CALCULATIONS

Data Insights from the Philadelphia Department of Public Health

Severe Maternal Morbidity in Philadelphia, 2011-2014

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HIGHLIGHTS

- The rate of severe maternal morbidity increased by 28% during 2011-2014 in Philadelphia and was 57% higher than the national average.
- Blood transfusions were the most common indicator of severe maternal morbidity.
- Women of color and women who were 40 and older had the highest rate of severe maternal morbidity.
- Rates of morbidity continue to be the highest for non-Hispanic black women, regardless of insurance type.

INTRODUCTION

Severe maternal morbidity refers to unanticipated outcomes of labor and delivery that result in short- or long-term consequences to a woman's health.[1] Severe maternal morbidity not only puts the woman's life in danger, but also poses risks to her child. Severe maternal morbidity is defined by the Centers for Disease Control and Prevention and is based on a standardized measure of 21 indicators, comprising diagnosis and procedure codes from the International Classification of Diseases, version 9 (ICD-9).[2]

In the United States, severe maternal morbidity has increased over the past two decades and has affected more than 50,000 women every year.[2] It is unknown exactly why severe maternal morbidity is increasing, but it may be due to increases in maternal age, pre-existing chronic medical conditions, pre-pregnancy obesity, or cesarean deliveries. Previous studies have reported increased risks of severe maternal morbidity associated with advanced maternal age and low socioeconomic status. [3,4] Further, racial and ethnic disparities in severe maternal morbidity continue to persist, with non-Hispanic black women having a disproportionate burden.[3,4]

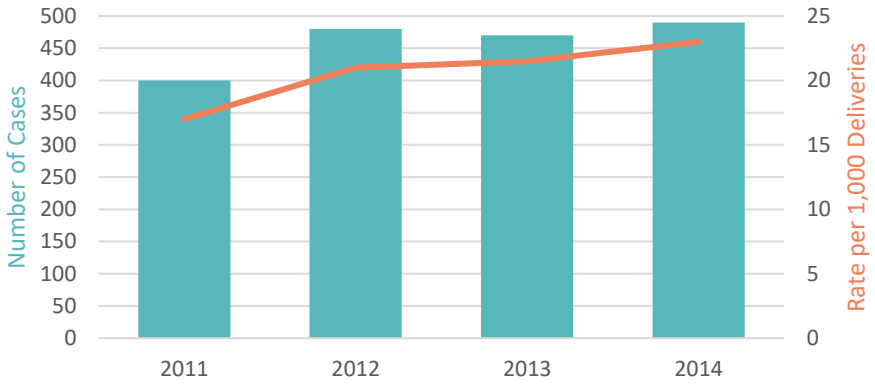
Monitoring and understanding local trends are critical to identifying opportunities for improvement in maternal health and reducing severe maternal morbidity. During 2011-2014, there was an average of 462 cases per year of severe maternal morbidity in Philadelphia, with a rate of 20.9 per 1,000 deliveries. This was 45% higher than the national rate (14.4 per 1,000 deliveries).

This issue of *Calculations* presents trends in delivery hospitalizations involving severe maternal morbidity in Philadelphia County from 2011 through 2014. First, trends in overall severe maternal morbidity and leading diagnosis- or procedure-based indicators are presented. Second, differences in rates of severe maternal morbidity are examined by age, race, and type of insurance. Finally, actionable next steps that can be taken to improve surveillance and reduce severe maternal morbidity in Philadelphia are provided.

FINDINGS

Over the four-year period from 2011-2014, the rate of severe maternal morbidity in Philadelphia County increased by 28% from 17.7 to 22.7 per 1,000 deliveries. This rate was 57% higher than the national rate (14.4 per 1,000 deliveries in 2014).

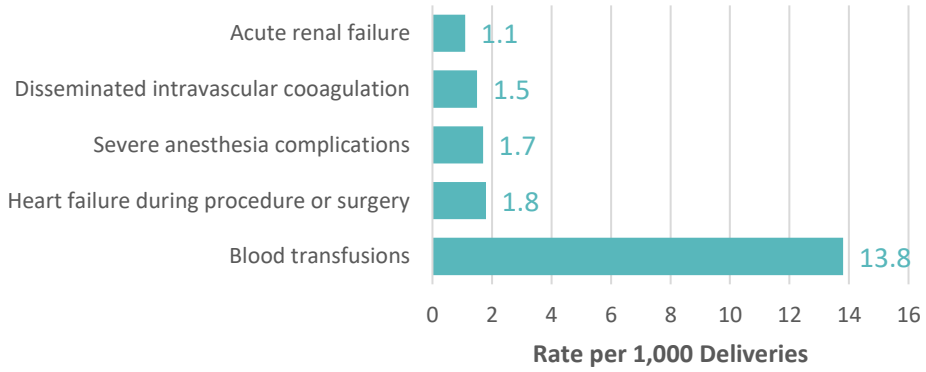
Severe Maternal Morbidity per 1,000 Deliveries & No. of Cases | 2011–2014



Source: Pennsylvania Health Care Cost Containment Council

Blood transfusions (13.8 per 1,000 deliveries) were the most common indicator of severe maternal morbidity and contributed to 66% of all cases. While, the other leading indicators were mostly related to complications during a procedure or surgery.

Leading Indicators of Severe Maternal Morbidity | 2011–2014

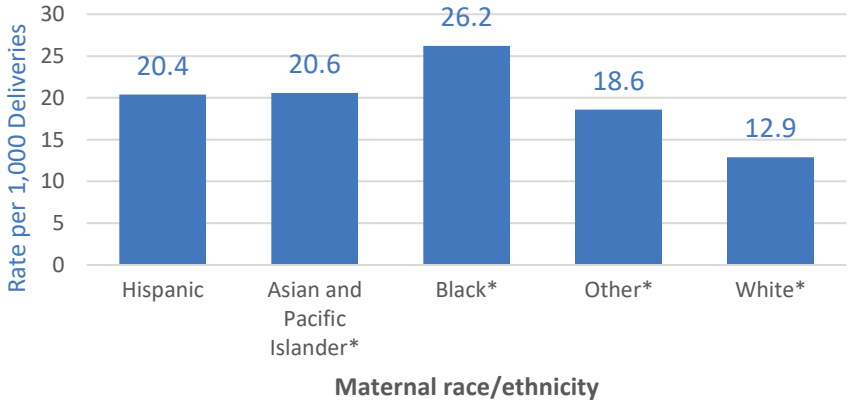


Source: Pennsylvania Health Care Cost Containment Council

Women of color had higher rates of severe maternal morbidity than non-Hispanic white women. The rate of severe maternal morbidity among non-Hispanic black women, was two times higher than that of white women.

**Non-Hispanic*

Severe Maternal Morbidity by Maternal Race/Ethnicity | 2011–2014

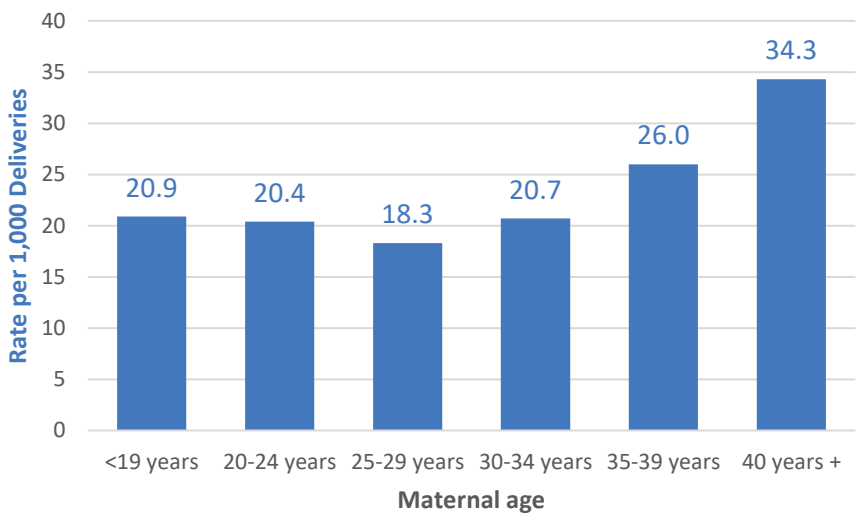


Source: Pennsylvania Health Care Cost Containment Council

Women who were 40 and older had the highest rate of severe maternal morbidity (34.3 per 1,000 deliveries), while women aged 25-29 years had the lowest rate of severe maternal morbidity (18.3 per 1,000 deliveries).

**Non-Hispanic*

Severe Maternal Morbidity by Maternal Age | 2011–2014

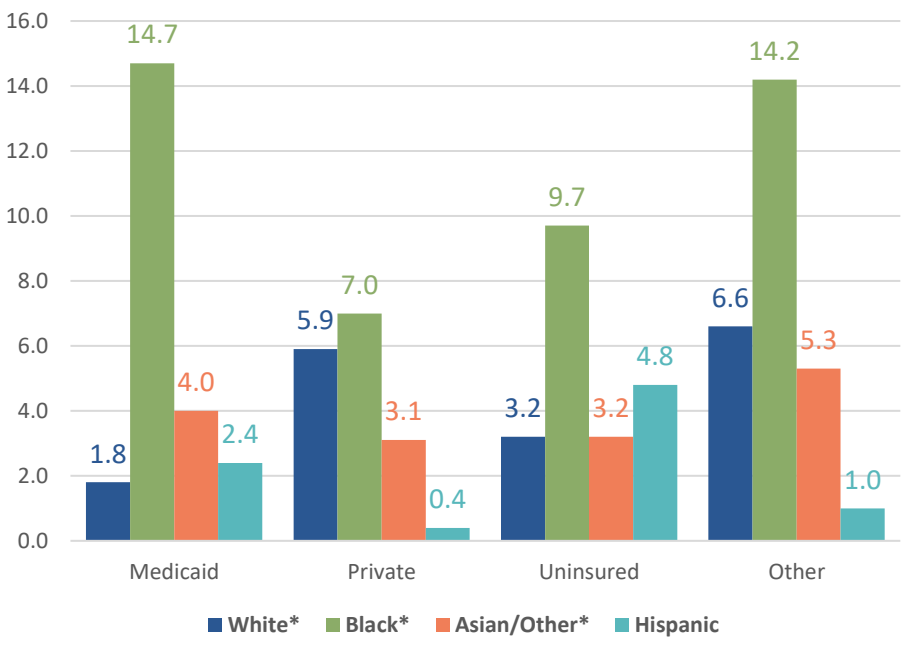


Source: Pennsylvania Health Care Cost Containment Council

Rates of severe maternal morbidity continue to be the highest for non-Hispanic black women regardless of type of insurance.

**Non-Hispanic*

Severe Maternal Morbidity by Primary Payer and Race/Ethnicity | 2011–2014



Source: Pennsylvania Health Care Cost Containment Council

Reducing rates of severe maternal morbidity and eliminating racial inequities in health will require examining risk factors that are beyond individual- and hospital-level.

WHAT CAN BE DONE?

The Department of Public Health will:

- Conduct local pregnancy-related surveillance to better understand the risk factors of severe maternal morbidity.
- Create and disseminate a campaign focused on the importance of preconception, prenatal, and postpartum care.

Hospitals and health care providers could:

- Use standardized criteria to identify women at risk of having a severe maternal morbidity event.
- Ensure that pregnant and postpartum women with chronic conditions are connected to subspecialty care.
- Implement best practices including safety bundles established by the Alliance for Innovation on Maternal Health.
- Provide training in cultural competency, implicit bias, and trauma-informed care.

Women who are planning to become pregnant could:

- Have annual visits with their primary care doctor to identify and manage chronic conditions.
- Discuss with their primary care doctor how to be as healthy as possible before or between pregnancies.
- Quit smoking and substance use.

Women who are pregnant or postpartum could:

- Receive prenatal care as early as possible.
- Always identify that they are pregnant or were pregnant within the last year when seeking medical care.
- Notify their provider immediately if they experience dizziness, chest pain, rapid pulse, difficulty breathing, and swelling in the legs, hands, or face.
- Report any new or emerging symptoms, regardless of whether they seem related to pregnancy.

RESOURCES

Centers for Disease Control and Prevention
https://www.cdc.gov/reproductivehealth/maternalinfanthealth/severematernalmorbidity.html

The Council on Patient Safety in Women's Health Care https://safehealthcareforeverywoman.org/wp-content/uploads/2017/11/Support-after-Severe-Maternal-Event-Bundle.pdf

REFERENCES

1. Kilpatrick SK, Ecker JL. American College of Obstetricians and Gynecologists and the Society for Maternal–Fetal Medicine. Severe maternal morbidity: screening and review. *Am J Obstet Gynecol*. 2016; 215(3):B17–B22.
2. CDC. Severe Maternal Morbidity in the United States. Available at: https://www.cdc.gov/reproductivehealth/maternalinfanthealth/severematernalmorbidity.html
3. Creanga AA, Syverson C, Seed K, Callaghan WM. Racial and ethnic disparities in severe maternal morbidity: a multistate analysis, 2008-2010. *Am J Obstet Gynecol*. 2014; 210:435.e1-435.e8.
4. Creanga, AA, Berg, CJ, Ko, JY. Maternal mortality and morbidity in the United States: where are we now? J Women's Health. 2014; 23:39.

TECHNICAL NOTES

The estimates in this issue of *Calculations* are based on data from the Pennsylvania Health Care Cost Containment Council. Inpatient data from 2011-2014 were used to identify severe maternal morbidity.

Data from 2015 and beyond were excluded due to the transition of the International Classification of Diseases coding system from the 9th to the 10th revision.

The sample was limited to women aged 12-65 years with pregnancy-related delivery hospitalizations at community, non-rehabilitation hospitals. The unit of analysis was the hospitalization not the individual. Delivery hospitalizations were identified by the Diagnosis Related Group (DRG) codes pertinent to Pregnancy, Childbirth, and the Puerperium. Pregnancies not resulting in a live birth, including ectopic and molar pregnancies, spontaneous abortions and stillbirths, were excluded. To capture the most severe cases of the 21 indicators during delivery hospitalizations, indicators were re-classified as severe maternal morbidity if:

- The mother's length of stay was equal to or greater than the 90th percentile by delivery method.
- The mother was transferred before or after delivery to a different facility.
- The mother died during delivery hospitalization.
- At least one of the five procedure indicators were present.

Primary payer is the expected payer for the hospital stay. Payer combines the following categories into detailed groups:

- Uninsured: includes self-pay or charity/indigent care
- Medicaid: includes patients covered by fee-for service and managed care Medicaid
- Medicare: includes patients covered by fee-for-service and managed care Medicare
- Private: includes Blue Cross, commercial carriers, preferred providers organizations (PPOs), and private health maintenance organizations (HMOs)
- Other: includes government programs

Diagnosis and Procedure Codes used to define indicators of severe maternal morbidity

Severe Maternal Morbidity Indicator	Diagnosis or Procedure	ICD-9 codes
Acute myocardial infarction	Diagnosis	410.xx
Acute renal failure	Diagnosis	584.x, 669.3x
Adult respiratory distress syndrome	Diagnosis	518.5, 518.81, 518.82, 518.84, 799.1
Amniotic fluid embolism	Diagnosis	673.1x
Aneurysm	Diagnosis	441.xx
Cardiac arrest/ventricular fibrillation	Diagnosis	427.41, 427.42, 427.5
Disseminated intravascular coagulation	Diagnosis	286.6, 286.9, 666.3x
Eclampsia	Diagnosis	642.6x
Internal injuries of the thorax, abdomen, and pelvis	Diagnosis	860.xx – 869.xx
Intracranial injuries	Diagnosis	800.xx, 801.xx, 803.xx, 804.xx, 851.xx –854.xx
Heart failure during procedure or surgery	Diagnosis	669.4x, 997.1
Puerperal cerebrovascular disorders	Diagnosis	430, 431, 432.x, 433. xx, 434.xx, 436, 437.x, 671.5x, 674.0x, 997.2, 999.2
Pulmonary edema/acute heart failure	Diagnosis	428.1, 518.4
Severe anesthesia complications	Diagnosis	668.0x, 668.1x, 668.2x
Sepsis	Diagnosis	038.xx,995.91, 995.92
Shock	Diagnosis	669.1x, 785.5x, 995.0, 995.4, 998.0x
Sickle cell anemia with crisis	Diagnosis	282.62, 282.64, 282.69
Thrombotic embolism	Diagnosis	415.1x, 673.0x, 673.2x, 673.3x, 673.8x
Blood transfusion	Procedure	99.0x
Conversion of cardiac rhythm	Procedure	99.6x
Hysterectomy	Procedure	68.3x – 68.9
Temporary tracheostomy	Procedure	31.1
Ventilation	Procedure	93.90, 96.01 - 96.05, 96.7x
Cardio monitoring	Procedure	89.6x
Operations on the heart and pericardium	Procedure	35.xx, 36.xx, 37.xx, 39.xx

SUGGESTED CITATION

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