multidisciplinary expert group that includes midwives, nurses, social workers, doulas and other community-based organization representatives and women's advocates, obstetrician-gynecologists, maternal-fetal medicine specialists, cardiologists, anesthesiologists, regional perinatal center representatives, pathologists, policymakers, and representative of the American College of Obstetricians and Gynecologists. The M3RC completed review of all 2016 maternal deaths that occurred in New York City, and the data from those reviews are presented in this report. The M3RC is currently on track to complete the review of all 2017 maternal deaths by the end of this calendar year. Two seminal events occurred in July-August of 2019 that bolster the sustainability of the M3RC: 1) the enactment of the New York State (NYS) Bills A03276/S1819 and A8338/S6529 , which formally established protections for the NYC M3RC and establishes an NYS-NYC maternal mortality and morbidity advisory council; and 2) the Health Department received CDC funding to support the infrastructure and activities of the NYC M3RC.