

# **UNDERSTANDING MATERNAL DEATHS IN COLORADO:**

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**AN ANALYSIS OF MORTALITY  
FROM 2008 - 2013**

**OCTOBER 2017**

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### **Acknowledgements**

The Colorado Maternal Mortality Review Committee gratefully acknowledges the work of the Centers for Disease Control and Prevention in developing the Maternal Mortality Review Data System (MMRDS). The system was developed to be a repository for medical and social information about individual maternal deaths to be used by state-based maternal mortality review committees and also as a national public health surveillance system for maternal mortality. The system was created using Epi Info 7 and combines a large number of variables from numerous data sources. The analysis in this report would not have been possible without the use of the MMRDS.

Colorado was one of six states to first pilot the data system, beginning in 2013. More recently, the MMRDS became MMRIA, the Maternal Mortality Review Information Application. A report on the revised system and a preliminary analysis of data from four states, including Colorado, can be found at <https://www.cdcfoundation.org/sites/default/files/upload/pdf/MMRIAReport.pdf>. Twenty-four states (30 jurisdictions) are now using the application.

### **Statement on Structural Inequity**

*The Colorado Department of Public Health and Environment acknowledges that generations-long social, economic and environmental inequities results in adverse health outcomes. They affect communities differently and have a greater influence on health outcomes than either individual choices or one's ability to access health care. Reducing health disparities through policies, practices and organizational systems can help improve opportunities for all Coloradans.*

# Understanding Maternal Deaths in Colorado: An Analysis of Mortality from 2008 to 2013

## Introduction

The death of a woman during pregnancy, childbirth, or within a year postpartum is a tragic event that happens more frequently in the United States than in other developed countries. Despite the Healthy People goal of a 10 percent reduction in maternal mortality by 2020, the estimated national maternal mortality ratio continues to increase. In fact, a recent study found that maternal mortality increased by 26.6 percent in 48 states and Washington DC between 2000 and 2014.<sup>1</sup> Meanwhile, the international trend was in the opposite direction.<sup>1,2,3</sup>

Maternal health experts are actively searching for answers about why maternal mortality is higher and increasing in the United States compared to other developed nations. In Colorado, the state's Maternal Mortality Review Committee plays a vital role in answering these questions. The committee is comprised of a multidisciplinary team with representation from obstetrics and gynecology, maternal-fetal medicine, forensic pathology, nurse-midwifery, anesthesiology, nursing and psychiatry, mental and behavioral health and public health. It reviews all deaths to women during pregnancy up to one year postpartum, irrespective of cause. A critical component of each analysis is determining whether or not the death was from a cause related to or aggravated by the pregnancy or its management.

## Definitions

Figure 1 on the following page displays terms and definitions used by the Centers for Disease Control and Prevention (CDC) and the American Congress of Obstetricians and Gynecologists (ACOG). Pregnancy-associated death is an umbrella term that includes both deaths which are not related to pregnancy (a large proportion) and deaths that are related to pregnancy (a small proportion). Some 15 to 37 pregnancy-associated deaths occurred in Colorado each year between 2008 and 2013, totaling 145 over six years. Each case is considered important, and an analysis of contributing factors can assist in the development of prevention strategies. The Colorado Maternal Mortality Review Committee is committed to examining each case to better understand trends in Colorado and to inform how such tragedies can be prevented in the future.

*"Behind each number is  
a human face."*

--William Foege, M.D.,  
MPH, Former Director, U.S.  
Centers for Disease Control

<sup>1</sup> MacDorman ME, Declercq E, Cabral H, and Morton C (2016). Recent increases in the U.S. Maternal Mortality Rate: Disentangling trends from measurement Issues. *Obstet Gynecol*, 2016 Sep;128(3):447-55.

<sup>2</sup> Hogan MC, Foreman KJ, Naghavi M, Ahn SY, Wang M, Makela SM, Lopez AD, Lozano R, Murray CJ. *Lancet*. 2010 May 8; 375(9726):1609-23.

<sup>3</sup> Amnesty International. *Deadly delivery: The maternal health care crisis in the USA*. Amnesty International Publications. London: 2010. Accessed March 1, 2016. <http://www.amnestyusa.org/sites/default/files/pdfs/deadlydelivery.pdf>.

Figure 1.

**Pregnancy-associated death:** The death of a woman while pregnant or within one year of the end of pregnancy, regardless of the cause. These deaths make up the universe of maternal mortality. Within the universe, deaths are classified as not pregnancy-related and pregnancy-related.



**Not pregnancy-related death:** The death of a woman while pregnant or within one year of the end of pregnancy due to a cause unrelated to pregnancy. For example, a pregnant woman dies in a train crash. The Centers for Disease Control use the term “pregnancy-associated but not pregnancy-related” for this category.

**Pregnancy-related death:** The death of a woman while pregnant or within one year of the end of pregnancy, regardless of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management. For example, a pregnant woman dies due to eclampsia.

## Methods

The Colorado Department of Public Health and Environment (CDPHE) identifies the cohort of maternal deaths from several sources including death certificates with the pregnancy status checkbox marked; ICD-10 obstetric cause of death codes; linkage to live birth or fetal death certificates; and the National Violent Death Reporting System. Additional records are then gathered for each case, including autopsy reports, toxicology, medical records, and other relevant items. Based on this information, de-identified case summaries are developed by CDPHE staff for committee members to review in order to:

- determine the annual number of pregnancy-associated and pregnancy-related deaths;
- identify trends and risk factors among all pregnancy-associated deaths in Colorado; and
- develop actionable strategies for prevention and intervention.

This comprehensive review of processes and factors leading to a maternal death establishes a deeper understanding of what occurred and what can be done to prevent future maternal deaths in

Colorado. National estimates of maternal deaths are identified using death certificate data alone. In contrast, the enhanced surveillance methods employed by the Colorado Maternal Mortality Review Program establish a more accurate picture of contributing factors in the state. As shown in Table 1, improved case identification and committee review processes strengthens the reliability of data for Colorado to more effectively measure the problem and work toward policy and/or program reforms to improve health outcomes.<sup>4</sup>

**Table 1. Data Sources and Definitions for Maternal Mortality Reviews**

<b>Analysis</b>	<b>Colorado Maternal Mortality Review</b>	<b>Centers for Disease Control, National Center for Health Statistics Review</b>
<b>Methods for identifying maternal death</b>	Death certificates linked to fetal death and birth certificates Pregnancy check box on death certificates ICD-10 codes on death certificates National Violent Death Reporting System (NVDRS) data	Death certificate ICD-10 codes and pregnancy check box
<b>Data source for committee review</b>	Death/birth or fetal death certificate Coroner's report and autopsy Medical records (e.g. prenatal care, postpartum visits, emergency department visits) Toxicology Any other relevant items	Not applicable
<b>Time frame</b>	During pregnancy to 365 days postpartum*	During pregnancy to 42 days postpartum
<b>Terms</b>	Pregnancy-associated Pregnancy-related Not pregnancy-related	Maternal death (Associated and) pregnancy- related (Associated but) not pregnancy- related
<b>Measure</b>	Pregnancy-associated mortality ratio: number of pregnancy-associated deaths per 100,000 live births. Pregnancy-related mortality ratio: number of pregnancy-related deaths per 100,000 live births. Not pregnancy-related mortality ratio: number of not pregnancy-related deaths per 100,000 live births.	Maternal mortality rate: number of maternal deaths per 100,000 live births

\*The Colorado Maternal Mortality Review Committee reviews cases up to one year postpartum for a more comprehensive understanding of what is occurring during the first year postpartum.

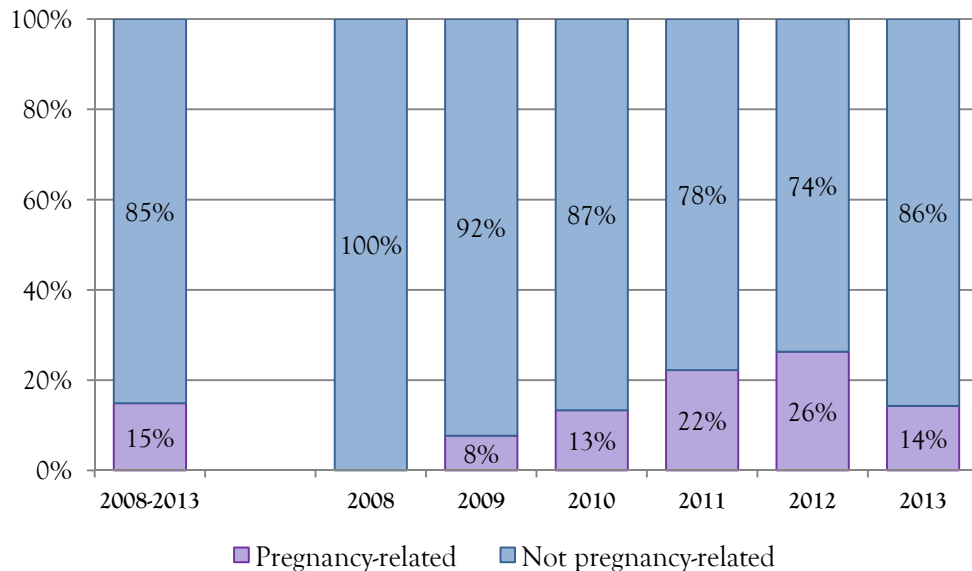
<sup>4</sup> U.S. Centers for Disease Control and Prevention [CDC] (2017). *Report from Maternal Mortality Review Committees: A View Into Their Critical Role*. Available online at <http://reviewtoaction.org/sites/default/files/national-portal-material/Report%20from%20MMRCs%20A%20View%20Into%20Their%20Critical%20Role.pdf>

### Determination of Pregnancy Relatedness

Between 2008 and 2013 the overall number of pregnancy-associated deaths in Colorado ranged between 15 and 37 cases each year, and totaled 145 cases for the six-year period. The Colorado Maternal Mortality Review Committee determined that most deaths, 85 percent, were **not** related to pregnancy (120/141). Pregnancy-relatedness could not be determined for 4 cases. During the period, the proportion of deaths that were related to pregnancy fluctuated between none and 26 percent (Figure 2).

Year	Number of Pregnancy-Associated Deaths	Number of Not Pregnancy-Related Deaths	Number of Pregnancy-Related Deaths
2008	17	17	0
2009	26	24	2
2010	15	13	2
2011	37	28	8
2012	20	14	5
2013	30	24	4
<b>Total</b>	<b>145</b>	<b>120</b>	<b>21</b>

Figure 2. Pregnancy-Associated Deaths by Type of Association, Colorado, 2008-2013

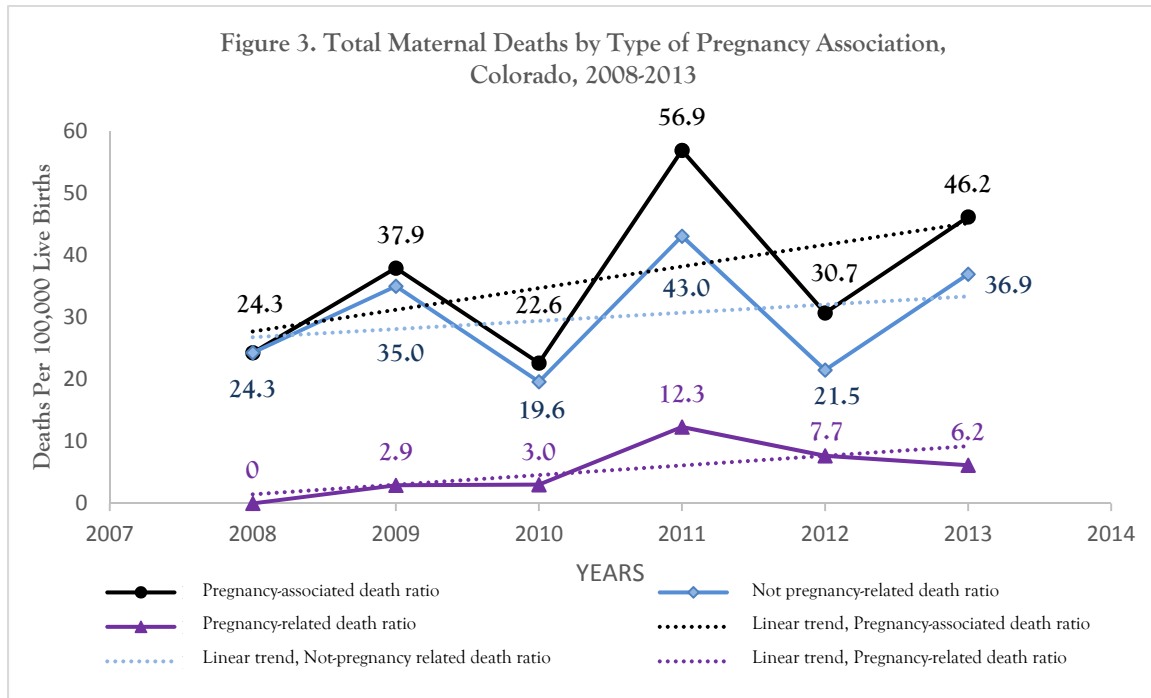


Note: The committee reviewed cases that occurred before 2008, but changes in case identification and review methodologies resulted in restricting the current analysis to data from 2008 to 2013. It should be noted that some of the cases before 2008 were pregnancy-related.

### Maternal Mortality on the Rise

Because the total number of pregnancy-associated deaths identified per year in Colorado is small and variable, the ratio of deaths to births fluctuates from year to year and trends can be difficult to determine. Trend lines have been included in Figure 3 to reveal the upward trajectory of all ratios. In 2008, the overall pregnancy-associated mortality ratio in Colorado was 24.3 deaths per 100,000 live births. The ratio nearly doubled by 2013, reaching 46.2 deaths per 100,000 live births. The not pregnancy-related mortality ratio increased from 24.3 deaths per 100,000 live births to 36.9 over the same time period, an increase of greater than 50 percent. The pregnancy-related mortality ratio also increased from no deaths in 2008 to 6.2 deaths per 100,000 live births in 2013. While this

ratio remains lower than the national pregnancy-related mortality ratio of 17.3 deaths per 100,000 live births in 2013, this upward trend should not be overlooked.<sup>5</sup>



### Demographic and Prenatal/Intrapartum Characteristics

Table 2 compares the demographic characteristics of women who died during pregnancy or up to one year postpartum to those of all women who gave birth in Colorado between 2008 and 2013. The comparison data demonstrates that the cohort of mothers who died were younger than the overall group of Colorado mothers, with an average age of 27.3 versus 28.3, and a median age of 26.1 compared to 29.2. Differences are observed across racial groups with a significantly different percentage of pregnancy-associated deaths occurring among black/African American women (9.7 percent) compared to the percent of all black/African American women giving birth in the same time period (5.4 percent). This finding aligns with national trends, where a disparity in maternal mortality rates exists among black/African American women across all education levels and persists even after controlling for differences in socioeconomic status.<sup>6,7</sup>

Statistically significant differences were also observed by marital status, education level, annual household income, and location of residence. Nearly half (45.2 percent) of deaths occurred to women with an annual household income of less than \$15,000, compared to one-quarter (25.5 percent) of births occurring among all women with a similar low household income.

<sup>5</sup> U.S. Centers for Disease Control and Prevention [CDC] (2017). Pregnancy Mortality Surveillance System data accessed 6/26/2017. <https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pmss.html>.

<sup>6</sup> Creanga A et al (2014). Racial and ethnic disparities in severe maternal morbidity: a multistate analysis, 2008-2010. *Obstet Gynecol* 2014. 435, 437.

<sup>7</sup> Singh GK (2010). Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau, *Maternal Mortality in the United States, 1935-2007: Substantial racial/ethnic, socioeconomic, and geographic disparities persist* (2010). Available online at <https://www.hrsa.gov/ourstories/mchb75th/mchb75maternalmortality.pdf>.

**Table 2. Demographic Characteristics of All Pregnancy-Associated Deaths Compared to Characteristics of All Colorado Mothers, 2008-2013**

Characteristics	Colorado Maternal Deaths (N=145)		Total Colorado Births 2008-2013 (N=400,220)	
	Frequency	Percent	Frequency	Percent
<b>Maternal Age</b>				
Less than 20	11	7.6	31,138	7.8
20-24	41	28.3	85,048	21.3
25-29	42	29.0	112,414	28.1
30-34	29	20.0	105,818	26.4
35-39	21	14.5	53,183	13.3
40+	1	0.7	12,569	3.1
Unknown	0	~	50	~
Total Known	145	100.0	400,170	100.0
Mean Maternal Age	27.3	~	28.3	~
Median Maternal Age	26.1	~	29.2	~
<b>Maternal Race/ Ethnicity</b>				
White non-Hispanic	88	61.1	242,129	63.6
White Hispanic	36	25.0	98,559	25.9
Black/African American	14	9.7*	20,514	5.4
Other	6	4.2	19,623	5.2
Unknown	1	~	19,395	~
Total Known	144	100.0	380,825	100.0
<b>Marital Status</b>				
Married	88	61.1**	302,785	75.8
Not Married	56	38.9	96,848	24.2
Unknown	1	~	587	~
Total Known	144	100.0	399,633	100.0
<b>Education</b>				
Less than high school	33	22.8	68,769	17.8
High school or GED	55	37.9**	80,309	20.8
Some College or Associate's	42	29.0	113,202	29.3
Bachelor's	11	7.6	88,254	22.9
Master's or higher	4	2.8	35,458	9.2
Unknown	~	~	14,228	~
Total Known	145	100.0	385,992	100.0
<b>Household Income</b>				
Less than \$15,000	47	45.2**	90,483	25.5
\$15,000-\$24,999	17	16.3	45,690	12.9
\$25,000-\$34,999	17	16.3	34,763	9.8
\$35,000-\$49,999	7	6.7	34,350	9.7
\$50,000-\$74,999	8	7.7	52,230	14.7
\$75,000 and higher	8	7.7	97,590	27.5
Unknown	41	~	45,114	12.7
Total Known	104	100.0	355,106	100.0
<b>County of Residence <sup>a</sup></b>				
Urban	117	82.4	352,525	88.1
Rural	25	17.6*	47,677	11.9
Unknown	3	~	18	~
Total Known	142	100.0	400,202	100.0

Characteristics of maternal deaths were taken from birth certificates; death certificate data were used when birth certificate data or birth certificates were missing. Educational level was determined from death certificate data alone due to inconsistencies in birth certificate coding. Household income data were available only from birth certificates.

\*p<.05 \*\*p<.01, Z test for two population proportions. <sup>a</sup> Counties categorized by the Colorado Rural Health Center.

In addition to demographic characteristics, supplemental information is collected through the review process regarding prenatal and intrapartum status, including but not limited to pre-pregnancy BMI, gestational age, birth weight, timing and adequacy of prenatal care, WIC participation, parity, and maternal weight gain during pregnancy. Table 3 compares these prenatal and intrapartum maternal characteristics among all pregnancy-associated deaths with those of all Colorado mothers. Statistically significant differences were observed in every category, with deceased mothers more likely to have been obese prior to pregnancy; had delayed or inadequate



prenatal care; gained an inadequate amount of weight during pregnancy; delivered prematurely; had low birth weight babies; used WIC; and had four or more live births.

**Table 3. Prenatal/Intrapartum Characteristics of All Pregnancy-Associated Deaths Compared to Characteristics of All Colorado Mothers, Colorado, 2008-2013**

Characteristics	Colorado Maternal Deaths (N=118)		Colorado Total Births (N=400,220)	
	Frequency	Percent	Frequency	Percent
<b>Pre-Pregnancy BMI</b>				
Underweight (<18.5)	5	4.6	16,385	4.2
Normal weight (18.5-24.9)	47	43.1	202,294	52.4
Overweight (25-29.9)	28	25.7	95,603	24.8
Obese (>=30)	29	26.6*	71,902	18.6
Missing/Unknown	9	~	14,036	~
Total Known	109	100.0	386,184	100.0
<b>Trimester Prenatal Care Began</b>				
First Trimester	62	57.4**	307,455	79.0
Second Trimester	31	28.7**	60,347	15.5
Third Trimester	6	5.6	15,405	4.0
No Care Received	9	8.3**	6,147	1.6
Missing/Unknown	10	~	10,866	~
Total Known	108	100.0	389,354	100.0
<b>Gestational Age</b>				
Early Preterm (<34 weeks)	14	11.9**	10,007	2.5
Preterm (34-36 weeks)	22	18.6**	26,226	6.6
Early Term (37-38 weeks)	31	26.3	98,839	24.7
Full Term (39-40 weeks)	45	38.1**	230,027	57.5
Late Term (41+ weeks)	6	5.1	34,814	8.7
Missing/Unknown	0	~	307	~
Total Known	118	100.0	399,913	100.0
<b>Birth Weight</b>				
Very Low Birthweight (<1500 grams)	7	6.0**	5,134	1.3
Low Birthweight (1500-2499 grams)	22	18.8**	30,107	7.5
Healthy Birthweight (>=2500 grams)	88	75.2	364,837	91.2
Missing/Unknown	1	~	142	~
Total Known	117	100.0	400,078	100.0
<b>Kotelchuck Index <sup>a</sup></b>				
Inadequate	29	29.0**	65,709	16.9
Intermediate	19	19.0	83,438	21.4
Adequate	28	28.0*	153,604	39.5
Adequate Plus	24	24.0	86,465	22.2
Missing/Unknown	18	~	10,862	~
Total Known	100	100.0	389,216	100.0
<b>WIC Participant</b>				
Yes	54	49.1**	118,315	31.4
No	56	50.9	258,059	68.6
Missing/Unknown	8	~	23,846	~
Total Known	110	100.0	376,374	100.0
<b>Parity</b>				
One	35	29.7*	164,226	41.1
Two	35	29.7	128,256	32.1
Three	21	17.8	64,667	16.2
Four or more	27	22.9**	42,639	10.7
Missing/Unknown	0	~	432	~
Total Known	118	100.0	399,788	100.0
<b>Maternal Weight Gain During Pregnancy</b>				
Inadequate weight gain	30	30.9*	85,472	22.3
Adequate weight gain	27	27.8	129,024	33.7
Excessive weight gain	40	41.2	168,599	44.0
Missing/Unknown	21	~	17,125	~
Total Known	97	69.1	383,095	100.0

\* p<.05 \*\* p<.01, Z test for two population proportions

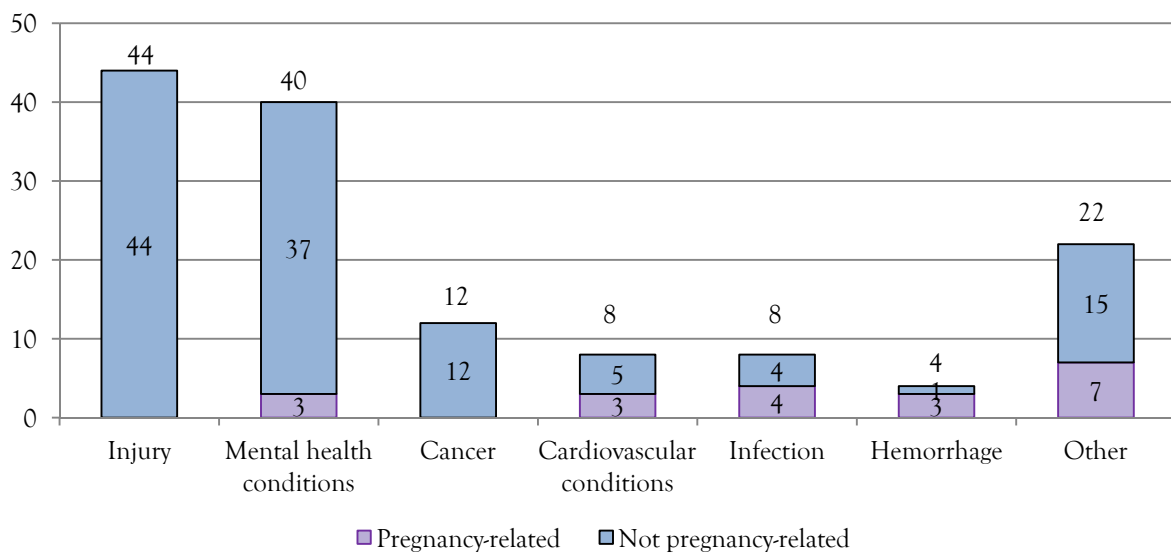
a The Kotelchuck Index, also called the Adequacy of Prenatal Care Utilization (APNCU) Index, is a classification of the adequacy of prenatal care received by the mother based on a ratio of observed to expected prenatal care visits. The classes are as follows: Inadequate (received less than 50 percent of expected visits), Intermediate (50-79 percent), Adequate (80-109 percent), and Adequate Plus (110 percent or more).

## Leading Causes of Death

The most frequent causes of all 145 pregnancy-associated deaths were injury-related (44) and mental health conditions (40); in fact these two causes accounted for nearly six out of every ten maternal deaths. Injury deaths included intentional injuries (homicides), unintentional injuries (motor vehicle crashes) and injuries with unknown intention. Mental health conditions included depression/suicide, suicide, recreational drug abuse, prescription drug abuse and other psychiatric conditions not otherwise specified.

Figure 4 displays the number of deaths by cause and also by whether the deaths were related or not related to pregnancy. Injury (including 27 motor vehicle crashes and 14 homicides), mental health conditions and cancer constituted the three leading causes of death for all mothers and comprised two-thirds of all deaths. All injury and cancer deaths were determined to be not pregnancy-related, as were most deaths due to mental health conditions. Cardiovascular conditions, infection, and hemorrhage accounted for a total of 20 deaths and were, as a group, equally divided between pregnancy-related and not pregnancy-related. Deaths due to other conditions were primarily not pregnancy-related.

**Figure 4. Leading Causes of Pregnancy-Associated Death by Type of Association, Colorado, 2008-2013**

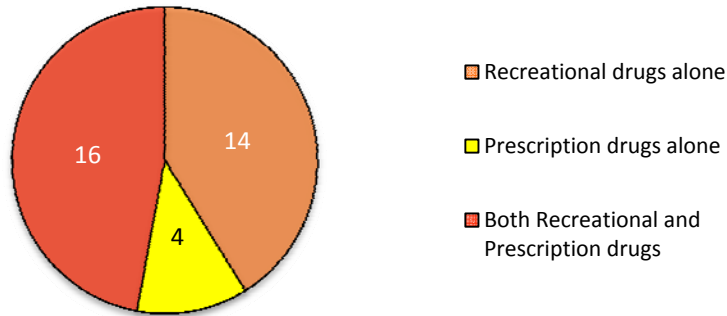


The causes of pregnancy-related deaths could be determined for 20 of the 21 cases. The leading causes of death were infection (4), mental health conditions (3), cardiovascular conditions (3), and hemorrhage (3). The remaining deaths were attributed to other conditions including epilepsy/seizure disorder (2), amniotic fluid embolism (2), cerebrovascular accident (1), and ruptured ectopic pregnancy (1).

## Toxic Drugs

Toxic amounts of prescription and recreational drugs were identified in more than a quarter (34, 28.3%) of all 120 not pregnancy-related cases. Figure 6 illustrates that among these 34 cases, 14 had toxic amounts of recreational drugs, 4 had toxic amounts of prescription drugs, and 16 had a combination of both recreational and prescription drugs.

Figure 6. Types of Substances Used among Not Pregnancy-Related Deaths Found with Toxic Amounts of Substances, Colorado, 2008=2013, n=34



Toxic drug findings are reinforced and discussed in greater detail in a 2016 study<sup>8</sup> directed by a member of the Colorado Maternal Mortality Review Committee. The study analyzed maternal deaths from suicide and overdose in Colorado between 2004 and 2012. Self-harm, defined as accidental overdose or suicide, accounted for 30 percent of all maternal deaths in the period.

**Timing of Death**

The timing of death differs greatly according to whether or not the death was related to pregnancy (Table 4). Among deaths that were not pregnancy-related, only one-quarter occurred during pregnancy or within six weeks of delivery. By contrast, among pregnancy-related deaths, three-quarters took place during pregnancy or within six weeks of delivery.

Table 4. Pregnancy-Associated Deaths by Pregnancy Status and Relatedness, Colorado, 2008-2013

Pregnancy Status	Not pregnancy-related		Pregnancy-related	
	Number	Percent	Number	Percent
During pregnancy	15	12.5	7	33.3
1-42 days postpartum (within 6 weeks)	15	12.5	9	42.9
43-365 days postpartum (7-52 weeks)	90	75.0	5	23.8
Total	120	100.0	21	100.0

Note: Pregnancy status could not be determined for 4 cases.

**Trends in Leading Causes of Maternal Mortality**

Mortality ratios were calculated for the three leading causes of maternal mortality that were not pregnancy-related: motor vehicle crashes, homicide, and mental health conditions. Figures 7,8, and 9 display the ratios for each year between 2008 and 2013 in order to show trends for each cause.

Figure 7 displays the total pregnancy-associated death ratio along with the maternal motor vehicle crash death ratio. While the total pregnancy-associated death ratio increased from 24.3 deaths in 2008 to 46.2 deaths in 2013, the motor vehicle death ratio dropped from 12.9 to 4.6. Dotted

<sup>8</sup> Metz et al (2016). Maternal Deaths From Suicide and Overdose in Colorado, 2004-2012. *Obstet Gynecol* 2016; 0:1-8.

trend lines show a diverging pattern between the two ratios, indicating that motor vehicle crashes did not contribute to the increasing total pregnancy-associated death ratio.

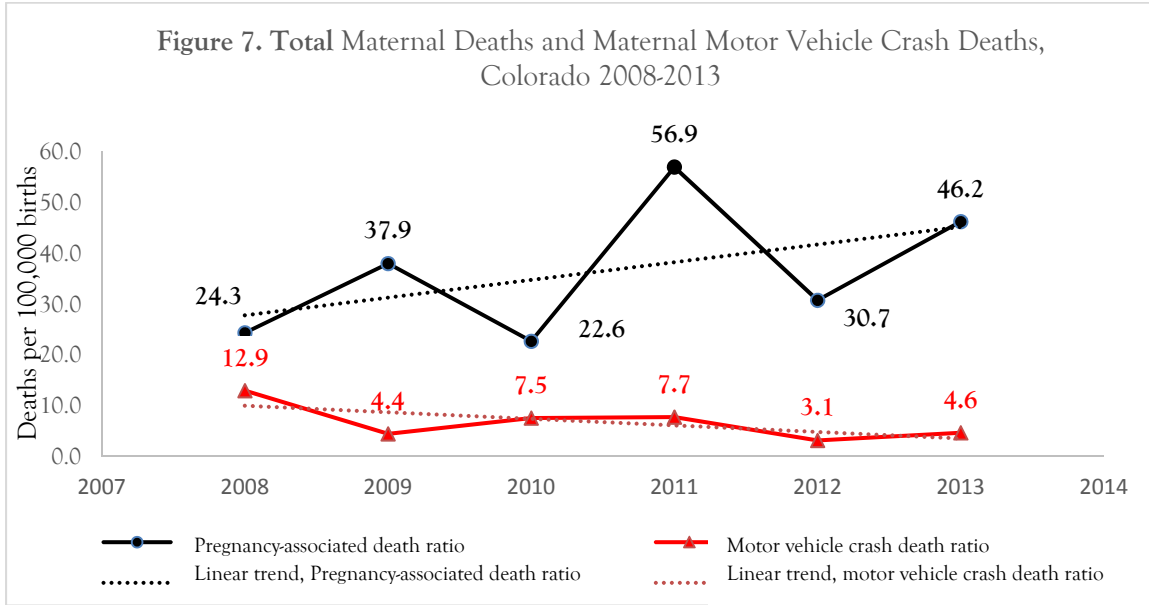


Figure 8 displays the total pregnancy-associated death ratio with the maternal homicide death ratio. The homicide death ratio falls from 7.1 in 2008 to 3.1 in 2013. Dotted trend lines show a diverging pattern between the two ratios, indicating that homicides did not contribute to the increasing total pregnancy-associated death ratio.

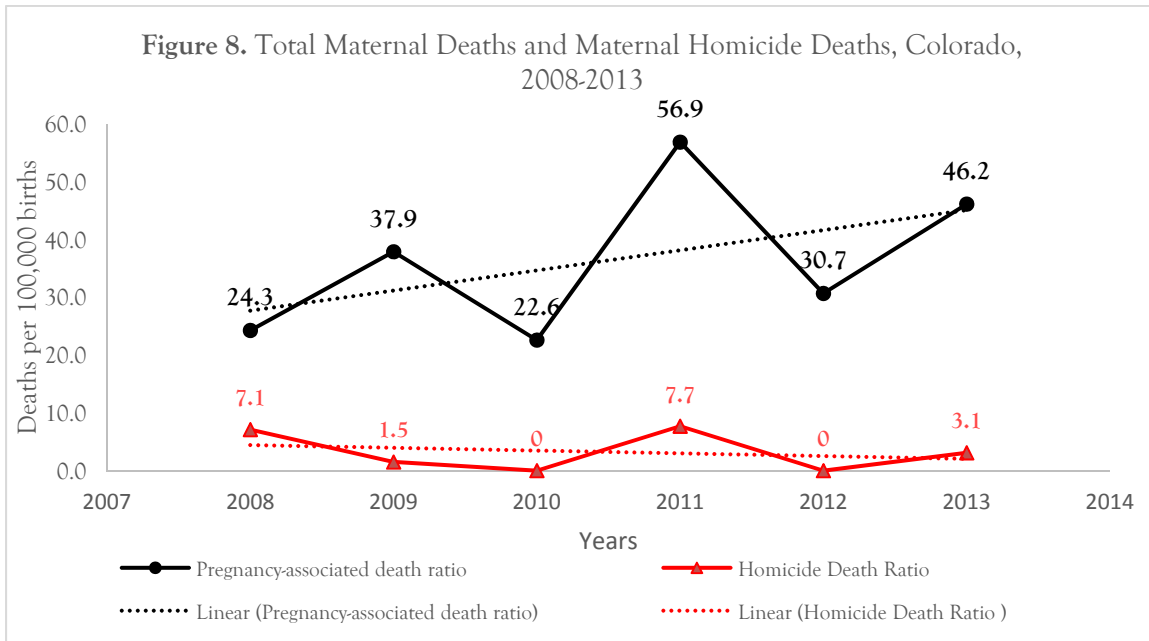
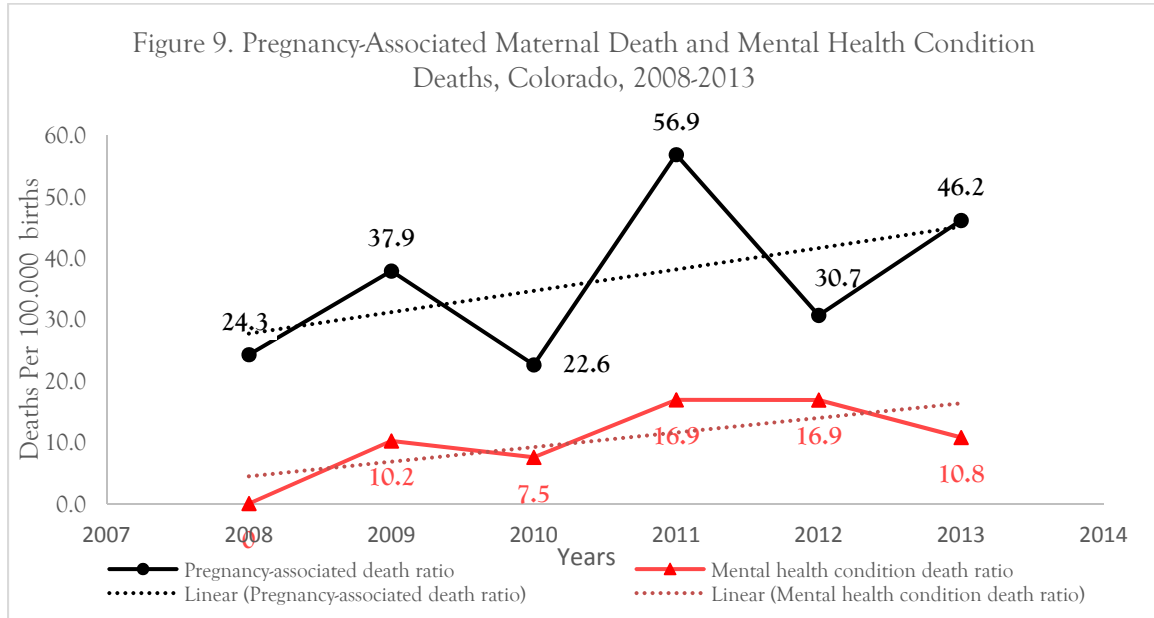


Figure 9 presents the total pregnancy-associated ratio with the maternal mental health condition death ratio. In this graph, the mental health ratio shows a steady upward trend, rising from 0 in 2008 to 10.8 in 2013. The trend line parallels the trend of the total pregnancy-associated death ratio. The conclusion can be drawn that mental health conditions are increasingly contributing to the total pregnancy-associated death ratio, while motor vehicle crashes and homicide recede as factors.

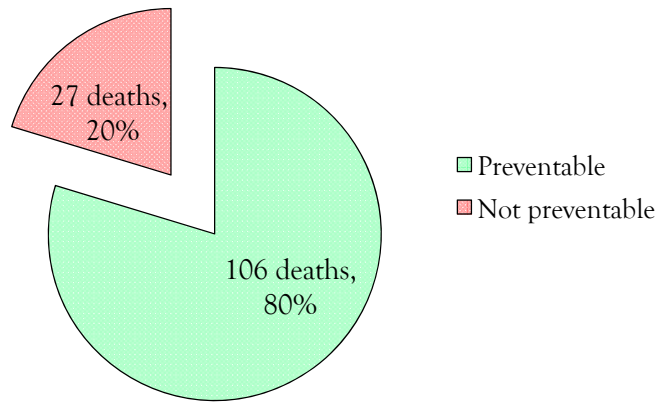


### Preventing Maternal Death

The issue of maternal death is as complex as it is tragic. The analysis of deaths between 2008 and 2013 provides a great deal of insight into data that had historically been difficult to compile in a meaningful way. Many different causes are apparent and trends that are discernible are only now coming into focus. Nevertheless, a comprehensive understanding of maternal mortality is essential to the prevention of future maternal deaths. To that end, the Colorado Maternal Mortality Review Committee made a determination about the preventability of each maternal death. A death was considered to be preventable if the committee determined that there was at least some chance of the death being averted by one or more reasonable changes to patient, community, provider, facility, and/or systems factors.

Of the 133 deaths with enough information to make a determination, the committee categorized 106, or 80 percent, as preventable (Figure 10), providing hope that in the future many maternal deaths can be prevented. This large percentage held for both deaths that were pregnancy-related and those that were not pregnancy-related.

Figure 10. Committee Determination of the Preventability of Maternal Deaths, Colorado, 2008-2013, n = 133



In 2016 the committee decided that the determination of preventability as yes or no (or unclear) was inadequate and that some gradations were needed as to how likely the outcome could have been different. Further, a description of the level of care where prevention efforts needed to be focused was also necessary: at the patient, family, community, provider, facility, and/or systems levels. Accordingly, the committee adopted the additional categories and all deaths reviewed since then include the additional data.

**Conclusions**

Maternal mortality is increasing in Colorado, largely driven by increases in deaths from causes not related to pregnancy. Increases in deaths from causes that are related to pregnancy play a considerably smaller role. Maternal deaths occur more often among women with low incomes, less education, higher parity, and black/African American race. Deaths occur throughout pregnancy and the following year.

Although motor vehicle crash and homicide deaths comprise the majority of deaths, these two causes have decreased in recent years. On the increase, however, have been deaths due to underlying mental health conditions. Furthermore, toxic amounts of prescription and/or recreational drugs have played a role in one-quarter of all deaths.

Colorado’s maternal death ratios are below the national average, but virtually 80 percent of the state’s deaths between 2008 and 2013 were considered preventable by the Colorado Maternal Mortality Review Committee. This high proportion suggests that maternal deaths can be greatly reduced in the future if prevention efforts are undertaken deliberately.