Maternal Mortality and Severe Maternal Morbidity Nevada, 2021

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Office of Analytics

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Accessibility Disclosure

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Background

Nevada Revised Statutes (NRS) 442.767 states that the Department of Health and Human Services compile and publish an annual report on or before April 1 that "consists of data concerning maternal mortality and severe maternal morbidity in this State during the immediately preceding year." [1]

Maternal mortality is defined as deaths due to complications from pregnancy or childbirth. This report provides insight into demographic characteristics, cause of death, and drug overdose death associated with pregnancy-associated deaths in 2021. Previous reports have provided data on pregnancy-related deaths from the Pregnancy Maternal Surveillance System (PMSS) from 2012 to 2017. PMSS is a national surveillance program conducted by the Centers for Disease Control and Prevention (CDC) to understand better the risk factors for and causes of pregnancy-related deaths in the United States. The Nevada Department of Health and Human Services Office of Analytics annually provides a list of pregnancy-associated deaths to the CDC. Medical epidemiologists at the CDC review and analyze the cases provided, determine which cases meet the CDC's definition of pregnancy-related mortality and send a list of cases back to the Office of Analytics. At the time of this report, 2017 data was the latest year available which is included in the previous maternal mortality 2020 report.

For more information on PMSS, please visit CDC PMSS.

Maternal morbidity is a continuum from mild adverse effects to life-threatening events or death.[2] Severe Maternal Morbidity (SMM) refers to conditions and diagnoses which indicate potentially life-threatening maternal complications. SMM includes unexpected outcomes of labor and delivery resulting in significant short- or long-term consequences to health.[3] SMM relates to higher risks of adverse pregnancy outcomes like preterm birth and infant death. SMM is associated with a high rate of preventability. SMM can be considered a near miss for maternal mortality because, without identification and treatment, the conditions would lead to maternal death in some cases. Identifying SMM is important for preventing injuries leading to mortality and highlighting opportunities to avoid repeat injuries.

This report is divided into a section for maternal mortality and a section for SMM.

Maternal Mortality

Methodology

Data Sources

Web-Enabled Vital Records Registry Systems (WEVRRS)

Statewide births, deaths, and fetal births are collected by the Division of Public and Behavioral Health Office of Vital Records. WEVRRS is the software utilized by physicians, registered nurses, midwives, informants or funeral directors, and other individuals to collect and consolidate birth and death-related information.

Hospital Billing Data (Emergency Department Encounter and Hospital Inpatient Admissions)

The hospital billing data provides health billing data for emergency department encounters and inpatient admissions for Nevada's non-federal hospitals. NRS 449.485 mandates all hospitals in Nevada report information as prescribed by the Director of the Department of Health and Human Services. The data are collected using a standard universal billing form. The data include demographics such as age, gender, and race/ethnicity and uses International Classification of Diseases-9-Clinical Modification (ICD-9-CM) diagnoses codes and International Classification of Diseases-10-Clinical Modification (ICD-10-CM) diagnoses. ICD-10-CM diagnoses codes replaced ICD-9-CM diagnoses codes in the last quarter of 2015. Therefore, data before the last quarter in 2015 may not be directly comparable to data after that. In addition, the data includes billed hospital charges, procedure codes, discharge status, and external cause of injury codes. The billing information is for billed charges and not the actual payment received by the hospital.

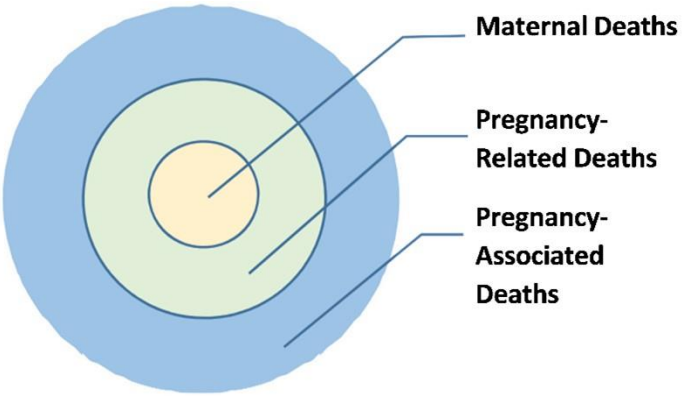
Definitions

Pregnancy-Associated Death is the death of a woman while pregnant or within one year of the termination of pregnancy, regardless of the cause. Pregnancy-associated death ratio is the number of pregnancy-associated deaths per 100,000 live births.

Pregnancy-Related Death is the death of a woman during pregnancy or within one year of the end of pregnancy, from a pregnancy complication, a chain of events initiated by pregnancy, or the aggravation of an unrelated condition by the physiologic effects of pregnancy. Pregnancy-related death ratio is the number of pregnancy-related deaths per 100,000 live births.

Maternal Death is the death of a woman while pregnant or within 42 days of the termination of pregnancy, regardless of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

Figure 1. Relationship among Three Definitions



Identification of Pregnancy-Associated Deaths

The methodology is based on the Reference Guide for Pregnancy-Associated Death Identification, developed by the Pregnancy-Associated Death Identification Workgroup, consisting of members from state health departments and the Centers for Disease Control and Prevention (CDC).[4]

Identifying by Vital and Hospital Discharge Records Linkages

A death data set is created for a given year for all Nevada female residents ages 10 to 60 years. Two data sets (birth and fetal death records, delivery and postpartum emergency department encounters, and hospital inpatient admission records) are created for the same year and the previous year. Death records of women ages 10 to 60 years are first linked with birth and fetal death records based on the mother's social security number (SSN). Death records of women ages 10 to 60 years that are not linked using SSN are then matched to birth and fetal death records utilizing the mother's first name, mother's last name, and mother's date of birth. Non-matched death records are then linked with delivery and postpartum emergency department encounter and hospital inpatient admission records based on the mother's SSN, mother's name, and date of birth. SAS software is used for the linkages.

Identifying by Causes of Death Information

Some pregnancy-associated deaths, such as those which occurred early during pregnancy, will not have birth or fetal death records to link. To identify pregnancy-associated deaths among those death records, the death records of females ages 10-60 are selected where the underlying causes of death were coded in A34 and O00-O99.9 (i.e. ICD-10 codes related to pregnancy) and/or the literal death cause field that contain any of the following pregnancy-related terms: amniotic, chorioamnionitis, eclampsia, ectopic, intrauterine fetal demise, peripartum, peripartum cardiomyopathy, placental, postpartum, pregnancy, pregnant, uterine hemorrhage, and uterine rupture. Selected pregnancy-associated deaths should be confirmed with additional data sources to avoid misclassification. Examples of additional confirmatory sources are provided in the section on Additional Data Sources.

Identifying by Pregnancy Checkboxes on the Death Records

Death records of females ages 10 to 60 were selected where the pregnancy checkbox on the death record was checked as pregnant at the time of death, not pregnant but pregnant within 42 days of the death, or not pregnant but pregnant 43 days to one year before death. Selected pregnancy-associated deaths should be confirmed with additional data sources to avoid misclassification. Examples of additional confirmatory sources are provided in the section on Additional Data Sources.

Additional Data Sources

Additional data sources identified by the Pregnancy-Associated Death Identification Workgroup that can help confirm pregnancy for deaths that do not link to vital records and hospital discharge records but have pregnancy indicated by causes of death information or pregnancy checkbox on the death record include:

- Obituaries
- Social Media

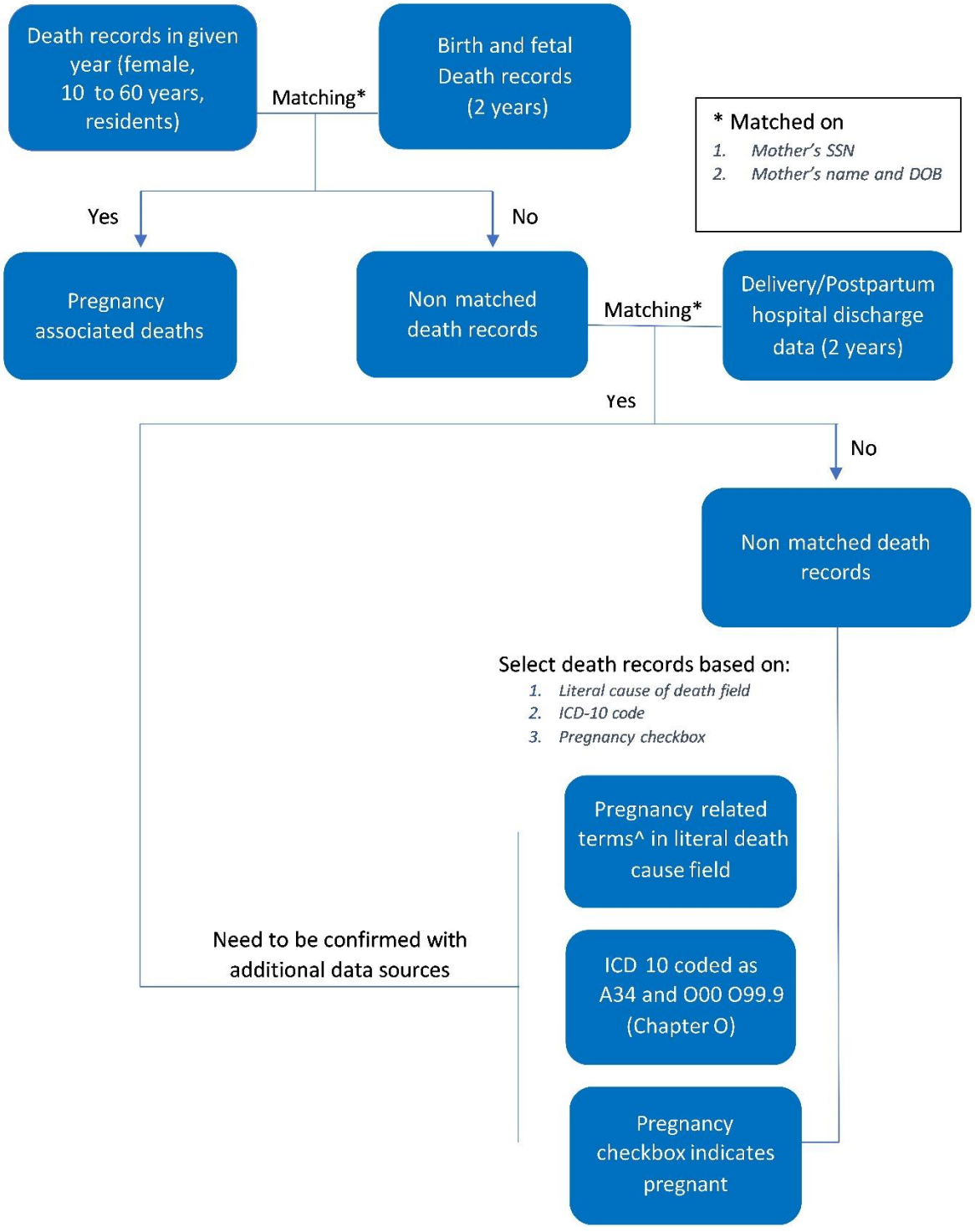
- Media and News Reports
- Certifier Confirmation
- Autopsy Reports

Analysis

The analyses in this report are for pregnancy-associated deaths for Nevada residents only. The pregnancy-associated death ratio was calculated as the number of pregnancy-associated deaths per 100,000 live births. The pregnancy-related death ratio was calculated as the number of pregnancy-related deaths per 100,000 live births.

The linkages and analyses were performed by using SAS 9.4.

Figure 2. Flow Chart of Identifying Pregnancy-Associated Deaths



^ Pregnancy-related terms include amniotic, chorioamnionitis, eclampsia, ectopic, intrauterine fetal demise, peripartum, peripartum cardiomyopathy, placental, postpartum, pregnancy, pregnant, uterine hemorrhage, and uterine rupture.

Findings

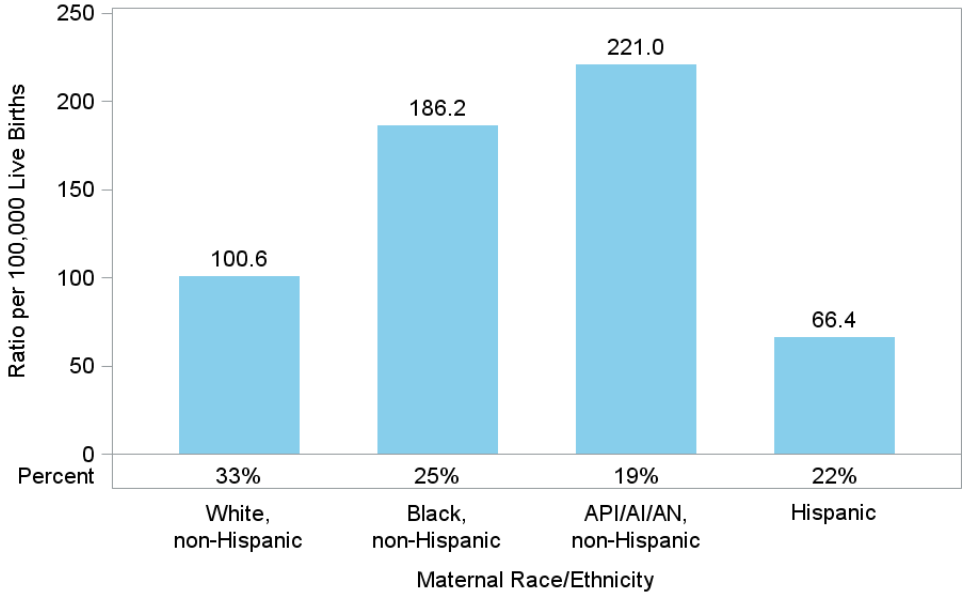
There were 36 pregnancy-associated deaths in 2021, with a ratio of 108.6 per 100,000 live births. The sections below explain the demographics, underlying causes of death, and drug overdose deaths associated with pregnancy-associated deaths in 2021. Data for 2021 are preliminary and subject to changes.

Demographics

In 2021, when comparing all Nevada births broken down by the mother's race and ethnicity, 36% of mothers were Hispanic, 36% were White, non-Hispanic mothers, 15% were Black, non-Hispanic, and 10% were Asian/Pacific Islander/American Indian/Alaska Native (API/AI/AN), non-Hispanic.

Figure 3 illustrates that API/AI/AN women had the highest pregnancy-associated death ratio at 221.0 per 100,000 live births and 19% of the pregnancy-associated deaths. Hispanic women had the lowest death ratio at 66.4 per 100,000 live births, accounting for 22% of all pregnancy-associated deaths.

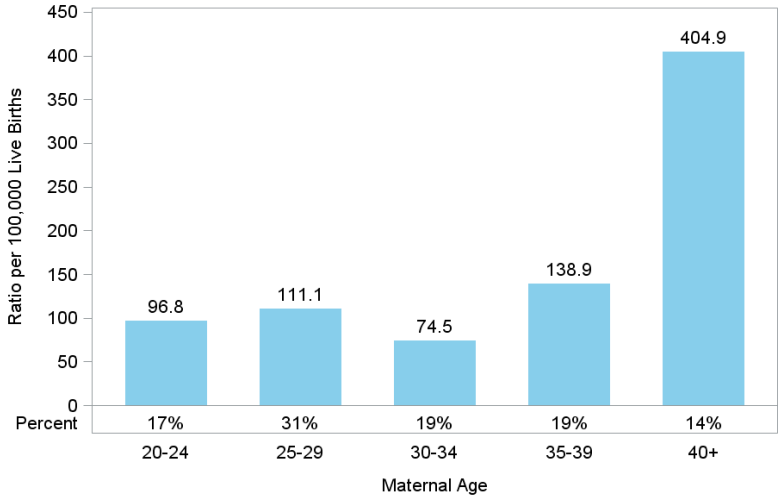
Figure 3. Pregnancy-Associated Death Ration and Percent by Race/Ethnicity, Nevada, 2021



Abbreviations: Asian or Pacific Islander (API); American Indian (AI); Alaska Native (AN).
**2021 data are preliminary and subject to changes.*

Figure 4 illustrates that women aged 40 and older had the highest pregnancy-associated death ratio at 404.9 per 100,000 live births, followed by women aged 35-39 at a ratio of 138.9 per 100,000 live births. Women aged 35 and older accounted for 33% of pregnancy-associated deaths.

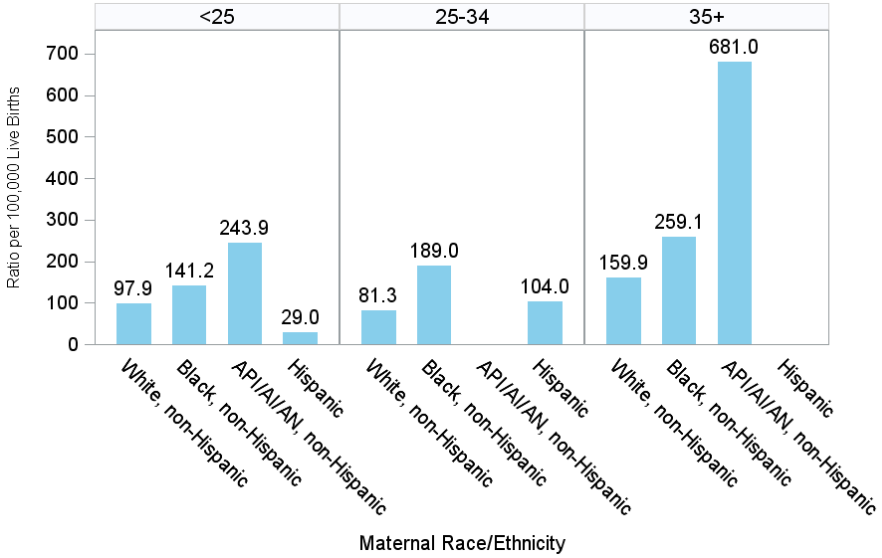
Figure 4. Pregnancy-Associated Death Ratio and Percent by Maternal Age, Nevada, 2021*



**2021 data are preliminary and subject to changes.*

Figure 5 illustrates the pregnancy-associated death ratio for each race and ethnicity within the age groups of under 25, 25-34, and 35 years and older. Among women under 25 years or 35 years and older, API/AI/AN women had the highest death ratio, at 243.9 per 100,000 live births and 681.0 per 100,000 live births, respectively. For women aged 25 to 34, Black non-Hispanic women had the highest death ratio at 189.0 per 100,000 live births.

Figure 5. Pregnancy-Associated Death Ratio by Maternal Age and Race/Ethnicity, Nevada, 2021*

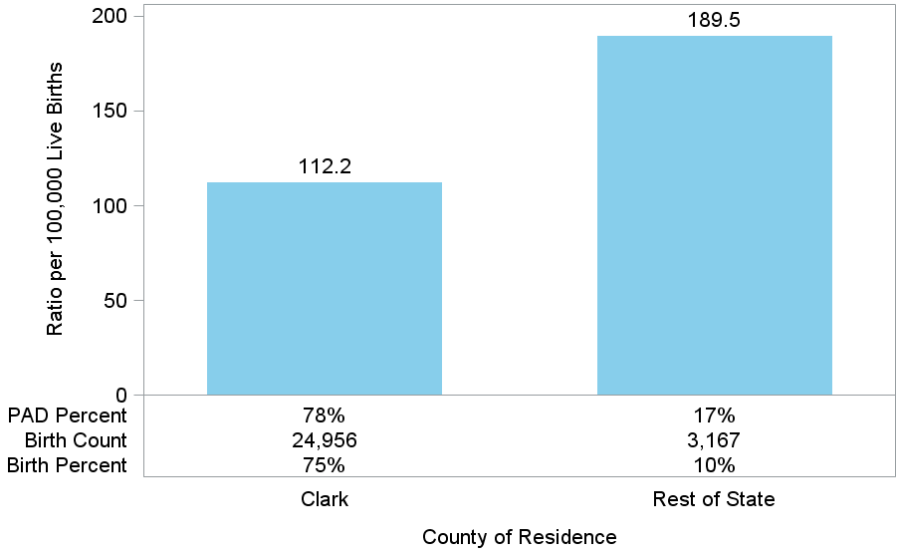


Abbreviations: Asian or Pacific Islander (API); American Indian (AI); Alaska Native (AN).

**2021 data are preliminary and subject to changes.*

Figure 6 shows that 78% of pregnancy-associated deaths occurred in Clark County. The Rest of State category had the highest pregnancy-associated death ratio at 189.5 per 100,000 live births. Counties included in the category of Rest of State were Carson City, Churchill, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lincoln, Lyon, Mineral, Nye, Pershing, Storey, and White Pine.

Figure 6. Pregnancy-Associated Death Ratio by County of Residence, Nevada, 2021*



6% of pregnancy-associated deaths had an unknown county of residence and the PAD ratio was unable to be calculated.
**2012 data are preliminary and subject to changes.*

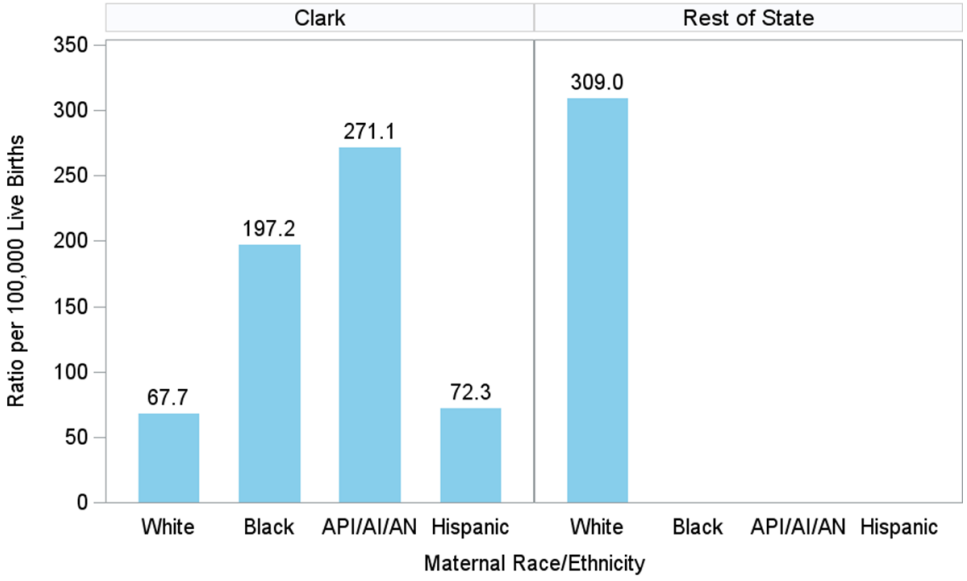
Table 1 lists counts of maternal mortalities by race and ethnicity and resident county. Figure 7 illustrates the pregnancy-associated death ratio for each race and ethnicity group within Clark County and the Rest of State. In Clark County, API/AI/AN women had the highest ratio at 271.1 per 100,000 live births. In the Rest of State, White, non-Hispanic women had a higher ratio at 309.0 per 100,000 live births compared to Clark County residents (67.7 per 100,000 live births). Please note that two pregnancy-associated deaths had an unknown county of residence, and the ratio was unable to be calculated due to insufficient birth data in this category.

Table 1. Maternal Mortality Counts by Race/Ethnicity and Maternal Resident County, Nevada, 2021*

Maternal Race/Ethnicity	Maternal Resident County		
	Clark	Rest of State	Unknown
White, non-Hispanic	5	6	1
Black, non-Hispanic	9	0	0
API/AI/AN, non-Hispanic	7	0	0
Hispanic	7	0	1

**2021 data are preliminary and subject to change*

Figure 7. Pregnancy-Associated Death Ratio by County of Residence and Race/Ethnicity, Nevada, 2021*

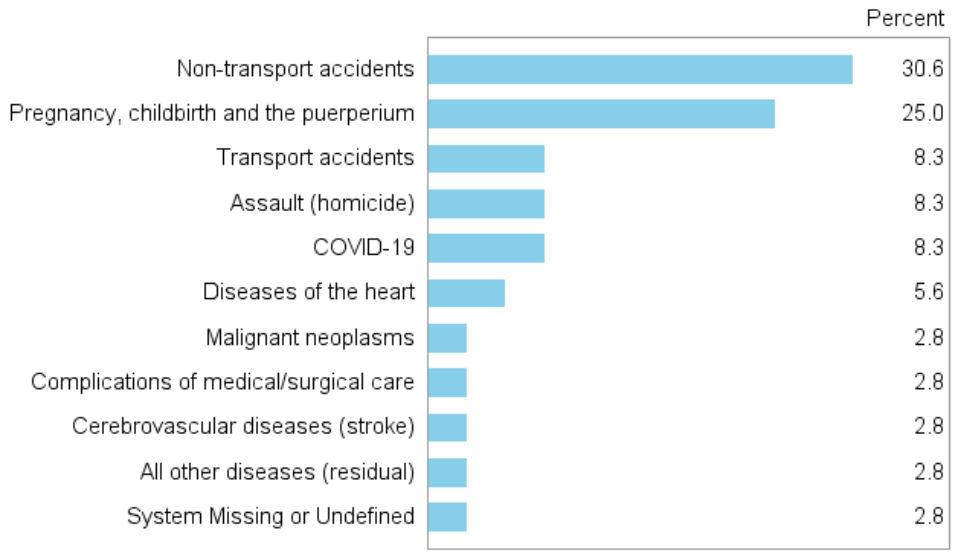


6% of pregnancy-associated deaths has an unknown county of residence and the PAD ratio was unable to be calculated.
Abbreviations: Asian or Pacific Islander (API); American Indian (AI); Alaskan Native (AN).
**2021 data are preliminary and subject to changes.*

Underlying Cause of Pregnancy-Associated Deaths

In 2021, the most common single cause of death was non-transport accidents, accounting for 30.6% of all pregnancy-associated deaths. The second most common death cause was pregnancy, childbirth, and the puerperium (25.0%), followed by transport accidents and assault (8.3%). All non-transport accidental deaths were due to unintentional drug overdose.

Figure 8. Underlying Causes of Death of Pregnancy-Associated Deaths, Nevada, 2021*

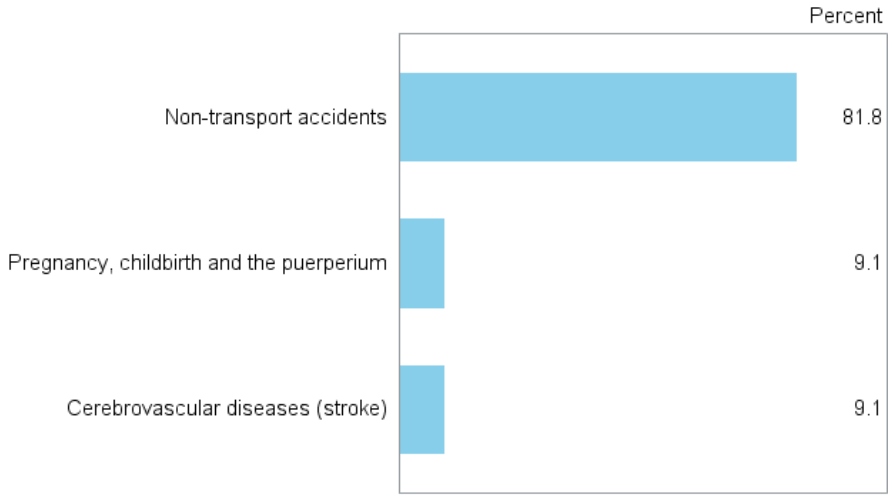


**Data for 2021 are preliminary and subject to changes.*

Drug Overdose Deaths

Drug overdose deaths were identified using the following underlying and contributing ICD-10 cause of death codes: X40-X44 (unintentional), X60-X64 (suicide), X85 (homicide), and Y10-Y14 (undetermined). Figure 9 shows 81.8% of drug overdose deaths had non-transport accidents as underlying death cause, and Figure 10 shows that all drug overdose deaths were unintentional deaths.

Figure 9. Drug Overdose Deaths by Underlying Cause of Death, Nevada, 2021*



Drug overdose deaths are identified using underlying and contributing ICD-10 cause-of-death codes: X40-X44(unintentional), X60-X64(suicide), X85(homicide), and Y10-Y14(undetermined).
**2021 are preliminary and subject to changes.*

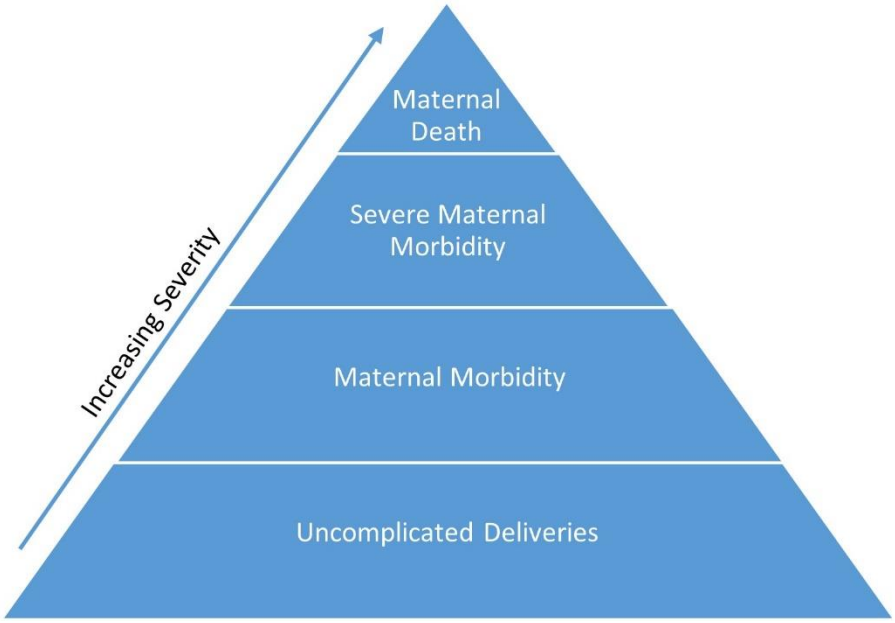
Figure 10. Drug Overdose Deaths by Intention, Nevada, 2021*

Drug overdose deaths are identified using underlying and contributing ICD-10 cause-of-death codes: X40-X44(unintentional), X60-X64(suicide), X85(homicide), and Y10-Y14(undetermined).
**2021 are preliminary and subject to changes.*

Severe Maternal Morbidity (SMM)

Figure 11 below illustrates the maternal morbidity continuum. The Centers for Disease Control and Prevention (CDC) reports that it has been steadily increasing in recent years and has affected more than 50,000 women in the United States in 2014. [5] The overall rate of SMM per 10,000 deliveries increased almost 200% over the years, from 49.5 in 1993 to 144.0 in 2014. [5] Blood transfusions play a primary role in this increase. [5] A blood transfusion refers to the procedure in which women are given donated blood around their delivery hospitalization. The rate of blood transfusions per 10,000 deliveries increased from 24.5 in 1993 to 122.3 in 2014. [5] There was a 20% increase in the rate of SMM per 10,000 deliveries after excluding blood transfusions (28.6 per 10,000 deliveries in 1993 to 35.0 per 10,000 deliveries in 2014). [5]

Figure 11. Continuum of Maternal Morbidity Showing Variation in Severity



Methodology

Data Sources

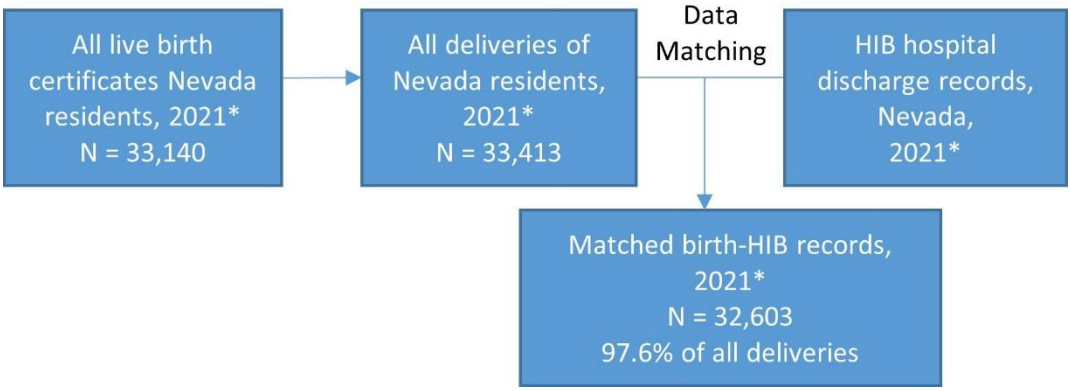
Nevada Electronic Birth Registration Data: Nevada Department of Health and Human Services, Office of Vital Records used Web-enabled Vital Records Registry System (WEVRRS) to collect information on all live births in Nevada and issue birth certificates. The birth certificate contains demographic information, such as the mother's age, race, education, and pregnancy information, such as parity and prenatal care.

Hospital Inpatient Billing (HIB) Data: The Hospital Inpatient Billing data provides health billing data for patients discharged from Nevada's non-federal hospitals. NRS 449.485 mandates all hospitals in Nevada report information as prescribed by the director of the Department of Health and Human Services. The data are collected using a standard universal billing form. The data are for patients admitted for at least 24 hours as an inpatient but do not include patients discharged from the emergency room. The data consists of demographics such as age, gender, race/ethnicity and uses International Classification of Diseases-10-Clinical 5 Modification (ICD-10-CM) diagnoses (up to 33 diagnoses respectively). In addition, the data includes billed hospital charges, procedure codes, length of hospital stay, discharge status, and external cause of injury codes. The billing data information is for billed charges and not the actual payment received by the hospital.

Data Matching

Nevada birth certificates were matched with the mother's delivery hospitalization record from Hospital Inpatient Billing (HIB) data. Multiple births (e.g., twins, triplets) were counted as one delivery (only one birth certificate was matched per hospital discharge record, even with multiple births). The total number of live births to Nevada residents was 33,140 in 2021. The total number of deliveries was 33,413, comprising all records from singleton births and one record per multiple births. Approximately 97.6% of all deliveries were matched with a hospital discharge record. All analyses are based on matched data (N=32,603). Birth certificates and hospital discharge records were matched with the mother's social security number, name, birth date, medical record number, and the facility of the delivery hospitalization. Non-matched birth certificates may be due to home births, missing social security numbers, misspelled names, etc. Data for 2021 are preliminary and subject to changes.

Figure 12. Data Matching Process for Birth Certificates and HIB Records, Nevada, 2021*



**2021 data are preliminary and subject to changes.*

Identification of Severe Maternal Morbidity (SMM)

SMM events were identified during delivery hospitalizations using an algorithm developed by researchers at the CDC. [6] The algorithm used ICD-9/10-CM codes to identify 25 indicators of SMM that represent either serious complications of pregnancy or delivery, such as disseminated intravascular coagulation or eclampsia, or procedures used to manage serious conditions, such as blood transfusion or hysterectomy. The Alliance for Innovation on Maternal Health (AIM) methods were used to identify pregnancy deliveries, and ICD-9 was converted to ICD-10 to identify SMM indicators. Four out of 25 ICD-9 indicators did not have corresponding ICD-10 codes. Of the 21 indicators remaining, 16 were identified using ICD-10 diagnosis codes, and five were identified using ICD-10 procedure codes. A complete list of conditions and ICD-10 codes is listed in Appendix A.

To ensure that only the most severe cases of these 21 indicators during delivery hospitalizations were captured, these indicators were classified as SMM only if they additionally met one of the following criteria:

- 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 was present.

Analysis

All SMM rates were calculated per 10,000 live deliveries that successfully matched with a HIB record. Chi-square tests and bivariate logistic regression were used to test the significance of the association between maternal characteristics and SMM. The analyses in this report include blood transfusion in SMM calculation unless otherwise noted. P-values less than 0.05 were deemed statistically significant.

Records with missing data on a variable of interest were not represented in the graph of SMM but are represented in the tables.

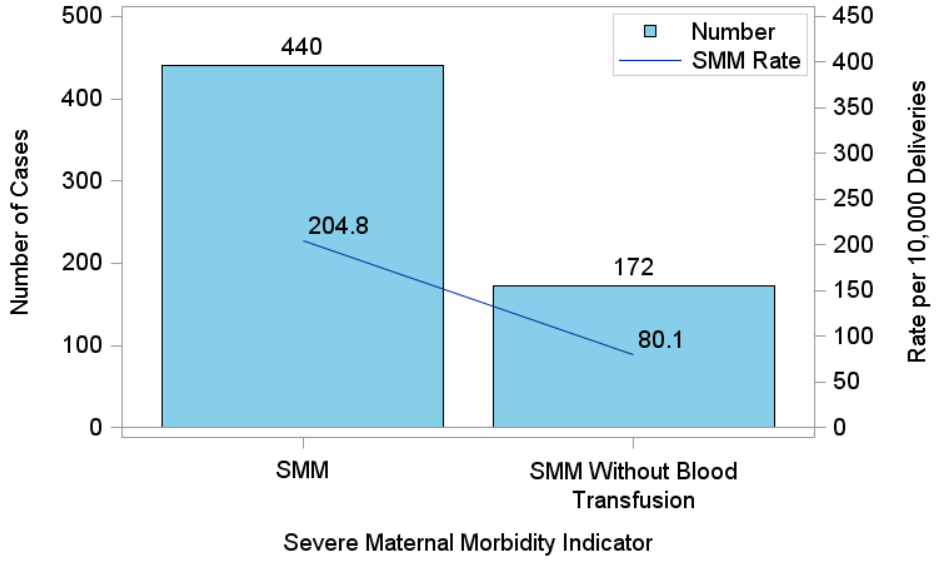
All analyses were conducted using SAS 9.4.

Findings

Leading Indicators

There was a total of 440 cases of SMM in 2021, with the rate of 204.8 per 10,000 deliveries. If blood transfusion was not included in the calculation, SMM cases drop to 172, and the rate drops to 80.1 per 10,000 deliveries.

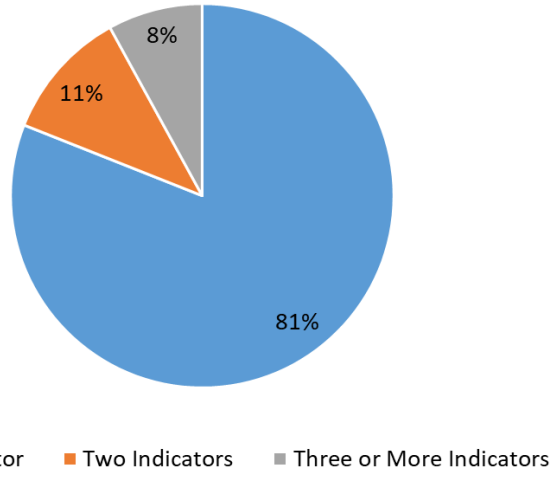
Figure 13. Severe Maternal Morbidity Rate per 10,000 Deliveries and Number of Cases, Nevada, 2021*



**2021 data are preliminary and subject to changes.*

Most deliveries with SMM (81%) had one indicator (out of a total of 21 SMM indicators), eleven percent of deliveries had two indicators, and eight percent had three or more indicators present.

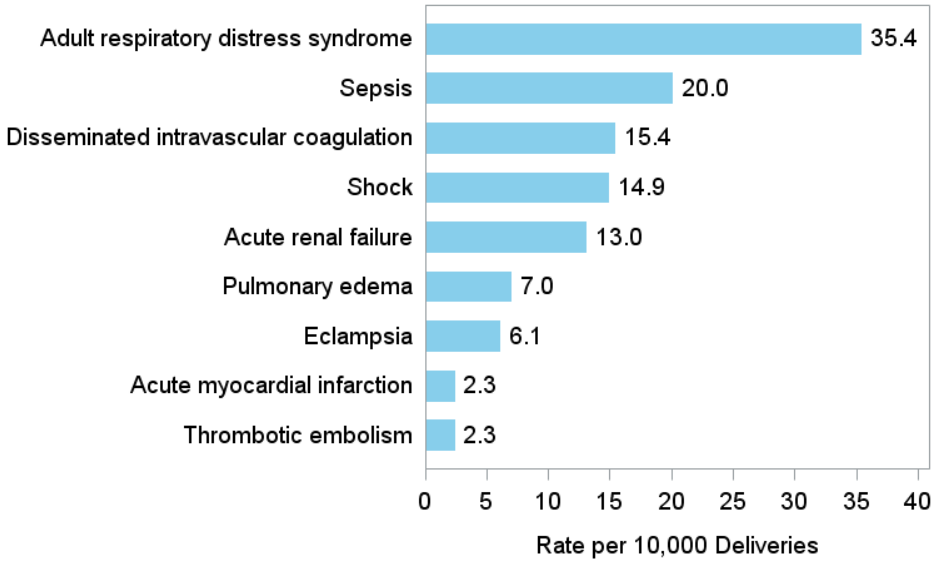
Figure 14. Distribution of Severe Maternal Morbidity Indicators, Nevada, 2021*



**2021 data are preliminary and subject to changes.*

The leading diagnosis-based indicators of SMM were adult respiratory distress syndrome (35.4 per 10,000 deliveries), sepsis (20.0 per 10,000 deliveries), disseminated intravascular coagulation (15.4 per 10,000 deliveries), shock (14.9 per 10,000 deliveries), acute renal failure (13.0 per 10,000 deliveries), pulmonary edema (7.0 per 10,000 deliveries), eclampsia (6.1 per 10,000 deliveries), and acute myocardial infarction and thrombotic embolism (2.3 per 10,000 deliveries). See Appendix A for a complete list and description of SMM indicators. Around 59% of adult respiratory distress syndrome cases were confirmed COVID-19 cases in 2021.[7]

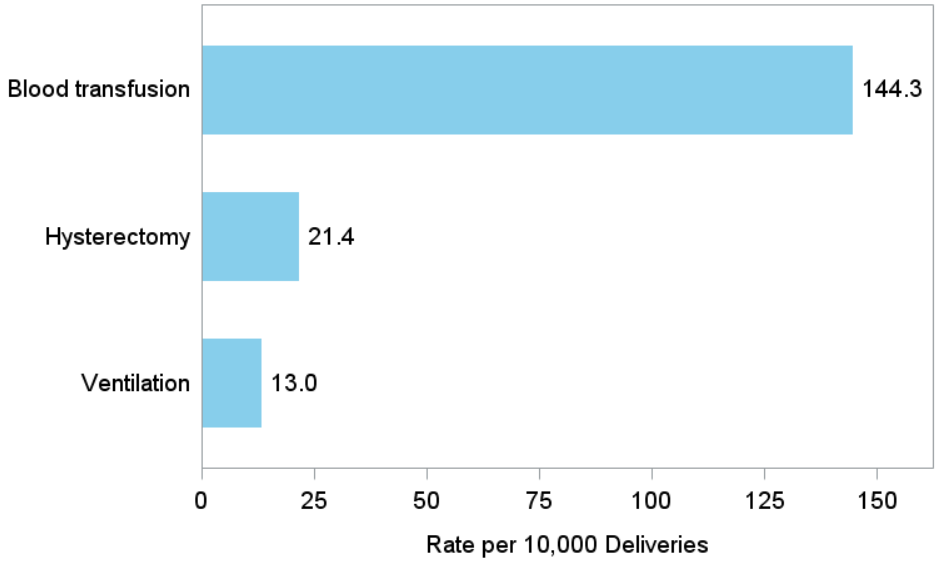
Figure 15. Leading Diagnosis-Based Indicators of Severe Maternal Morbidity, Nevada, 2021*



**2021 data are preliminary and subject to changes.*

Leading procedure-based indicators of SMM were blood transfusion (144.3 per 10,000 deliveries), hysterectomy (21.4 per 10,000 deliveries), and ventilation (13.0 per 10,000 deliveries). See Appendix A for a complete list and description of SMM indicators.

Figure 16. Leading Procedure-Based Indicators of Severe Maternal Morbidity, Nevada 2021*



**2021 data are preliminary and subject to changes.*

Table 2. Rate of Severe Maternal Morbidity Indicators per 10,000 Deliveries, Nevada, 2021*

SMM Indicator	Rate per 10,000 Deliveries
Diagnosis-Based Indicators	
Adult respiratory distress syndrome	35.4
Sepsis	20.0
Disseminated intravascular coagulation	15.4
Shock	14.9
Acute renal failure	13.0
Pulmonary edema	7.0
Eclampsia	6.1
Acute myocardial infarction	2.3
Thrombotic embolism	2.3
Cardiac arrest/ventricular fibrillation	1.4
Puerperal cerebrovascular disorders	0.9
Sickle cell anemia with crisis	0.9
Aneurysm	0.5
Amniotic fluid embolism	-
Heart failure during procedure or surgery	-
Internal injuries of the thorax, abdomen, and pelvis*	-
Intracranial injuries*	-
Severe anesthesia complications	-
Procedure-Based Indicators	
Blood transfusion	144.3
Hysterectomy	21.4
Ventilation	13.0
Conversion of cardiac rhythm	2.3
Temporary tracheostomy	0.5
Cardio monitoring*	-
Operations on the heart and pericardium*	-
SMM Rate Overall	204.8

**4 indicators were not carried over to ICD-10-CM codes system from ICD-9-CM.*
**2021 data are preliminary and subject to changes.*

Maternal Demographic Characteristics

Table 3. Severe Maternal Morbidity by Maternal Demographics, Nevada, 2021*

Demographic	SMM Cases	Rate per 10,000 Deliveries	Total Deliveries	Percent of Total Deliveries	Percent of SMM Cases	Chi-Square P-value
Maternal Age (Years)						
≤19	24	265.8	903	2.9	4.4	0.0002
20-24	76	188.2	4,038	13.2	13.8	
25-29	101	157.2	6,424	20.9	18.4	
30-34	124	202.6	6,119	20.0	22.6	
35-39	89	277.3	3,209	10.5	16.2	
≥40	26	329.9	788	2.6	4.7	
Unknown	0	0.0	0	0.0	0.0	
Race/Ethnicity						
White non-Hispanic	127	166.2	7,642	24.9	23.1	0.0002
Black non-Hispanic	91	279.5	3,256	10.6	16.6	
American Indian/Alaska Native non-Hispanic	5	314.5	159	0.5	0.9	
Asian/Pacific Islander non-Hispanic	57	286.7	1,988	6.5	10.4	
Hispanic	145	184.9	7,841	25.6	26.4	
Other	0	0.0	35	0.1	0.0	
Unknown	15	267.9	560	1.8	2.7	
Education						
Less Than High School	57	210.9	2,703	8.8	10.4	0.7856
High School Graduate	148	206.5	7,167	23.4	27.0	
Some College	114	187.8	6,069	19.8	20.8	
College Graduate or Higher	93	188.2	4,942	16.1	16.9	
Unknown	28	466.7	600	2.0	5.1	
Insurance^						
Medicaid	202	215.3	9,384	30.6	36.8	0.0206
Other Government	13	328.3	396	1.3	2.4	
Private	210	190.6	11,018	35.9	38.3	
Self-Pay	7	141.4	495	1.6	1.3	
Other	8	470.6	170	0.6	1.5	
Unknown	0	0.0	18	0.1	0.0	

^ Health insurance status indicates the primary payer for the delivery as recorded on hospital discharge form.

**2021 data are preliminary and subject to changes.*

When considering the SMM rate including blood transfusions, the SMM is significantly associated with maternal age (p = 0.0002) maternal race and ethnicity (p = 0.0002), and health insurance status (p = 0.0206).

Prenatal and Delivery Characteristics

Table 4. Severe Maternal Morbidity by Prenatal and Delivery Characteristics, Nevada, 2011**

Indicator	SMM Cases	Rate per 10,000 Deliveries	Total Deliveries	Percent of Total Deliveries	Percent of SMM Cases	Chi-Square P-value
Prenatal Care Initiation						
No Care	0	0.0	0	0.0	0.0	0.3177
First Trimester	308	185.8	16,576	54.1	56.1	
Second Trimester	59	202.3	2,916	9.5	10.7	
Third Trimester	11	207.2	531	1.7	2.0	
Unknown Start Date	6	379.7	158	0.5	1.1	
Unknown	56	430.8	1,300	4.2	10.2	
Adequacy of Prenatal Care						
Inadequate	47	237.6	1,978	6.5	8.6	<0.0001
Intermediate	30	150.9	1,988	6.5	5.5	
Adequate	117	140.0	8,355	27.2	21.3	
Adequate Plus	182	237.3	7,669	25.0	33.2	
Unknown	64	429.2	1,491	4.9	11.7	
Parity						
0 Previous Live Births	182	220.0	8,271	27.0	33.2	0.0294
1 Previous Live Birth	103	164.9	6,247	20.4	18.8	
2+ Previous Live Births	155	222.9	6,954	22.7	28.2	
Unknown	0	0.0	9	0.0	0.0	
Method of Delivery*						
Repeat Cesarean	115	321.0	3,583	11.7	20.9	<0.0001
Primary Cesarean	183	497.0	3,682	12.0	33.3	
Vaginal	142	99.9	14,216	46.4	25.9	
Plurality						
Singleton Birth	418	197.9	21,119	68.9	76.1	<0.0001
Multiple Birth	22	607.7	362	1.2	4.0	
Pre-Pregnancy BMI~						
Underweight (<18.5)	12	160.4	748	2.4	2.2	0.1947
Normal Weight (18.5-24.9)	170	202.9	8,378	27.3	31.0	
Overweight (25.0-29.9)	88	154.3	5,704	18.6	16.0	
Class I (30.0-34.9)	73	214.6	3,401	11.1	13.3	
Class II (35.0-39.9)	36	224.2	1,606	5.2	6.6	
Class III (≥40.0)	24	216.0	1,111	3.6	4.4	
Unknown	37	694.2	533	1.7	6.7	
Chronic Disease^						
No Chronic Disease	405	194.9	20,783	67.8	73.8	<0.0001
Any Chronic Disease	35	501.4	698	2.3	6.4	

** Method of delivery was identified from hospital discharge data using ICD-10 codes.*
~ Pre-pregnancy BMI was calculated using formula (weight (lb.) / height (in)^2) x 703 with mother's weight and height as recorded on birth certificate.
^ Any chronic disease includes deliveries to women with chronic hypertension, pre-existing diabetes or chronic heart disease as recorded on birth certificate.
*** 2021 data are preliminary and subject to changes.*

The SMM rate including blood transfusions is significantly associated with adequacy of prenatal care (p = <0.0001), parity (p = 0.0294), method of delivery (p = <0.0001), plurality (p = <0.0001), and maternal chronic disease status (p = <0.0001).

Conclusions

The pregnancy-associated death ratio was 108.6 per 100,000 births in Nevada in 2021. Women who were Asian, Pacific Islander, American Indian, or Alaska Native (API/AI/AN) had the highest pregnancy-associated death ratio at 221.0 per 100,000 live births and 19% of the pregnancy-associated deaths, followed by Black, non-Hispanic women (186.2 per 100,000 live births and 25% of pregnancy-associated deaths). Clark County reflected similar results to the statewide trends, where API/AI/AN, non-Hispanic women had the highest rates of pregnancy-associated deaths, followed by black, non-Hispanic women. Women aged 40 and older had the highest pregnancy-associated death ratio at 404.9 per 100,000 live births. Non-transport accidents were the most common cause of pregnancy-associated deaths, accounting for 31%.

Nevada's severe maternal morbidity rate was 204.8 per 10,000 deliveries in 2021. The leading indicators include adult respiratory distress syndrome, sepsis, disseminated intravascular coagulation, shock, acute renal failure, pulmonary edema, eclampsia, acute myocardial infarction, and thrombotic embolism. Mother's age, race/ethnicity, health insurance status, adequacy of prenatal care, parity, method of delivery, plurality, and chronic disease are all risk factors for severe maternal morbidity.

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Appendix A. Complete List of SMM Indicators and Associated ICD-10-CM Code

Classification	Severe Maternal Morbidity Indicator	ICD-10/Procedure Codes
Diagnosis	Acute myocardial infarction	121.xx, 122.x
	Aneurysm	171.xx, 179.0
	Acute renal failure	N17.x, O90.4
	Adult respiratory distress syndrome	J80, J95.1, J95.2, J95.3, J95.82x, J96.0x, J96.2x, R09.2
	Amniotic fluid embolism	O88.1x
	Cardiac arrest/ventricular fibrillation	I46.x, I49.0x
	Disseminated intravascular coagulation	D65, D68.8, D68.9, O72.3
	Eclampsia	O15.x
	Heart failure/arrest during surgery or procedure	I97.12x, I97.13x, I97.710, I97.711
	Puerperal cerebrovascular disorders	I60.xx-I68.xx, O22.51, O22.52, O22.53, I97.81x, I97.82x, O873
	Pulmonary edema/Acute heart failure	J81.0, I50.1, I50.20, I50.21, I50.23, I50.30, I50.31, I50.33, I50.40, I50.41, I50.43, I50.9
	Severe anesthesia complications	O74.0, O74.1, O74.2, O74.3, O89.0x, O89.1, O89.2
	Sepsis	O85, O86.04, T80.211A, T81.4XXA, R65.20, A40.x, A41.x, A32.7
	Shock	O75.1, R57.x, R65.21, T78.2XXA, T88.2XXA, T88.6 XXA, T81.10XA, T81.11XA, T81.19XA
	Sickle cell disease with crisis	D57.0x, D57.21x, D57.41x, D57.81x
	Air and thrombotic embolism	I26.x, O88.0x, O88.2x, O88.3x, O88.8x
Procedure	Conversion of cardiac rhythm	5A2204Z, 5A12012
	Blood transfusion	30230H0, 30230K0, 30230L0, 30230M0, 30230N0, 30230P0, 30230R0, 30230T0, 30230H1, 30230K1, 30230L1, 30230M1, 30230N1, 30230P1, 30230R1, 30230T1, 30233H0, 30233K0, 30233L0, 30233M0, 30233N0, 30233P0, 30233R0, 30233T0, 30233H1, 30233K1, 30233L1, 30233M1, 30233N1, 30233P1, 30233R1, 30233T1, 30240H0, 30240K0, 30240L0, 30240M0, 30240N0, 30240P0, 30240R0, 30240T0, 30240H1, 30240K1, 30240L1, 30240M1, 30240N1, 30240P1, 30240R1, 30240T1, 30243H0, 30243K0, 30243L0, 30243M0, 30243N0, 30243P0, 30243R0, 30243T0, 30243H1, 30243K1, 30243L1, 30243M1, 30243N1, 30243P1, 30243R1, 30243T1
	Hysterectomy	0UT90ZZ, 0UT94ZZ, 0UT97ZZ, 0UT98ZZ, 0UT9FZZ, 0UT90ZL
	Temporary tracheostomy	0B110Z4, 0B110F4, 0B113Z4, 0B113F4, 0B114Z4, 0B114F4
	Ventilation	5A1935Z, 5A1945Z, 5A1955Z