Maternal Mortality and Severe Maternal Morbidity in New York City
April 2021

Background

The New York City Department of Health and Mental Hygiene (Health Department, NYC DOHMH) conducts surveillance for 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 the year 2018, which requires annual reporting on maternal mortality and severe maternal morbidity, 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.

Each year, the Health Department identifies pregnancy-associated deaths based on data linkage between death certificates and birth or fetal death certificates as well as by International Classification of Diseases (ICD-10) codes and the pregnancy check box (i.e. was the decedent pregnant within a specified time period before death) on the death certificate. The Department implements measures to ensure data quality (i.e. examining discrepant age of decedent and pregnancy status), and uses this list of maternal deaths to internally review the deaths and then to develop five-year pregnancy-associated mortality reports, the latest of which is for the period 2011-2015[1]. In between the publication of five-year reports, the Department posts annual maternal mortality data on the NYC open data source portal[2].

In January of 2018, the Health Department convened the NYC Maternal Mortality and Morbidity Review Committee (M3RC) to conduct a multi-disciplinary committee review of maternal deaths, starting with 2016 deaths using the Center for Disease Control's (CDC) best practice guidance for Maternal Mortality Review Committees, called the Maternal Mortality Review Information Application[3]. M3RC members serve two-year terms, and the Committee is composed of persons who provide clinical care as well as non-clinical experts such as doulas, community advocates, researchers, and representatives from the Office of the Medical Examiner and other City agencies. Prior to committee meetings, medical abstractors develop a case narrative of each maternal death using vital records, autopsy reports and hospital discharge data. After reviewing case narratives within committee meetings, the M3RC determines whether the death was causally related to pregnancy, the underlying cause of death, key contributing factors, and whether there was a chance to alter the outcome. The committee reviews maternal deaths, and then uses the data to make citywide recommendations at the system, facility, provider, community, and individual levels to prevent future tragedies. Committee findings from these reviews are included in this report.

Following CDC guidance, cases from a one year cohort are reviewed within two years of the death to enable the operations team sufficient time for case identification, including data linkage and cleaning, collection of medical and other relevant records, case adjudication for cases in the court system, case abstraction and case review. This case identification and review process and timeline is the gold-standard for maternal death review surveillance established by the CDC, which the Health Department must follow – along with all other 25 state committees funded by CDC, including the New York State Maternal Mortality Review Board – as joint grantees of the Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM)[4]. The Health Department's role in surveillance is distinct from the regulatory role over hospitals held by the New York State Department of Health (NYS DOH). All hospitals must report adverse events, including maternal deaths, in real time to the NYS DOH through the New York Patient Occurrence Reporting and Tracking System (NYPORTS), which is then tasked with hospital oversight. The NYC Health Department does not have access to the NYPORTS database nor regulatory authority over hospitals.

Severe maternal morbidity data included in this report are derived from linking NYC birth certificates for births occurring at New York City facilities with the mother's delivery hospitalization record from the Statewide Planning and Research Cooperative System. Severe maternal morbidity is identified using an established algorithm developed by the CDC that uses ICD-10 codes from hospital discharge data for diagnoses of serious complications of pregnancy or delivery or procedures used to manage serious conditions.

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[1] https://www1.nyc.gov/assets/doh/downloads/pdf/ms/pregnancy-associated-mortality-report-2011-2015.pdf
[2] https://opendata.cityofnewyork.us/data/
[3] https://reviewtoaction.org/implement/mmria).
[4] https://www.cdc.gov/reproductivehealth/maternal-mortality/erase-mm/index.html

Core 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.

Data Summary

In 2017, there were 117,013 live births and 58 pregnancy-associated deaths in New York City. The pregnancy-associated mortality ratio was 49.6 deaths per 100,000 live births. Of the 2017 pregnancy-associated deaths, 21 were pregnancy-related and the pregnancy-related mortality ratio was 17.9 deaths per 100,000 live births. Embolisms and mental health conditions were the most common causes of pregnancy-related death (n=5 each) followed by cardiovascular conditions (n=3). Cancer was the most common cause of pregnancy-associated but not related death (n=10) followed by overdose and other causes related to substance use (n=5). Pregnancy-associated and pregnancy-related mortality ratios should be interpreted with caution as the numbers of deaths each year are very small. It is recommended to review a minimum of five years of data in one dataset to obtain more reliable mortality ratios, and only then compare trends over five-year intervals.

Table 1. Causes of pregnancy-associated death, New York City, 2017

	2017	
Cause of death	**N**	**%***
Pregnancy-related		
Embolism[5]	5	23.8
Mental health conditions	5	23.8
Cardiovascular conditions[6]	3	14.3
Cardiomyopathy[7] (2)		
Other cardiovascular conditions (1)		
Hemorrhage[8]	2	9.5
Infection	2	9.5
Other pregnancy-related causes	4	19.0
Subtotal pregnancy-related	**21**	**36.2**
Pregnancy-associated but not related		
Cancer	10	34.5
Overdose/substance use disorder	5	17.2
Asthma[9]/pulmonary conditions[10]	4	13.8
Embolism	3	10.3
Other not pregnancy-related causes	7	24.1

[5] Obstruction of an artery, typically by a clot of blood
[6] Name for the group of disorders of heart and blood vessels
[7] Disease of the heart muscle
[8] Severe blood loss
[9] Respiratory condition marked by spasms in the bronchi of the lungs, causing difficulty in breathing
[10] Diseases of the lungs

Subtotal pregnancy-associated but not related	**29**	**60.3**
Unable to determine relation to pregnancy		
Homicide	3	37.5
Infection	2	25.0
Other unable to determine relation to pregnancy	3	37.5
Subtotal unable to determine relation to pregnancy	**8**	**13.8**
Total pregnancy-associated deaths	**58**	**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, 2017

Characteristic	Pregnancy-associated deaths n (%)	Pregnancy-related deaths n (%)
Total	**58 (100%)**	**21 (100%)**
Race/ethnicity		
White non-Latina	11 (19%)	2 (10%)
Latina	16 (28%)	6 (29%)
Black non-Latina	23 (40%)	11 (52%)
Asian/Pacific Islander	5 (9%)	1 (5%)
Other/Biracial	3 (5%)	1 (5%)
Borough of residence		
Manhattan	5 (9%)	4 (19%)
Bronx	9 (16%)	6 (29%)
Brooklyn	16 (28%)	7 (33%)
Queens	12 (21%)	0 (0%)
Staten Island	8 (14%)	1 (5%)
Non-resident of NYC	8 (14%)	3 (14%)

Table 3. Characteristics of persons who experienced severe maternal morbidity events, New York City, 2017

Characteristic	Severe maternal morbidity	
	N	Rate per 10,000 births
Total	**3,066**	**283.7**
Race/ethnicity		
White non-Latina	684	187.9
Latina	969	313.7
Black non-Latina	947	457.2
Asian/Pacific Islander	435	225.4
Other/multiple/not reported	31	399.0
Maternal education		
Less than high school	610	334.3
High school graduate/equivalent	775	317.5
Some college	680	293.7
College graduate or higher	981	233.6
Borough of residence		

Characteristic	Severe maternal morbidity	
	N	Rate per 10,000 births
Manhattan	340	226.8
Bronx	676	377.3
Brooklyn	1,002	283.5
Queens	613	254.1
Staten Island	153	300.6
Non-resident of NYC	281	264.9
Place of birth		
Foreign-born	1,575	279.8
US-born (including territories)	1,489	287.7
Age group		
19 years or less	113	376.8
20-24 years	468	289.0
25-29 years	685	250.5
30-34 years	820	246.8
35-39 years	699	317.3
40 or more years	281	446.6
Insurance coverage for delivery		
Medicaid	1,980	309.9
Private	999	237.3
Uninsured	38	403.0
Neighborhood poverty		
Very high (>30%)	604	337.5
High (20-30%)	728	281.3
Medium (10-20%)	1,084	283.0
Low (<10%)	362	247.0
Pre-pregnancy diabetes mellitus		
Yes	78	638.3
No	2,988	279.6
Pre-pregnancy hypertension		
Yes	200	763.9
No	2,866	271.8
Heart disease		
Yes	26	1,027.7
No	3,040	281.9
Trimester of prenatal care entry		
First trimester	2,079	261.4
Second trimester	604	321.1
Third trimester	232	351.2
No prenatal care	31	607.8
Not reported	120	460.1
Worked during pregnancy		
Yes	1,538	256.2
No	1,515	316.3

Characteristic	Severe maternal morbidity	
	N	Rate per 10,000 births
Previous miscarriages or stillbirths		
Yes	795	322.0
No	2,267	272.4
Pregnancy resulted in first live birth		
Yes	1,327	285.5
No, person had previous live birth	1,739	282.4

Recommendations Implementation Update (2019):

In last year's 2019 report, the Health Department recommended that work continue in support of New York City's comprehensive plan to reduce maternal deaths and life-threatening complications of childbirth. In 2019, the Health Department received a subaward from the New York State Department of Health to fund the M3RC through the Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) grant, which also funds the New York State Health Department's Maternal Mortality Review Board. The M3RC reviews all maternal deaths that occur in New York City (approximately half of all maternal deaths in the state), while the NYS DOH reviews all deaths that occur in the rest of the state. Through the ERASE MM grant, both Committees are required to use a standard CDC protocol for death reviews and report their data into Maternal Mortality Review Information Application (MMRIA) to establish standardized national dataset. Despite the COVID-19 pandemic, the NYC Health Department was able to review all 2018 maternal deaths as scheduled.

Additionally, over the past year, the NYC DOHMH completed the three-year Severe Maternal Morbidity (SMM) Project in partnership with the Fund for Public Health of New York with support from Merck for Mothers. The Project implemented a three-pronged strategy to: 1) improve the quality of maternity care at hospitals; 2) learn about mothers' needs and their experiences with SMM, and the ramifications of SMM on their lives, to inform action and further research; and 3) inform and support mobilization of communities around maternal health This project resulted in the publication of a SMM "how-to" toolkit organized by the three strategies for stakeholders from hospitals, the research field, and those engaging with community partners to replicate the work. The Project culminated in a web-based Maternal Health Summit on December 8, 2020, which was attended by 360 participants from clinical, research and community sectors. The project included the development of a standardized method to identify and review SMM cases through multidisciplinary hospital-level quality improvement committees. This quality improvement strategy was scaled up over the past year under the Health Department's Maternity Hospital Quality Improvement Network (MHQIN).

The MHQIN is implemented in eight NYC Health + Hospitals (H+H) facilities, five private facilities and one state-funded facility that collectively serve one-third of all births in New York City, including 47% of citywide births to Black mothers, 49% of births to Latina mothers, and 40% of births to mothers covered by Medicaid insurance. The MHQIN addresses the root causes of racial/ethnic disparities in maternal mortality and SMM through the implementation of several key strategies aimed at reducing preventable deaths and SMM and addressing inequities in these outcomes. The key accomplishments of the MHQIN initiative are provided below organized by strategy, as outlined in last year's report.

Supporting private and public hospitals to enhance data tracking and analysis of severe maternal morbidity events to improve quality of care and eliminate preventable complications. Building on the quality improvement strategy piloted in the Severe Maternal Morbidity Project, the Health Department scaled up this work to 11 new hospitals. SMM data collection and case reviews continue at the three pilot hospitals and nine hospitals began case reviews. Over the past two years, these hospitals identified 461 SMM cases; of the 461 cases, 46% (n=210) have been abstracted, and 82% (n=172) of these have been discussed and reviewed by hospital quality improvement committees. Through these reviews, hospitals identified key drivers of SMM, and the Health Department provided hospitals with funding to implement strategies to address the drivers in collaboration with H+H. Examples include purchasing newborn mannequins with diverse racial and ethnic features for hospital simulation trainings and blood pressure cuffs for postpartum patients to use for home monitoring.

Expanding public education in partnership with community-based organizations and residents. The Health Department launched the NYC Standards for Respectful Care at Birth (NYC Standards) and disseminated 200,000 copies of the NYC Standards posters and brochures in priority languages via mass mailing kits, the 311 call center, and direct orders. The Health Department engaged 150 Birth Justice Defenders (community advocates) and community-based organizations on the NYC Standards reaching 2,500 community residents at outreach and education events. The Health Department supported the MHQIN Hospitals' display of the NYC Standards brochures and posters in high-traffic maternity areas, development of implementation plans to address identified gaps in respectful care policies and practices, and enrollment of staff in the Health Department's reproductive and gender justice trainings.

Addressing implicit bias and structural racism to enhance maternity care and reduce maternal mortality and severe maternal morbidity citywide. The Health Department, in partnership with national racial equity and organizational transformation leaders, conducted 25 trainings around implicit bias and trauma-and-resilience-informed systems concepts, reaching over 700 maternity staff and leadership from fourteen hospitals. This work included initial engagement with hospital leaders, such as CEOs and hospital vice presidents, to introduce the concepts of trauma and implicit bias and to elicit their support in implementing this work across their hospitals. Additionally, to support the sustainability of this initiative, the Health Department trained 13 staff from seven hospitals to continue the work using a train-the-trainer model.

Enhancing maternal care at NYC public and private hospitals. The Health Department, in partnership with the H+H Simulation Center, developed and executed a curriculum to train maternity teams from 14 hospitals in critical care. Teams of three to five staff per hospital were trained in the foundations of simulation, scenario design, and clinical team debriefs. Following the trainings, hospital teams at 12 hospitals implemented in-situ simulations focused on maternal code (obstetric advanced cardiac life support), post-partum hemorrhage, shoulder dystocia and COVID-19 care. Additionally, the Health Department provided technical support to three hospitals to better integrate doulas into their maternity care structures and supported the training of more than 30 community-based doulas who provide birth and post-partum support in adjacent communities.

2020 Recommendations:

The Health Department will continue to report maternal mortality data on an annual basis following M3RC review through NYC OpenData and in this report. Additionally, the Health Department will post a maternal mortality report on its website year with the most recent M3RC data and recommendations. Following posting of the report, the Health Department will conduct a citywide webinar to disseminate the data, discuss recommendations and continue to support the implementation of M3RC recommendations in collaboration with others. The Health Department will continue to partner with the New York State Department of Health to align the M3RC data from the New York State Department of Health's Maternal Mortality Review Committee to produce a statewide report. In addition, the Health Department will continue to participate in the statewide Maternal Mortality and Morbidity Advisory Council, led by the New York State Department of Health, which is charged with reviewing findings from both Committees to address structural and social determinant factors that impact maternal health outcomes.

Through the MHQIN, the Health Department will continue to:

1) Support SMM data collection and review at participating hospitals;
2) Support hospitals to operationalize recommendations emerging from these reviews through monthly strategic planning sessions with hospital leadership;
3) Assess the quality of care at participating hospitals by piloting a patient experience feedback process;
4) Train maternity staff in implicit bias and trauma-and-resilience-informed concepts;
5) Support embedded trainers in sustaining racial equity trainings at their institutions;
6) Disseminate the NYC Standards in priority languages and distribute accompanying community and provider guide;
7) Co-create educational webinars on the NY Standards of Respectful care with community-based organizations and Birth Justice Defenders (community advocates), and train them to educate community residents on human rights and to be active decision-makers in their birthing experiences; and
8) Support hospitals to integrate doulas and midwives into existing maternity care structures.