COMMONWEALTH *of* VIRGINIA

Department of Health

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February 20, 2025

MEMORANDUM

TO: The Honorable Glenn Youngkin
Governor, State of Virginia

The Honorable Don Scott
Speaker of the House, Virginia House of Delegates

The Honorable L. Louise Lucas
President Pro Tempore, Senate of Virginia

FROM: Karen Shelton, MD
State Health Commissioner, Virginia Department of Health

SUBJECT: 2024 Virginia Maternal Mortality Review Team Annual Report

This report is submitted in compliance with the Virginia Acts of the Assembly – §32.1-283.8, which states:

> *G. The Team shall compile annual statistical data, which shall be made available to the Governor and the General Assembly. Any statistical compilations prepared by the Team shall be public record and shall not contain any personal identifying information.*

Should you have any questions or need additional information, please feel free to contact me at (804) 864-7006.

KS/JH
Enclosure

Pc: The Honorable Janet V. Kelly, Secretary of Health and Human Resources

VDH VIRGINIA DEPARTMENT OF HEALTH
To protect the health and promote the well-being of all people in Virginia.

VIRGINIA MATERNAL MORTALITY REVIEW TEAM ANNUAL REPORT

REPORT TO THE GOVERNOR AND THE GENERAL ASSEMBLY

2024

VIRGINIA DEPARTMENT OF HEALTH

PREFACE

The Virginia Maternal Mortality Review Team (MMRT) is proud to present the 2024 Annual Report of statistical data as mandated by Code of Virginia, § 32.1-283.8. This shall be made available to the Governor and the General Assembly by October 1, 2024.

VIRGINIA MATERNAL MORTALITY REVIEW TEAM

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EXECUTIVE SUMMARY

The Virginia Maternal Mortality Review Team (MMRT) is proud to present the 2024 Annual Report of statistical data as mandated by Code of Virginia, § 32.1-283.8. This shall be made available to the Governor and the General Assembly by October 1, 2024. This report provides an overview of the patterns and trends in pregnancy-associated deaths in the state of Virginia in 2022. Pregnancy-associated death is defined as "the death of a woman while pregnant or within one year of pregnancy regardless of the outcome of the pregnancy or the cause of death."[1] This report also presents the MMRT preliminary determinations of preventability, pregnancy-relatedness, and contributors to mortality for 2021 pregnancy-associated death cases. Additionally, draft recommendations from the MMRT for the prevention of future pregnancy-associated deaths are also included. The MMRT is dedicated to understanding the circumstances surrounding each of these deaths so that strategies can be developed to reduce maternal mortality across the Commonwealth. The MMRT is an ongoing collaborative effort led by the VDH's Office of Family Health Services and Office of the Chief Medical Examiner. Data highlights are listed below.

2022 DATA HIGHLIGHTS

1. In the Commonwealth of Virginia, the number of pregnancy-associated deaths increased from 64 in 2021 to 67 in 2022.

2. The pregnancy-associated death rate increased from 66.9 per 100,000 live births in 2021 to 70.1 per 100,000 live births in 2022.

3. Approximately 33% of these deaths occurred between 43 and 365 days after the end of the pregnancy.

4. Over 35% of pregnancy-associated deaths involved women ages 35 and older.

    a. Pregnancies in women over the age of 35 are considered high-risk and account for 22.9% of all live births in 2022.

5. Black women continue to experience higher rates of pregnancy-associated deaths when compared to their White counterparts (138.1 vs. 50.6, respectively).

6. Black women were more likely to die from cardiac related causes (26.6 vs. 5.8 per 100,000 live births, respectively) and COVID-19 (15.9 vs. 0.0 per 100,000 live births, respectively) than their White counterparts.

7. Statistically, Black women were significantly more likely to die by homicide than any other race (10.6 vs. 2.9 per 100,000 live births, $p<.01$).

8. Approximately 86% of pregnancy-associated accidental deaths were from accidental overdoses.

[1] Association for Maternal and Child Health Programs. (2022, August 8). Definitions. Retrieved from Review to Action: https://reviewtoaction.org/learn/definitions

9. The pregnancy-associated death rate from accidental overdoses was higher among Black women when compared to White women (21.2 vs. 7.2, respectively).

10. The Central Health Services Area had the highest rate of pregnancy-associated deaths at 96.7 per 100,000 live births, followed by the Eastern (87.6 per 100,000 live births) and Southwestern (87.1 per 100,000 live births) Health Services Areas.

11. It is estimated that 53.3% of pregnancy-associated deaths in 2021 were pregnancy-related.

INTRODUCTION

MATERNAL MORTALITY REVIEW TEAM MANDATE

In accordance with the Code of Virginia, § 32.1-283.8., the Maternal Mortality Review Team (MMRT) "shall compile annual statistical data, which shall be made available to the Governor and the General Assembly. Any statistical compilations prepared by the MMRT shall be public record and shall not contain any personal identifying information."

MATERNAL MORTALITY REVIEW TEAM ACTIVITIES

This report presents the pregnancy-associated deaths identified and tracked by the Virginia Pregnancy-Associated Mortality Surveillance System (PAMSS) housed in the VDH, Office of the Chief Medical Examiner (OCME). Data from PAMSS are also used for the review of these deaths by the MMRT.

DATA COLLECTION AND PREPARATION

The data in this report reflect pregnancy-associated deaths that fall under the purview of the MMRT and are tracked using the Pregnancy-Associated Mortality Surveillance System (PAMSS). Several methods are utilized to identify cases of Pregnancy Associated Death (PAD) in Virginia. First, the VDH Office of Vital Records identifies cases of pregnancy-associated death in three ways: 1) examining the death certificate check box related to pregnancy status; 2) reviewing cause of death on the death certificate for causes directly attributable to pregnancy; and 3) matching death certificates of women of reproductive age with birth and fetal death certificates to identify deaths occurring among women who delivered in the year preceding death. Additional cases are identified through the Virginia Violent Death Reporting System (VVDRS). Using information obtained from the death certificates, birth certificates, fetal death certificates, and the VVDRS, the Maternal Mortality Program Manager identifies, requests and abstracts records from the hospital where the birth or pregnancy occurred, birth attendants' records, hospital records where the death occurred, autopsy records, and the Medical Examiner case investigation records. These records are used to confirm that the decedent was pregnant within 365 days of death.

METHODOLOGY

The MMRT collects and reviews retrospective data on all pregnancy-associated deaths in the state. A preliminary list of cases is compiled by the Office of Vital Records after the certification of death certificates from the previous calendar year. The certification process takes approximately 6-9 months after the end of the calendar year. The MMRT support staff then verify that each case is eligible for inclusion in the Pregnancy-Associated Mortality Surveillance System, a process that can take 6-9 months, prior to the MMRT review of the case. Once cases have been verified, the MMRT reviews each case to determine the contributors to mortality, preventability, pregnancy-relatedness and recommendations for interventions, practices, and policy changes that could have prevented the death. At the conclusion of each review cycle, the team develops and disseminates formal recommendations for the prevention of future deaths.

The last completed review cycle of pregnancy-associated death cases that the MMRT has reviewed is 2018. In September of 2022, the Office of the Chief Medical Examiner's Division of

Death Prevention received a grant from the Centers for Disease Control and Prevention (CDC) to increase surveillance efforts and create a partnership with the Virginia Neonatal Perinatal Collaborative (VNPC) to further address maternal mortality in Virginia. One of the goals of the grant program is to improve the timeliness of pregnancy-associated death case review. As such, the MMRT moved to begin reviewing cases from 2021. The MMRT is currently completing the review of 2021 cases and plans to begin the review of 2022 data in January of 2025. Data from 2019 and 2020 cases will be abstracted and analyzed but will not undergo a full MMRT review.

For 2021, the Office of Vital Records identified 117 deaths that were found to be pregnancy-associated based on the death certificate data for each case. Through the MMRT case eligibility/verification process, it was determined that approximately 45% of the initially identified cases were ineligible for review by the MMRT. For 2022, 109 potentially pregnancy-associated deaths were identified by the Office of Vital Records. Of these cases, approximately 39% were found to be ineligible. Reasons for ineligibility included the decedent not being pregnant within a year of death or the decedent being a resident of another state/territory.

STATISTICAL SUMMARY

Data are based upon Virginia residents who had a pregnancy-associated death within the state.

- Rates
  - Rates are per 100,000 live births among the specific Virginia population being described. This is the standard method both nationally and internationally. All rates in this report are per 100,000 live births unless otherwise noted.
  - Rates calculated from small case amounts (< 5) are considered unreliable and should be interpreted with caution.
  - Live birth numbers are used to depict the risk of maternal death relative to the number of live births during the same time-period and essentially captures the risk of death in a single pregnancy or a single live birth event.

- Race/Ethnicity
  - Race is presented as White, Black, and Other.
  - White and Black races represent those who have been identified as of non-Hispanic ethnicity.
  - 'Other' races are persons who are identified as being of Asian or Native American race or Hispanic ethnicity.

REPORT OUTLINE

This report will provide an overview of the Maternal Mortality Projects, the MMRT and its processes followed by a discussion of the preliminary statistical data for all pregnancy-associated deaths in 2022. Next, the report will present the statistical data for specific manners of pregnancy-associated deaths for 2022, namely natural deaths, accidents, homicides, and suicides. MMRT preliminary determinations of preventability, pregnancy-relatedness, and contributors to mortality for 2021 pregnancy-associated death cases will then be presented. The report will conclude with a summarization of the data presented, the discussion of recommendations from the MMRT for the

prevention of pregnancy-associated deaths in the state, and an outline of the next steps for the MMRT.

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OVERVIEW OF MATERNAL MORTALITY PROJECTS

PREGNANCY-ASSOCIATED MORTALITY SURVEILLANCE SYSTEM

Virginia's PAMSS collects information on all pregnancy-associated deaths among Virginia residents. This surveillance system allows for the identification and monitoring of patterns and trends related to pregnancy-associated deaths in Virginia, provides a snapshot of maternal mortality, and helps inform policy decisions of public health importance. Data from PAMSS includes not only surveillance data, but also data collected from the Maternal Mortality Review Team process. Current PAMSS data indicates pregnancy-associated deaths in Virginia remain a significant public health problem.

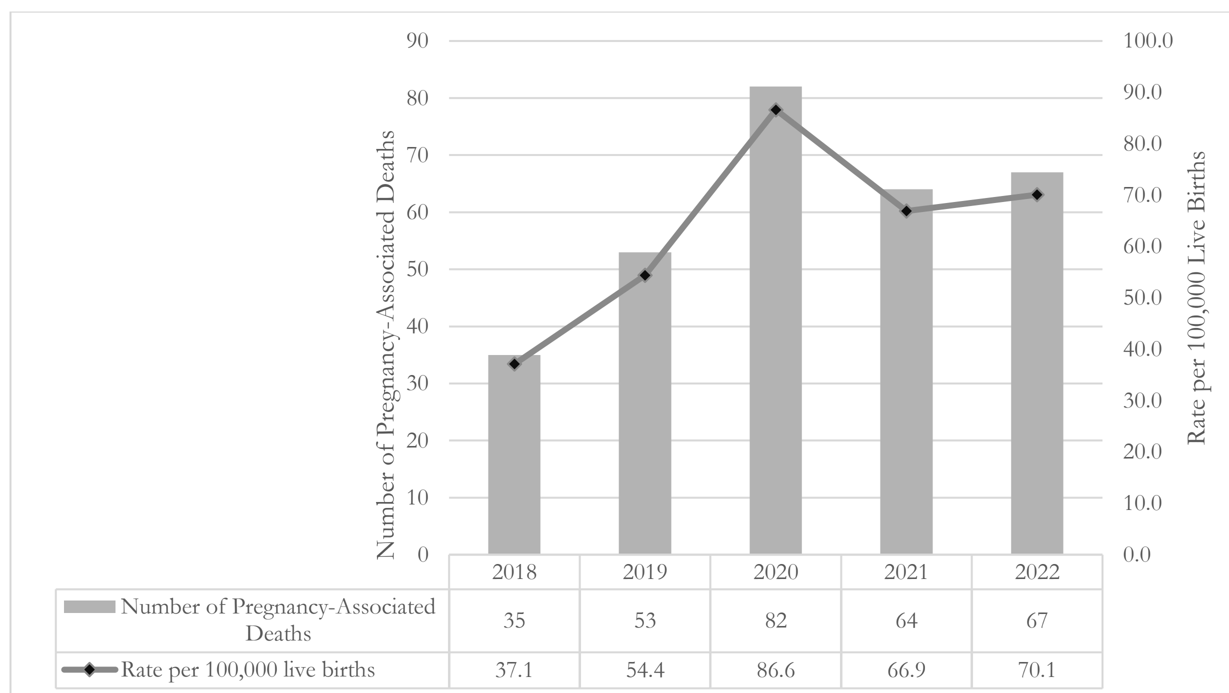
MATERNAL MORTALITY REVIEW TEAM

Virginia's MMRT is one of the longest continuously functioning, multidisciplinary review teams in the United States. The MMRT was established in March 2002 as a partnership between the Office of Family Health Services (OFHS) and the OCME. The team was codified, § 32.1-283.8, by the 2019 General Assembly, with the OCME continuing to provide coordination for the team. The MMRT is multidisciplinary and includes representatives from the Medical Society of Virginia; Virginia Section of the American College of Obstetricians and Gynecologists; Virginia College of Emergency Physicians; Virginia Chapter of the American College of Nurse Midwives; Association of Women's Health, Obstetrics and Neonatal Nurses; Virginia Chapter of the National Association of Social Workers; Virginia Hospital and Healthcare Association; Virginia Sexual and Domestic Violence Action Alliance; Virginia Dietetic Association; local health departments; and state planning agencies. The maternal mortality review is supported by the Center for Disease Control with funds from the Enhancing Reviews and Surveillance to Eliminate Maternal Mortality (ERASE MM) Program and the OFHS with the Title V Maternal and Child Health Block Grant from the U.S. Department of Health and Human Services, Maternal and Child Health Bureau.

Virginia's MMRT is dedicated to the identification of all pregnancy-associated deaths in the Commonwealth and the development of recommendations for interventions to reduce preventable deaths. The team collects records from the hospital where the birth or pregnancy-related issue, concern, or termination occurred; the birth attendant's records; hospital records where the death occurred; the autopsy records; and the Medical Examiner case investigation records. The team also collects records from other health care providers and specialists, social service agencies, and mental health facilities to ensure that each review is comprehensive and thoroughly assesses the woman's life, health, and healthcare utilization in the five years prior to her death. The team reviews each case to determine the community-related, patient-related, healthcare facility-related, and/or healthcare provider-related factors that contributed to the woman's death. Consensus decision-making is used to determine whether the death was preventable and/or related to the pregnancy. The team also recommends needed changes in the care received that may have led to better outcomes in that specific case. The MMRT is currently completing the review of cases from 2021 and will begin the review of 2022 cases in January of 2025.

SECTION 1: TOTAL PREGNANCY-ASSOCIATED DEATHS (PAD)

In 2022, the total number of pregnancy-associated deaths increased from 64 in 2021 to 67 in the state of Virginia (see Figure 1). The overall pregnancy-associated death rate[2] also increased from 66.9 in 2021 to 70.1 deaths per 100,000 live births in 2022. Black women continue to have higher rates of pregnancy-associated deaths compared to their White counterparts. In 2022, the rate for Black women was nearly three times the rate for White women at 138.1 vs. 50.6, respectively. Black women experienced higher rates of death from all manners of death (see Figure 2). Natural deaths, or deaths caused by a disease alone, accounted for 73.1% of all pregnancy-associated deaths (an increase from 64.1% in 2021). The proportion of accidental deaths declined from 21.9% in 2021 to 17.9% in 2022. The proportion of deaths from homicides and suicides also decreased in 2022 from 7.8% to 6.0% and 4.7% to 3.0% respectively. The Eastern Health Services Area had the highest proportion of deaths (28.4%) followed by the Central Health Services Area (23.9%). These two areas also had the highest rates of pregnancy-associated deaths at 87.6 and 96.7, respectively (see Table 1, Figure 3).



	2018	2019	2020	2021	2022
Number of Pregnancy-Associated Deaths	35	53	82	64	67
Rate per 100,000 live births	37.1	54.4	86.6	66.9	70.1

Figure 1: Number and Rate of Pregnancy-Associated Deaths by Year in Virginia, 2018-2022

[2] Rate provided is the Maternal Mortality Rate (MMR), which is calculated by dividing the number of deaths in a category by the number of live births and then multiplying that number by 100,000. The rate provides the number of deaths for every 100,000 live births to women who were residents of the state at the time of their deaths. Rates for race, age, and Health Services Area are category specific. The MMR is the standard measure for evaluating maternal morbidity and mortality.

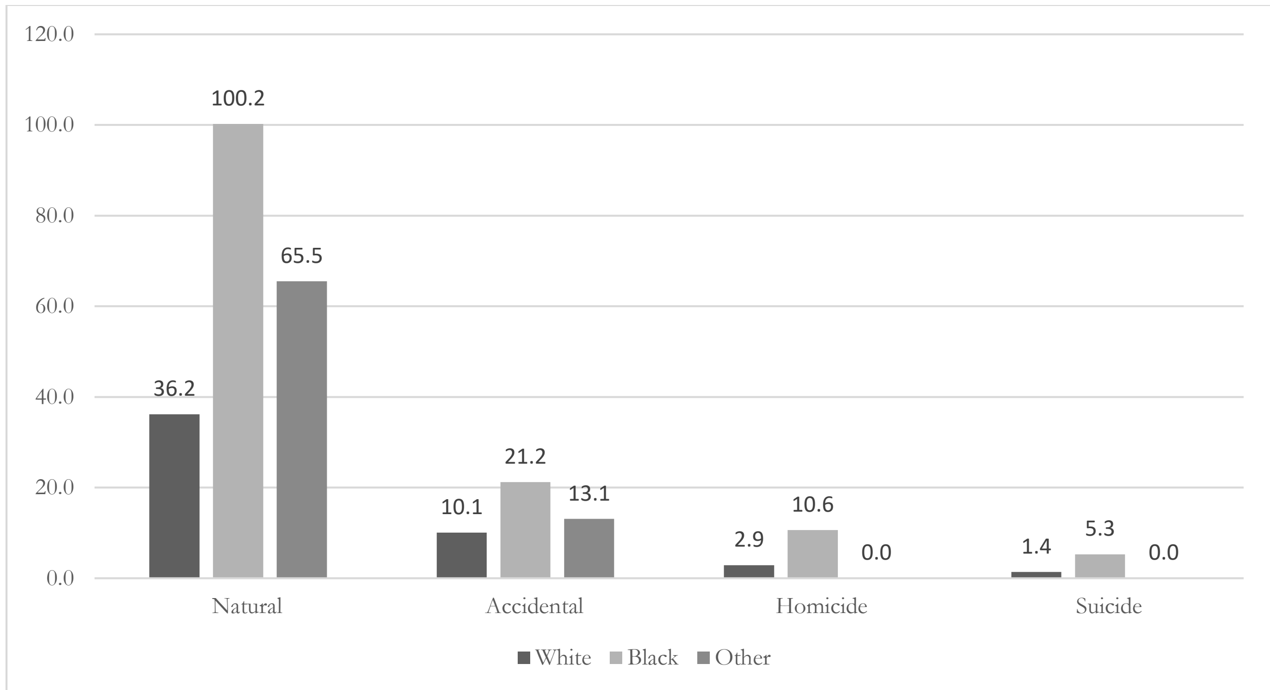


Figure 2: Rates of Manner of Pregnancy-Associated Deaths by Race, 2022

Table 1: Pregnancy-Associated Deaths in Virginia, 2022: Selected Characteristics

	2022 (n=67)		
Pregnancy-Associated Death Rate	**70.1**		
	No.	**%**	**Rate[3]**
Manner			
Natural	49	73.1	51.3
Accidental	12	17.9	12.6
Homicide	4	6.0	4.2
Suicide	2	3.0	2.1
Undetermined	0	0.0	0.0
Race			
White	35	52.2	50.6
Black	26	38.8	138.1
Other	6	9.0	78.6
Age			
19 and under	2	3.0	64.8
20-24	5	7.5	34.0
25-29	15	22.4	58.9
30-34	17	25.4	55.8
35-39	18	26.9	101.9
40 and over	10	14.9	237.6
Education			
Less than High School	8	11.9	8.4
High School Diploma	33	49.3	34.5

[3] Rates calculated from small case amounts (< 5) are considered unreliable and should be interpreted with caution.

	2022 (n=67)		
Pregnancy-Associated Death Rate	**70.1**		
	No.	**%**	**Rate[3]**
More than High School	24	35.8	25.1
Unknown	2	3.0	2.1
Interval Between End of Pregnancy and Death			
Pregnant at the time of death	23	34.3	24.1
0-42 days	22	32.8	23.0
43 days – 365 days	22	32.8	23.0
Health Planning Region			
Central	16	23.9	96.7
Eastern	19	28.4	87.6
Northern	13	19.4	43.6
Northwest	8	11.9	53.5
Southwest	11	16.4	87.1
Rural vs. Urban			
Rural	8	11.9	83.2
Urban	59	88.1	68.8

Table 1: Pregnancy-Associated Deaths in Virginia, 2022: Selected Characteristics

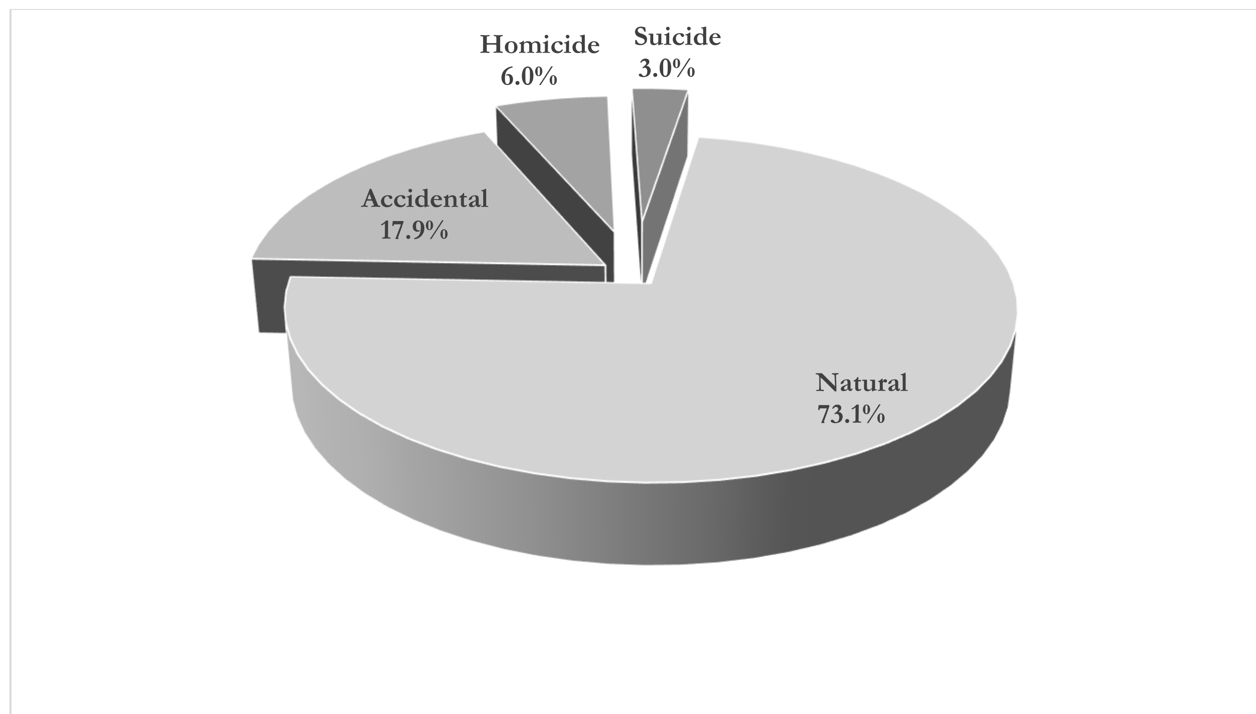


Figure 3: Percent of Pregnancy-Associated Deaths by Manner of Death, 2022

NATURAL DEATHS

The pregnancy-associated death rates for all natural deaths increased from 42.9 in 2021 to 51.3 in 2022. Black women continue to have significantly higher rates of natural pregnancy-associated deaths when compared to their White counterparts (100.9 vs. 36.2, respectively, p<.05). Cardiac related causes of death accounted for the largest proportion of natural deaths at 22.4% followed by deaths from cancer (14.3%). Among Black women, over 25% of natural deaths were from cardiac-related causes. Cardiac related causes of death include all deaths from a cardiac-related cause except for cardiomyopathy. These cardiac-related causes include coronary artery disease, pulmonary hypertension, valvular heart disease, and hypertensive cardiovascular disease, among others. Black women continue to have significantly higher rates of death from cardiac-related causes when compared to their White counterparts (26.6 vs. 5.8, respectively). COVID-19 was listed as a cause of death for 6.1% of natural pregnancy-associated deaths. All pregnancy-associated deaths from COVID-19 in 2022 occurred in Black women (see Table 2, Figure 4).

Table 2: Natural Pregnancy-Associated Deaths, 2022: Selected Characteristics

	White (n=25)			Black (n=19)			Other (n=5)			Total (n=49)		
Pregnancy-Associated Rate	36.2			100.9			65.5			51.3		
	No.	%	rate[4]	No.	%	rate	No.	%	rate	No.	%	rate
Cause of Death												
Amniotic Fluid Embolism	2	8.0%	2.9	0	0.0%	0.0	0	0.0%	0.0	2	4.1%	2.1
Cancer	5	20.0%	7.2	2	10.5%	10.6	0	0.0%	0.0	7	14.3%	7.3
Cardiac	4	16.0%	5.8	5	26.3%	26.6	2	40.0%	26.2	11	22.4%	11.5
Cardiomyopathy	0	0.0%	0.0	1	5.3%	5.3	1	20.0%	13.1	2	4.1%	2.1
COVID-19	0	0.0%	0.0	3	15.8%	15.9	0	0.0%	0.0	3	6.1%	3.1
Disorders of the Central Nervous System	1	4.0%	1.4	0	0.0%	0.0	0	0.0%	0.0	1	2.0%	1.0
Ectopic Pregnancy	0	0.0%	0.0	2	10.5%	10.6	0	0.0%	0.0	2	4.1%	2.1
Exacerbation of Chronic Disease	4	16.0%	5.8	1	5.3%	5.3	0	0.0%	0.0	5	10.2%	5.2
Hemorrhage	4	16.0%	5.8	2	10.5%	10.6	0	0.0%	0.0	6	12.2%	6.3
Infection	4	16.0%	5.8	0	0.0%	0.0	1	20.0%	13.1	5	10.2%	5.2
Other cause of death	1	4.0%	1.4	1	5.3%	5.3	0	0.0%	0.0	2	4.1%	2.1

[4] Rates calculated from small case amounts (< 5) are considered unreliable and should be interpreted with caution.

Pregnancy-Induced Hypertension	0	0.0%	0.0	1	5.3%	5.3	1	20.0%	13.1	2	4.1%	2.1
Pulmonary Embolism	0	0.0%	0.0	1	5.3%	5.3	0	0.0%	0.0	1	2.0%	1.0
Age												
19 and under	0	0.0%	0.0	1	5.3%	115.2	0	0.0%	0.0	1	2.0%	32.4
20-24	1	4.0%	9.7	1	5.3%	25.5	0	0.0%	0.0	2	4.1%	13.6
25-29	4	16.0%	21.5	3	15.8%	57.2	3	60.0%	187.1	10	20.4%	39.3
30-34	5	20.0%	22.4	6	31.6%	117.0	1	20.0%	32.9	12	24.5%	39.4
35-39	9	36.0%	70.1	5	26.3%	177.8	1	20.0%	49.7	15	30.6%	84.9
40 and over	6	24.0%	210.5	3	15.8%	350.5	0	0.0%	0.0	9	18.4%	214.0
Education												
Less than High School	3	12.0%	4.3	2	10.5%	10.6	0	0.0%	0.0	5	10.2%	5.2
High School Diploma	10	40.0%	14.5	10	52.6%	53.0	1	20.0%	13.1	21	42.9%	22.0
More than High School	12	48.0%	17.4	6	31.6%	31.9	3	60.0%	39.3	21	42.9%	22.0
Unknown	0	0.0%	0.0	1	5.3%	5.3	1	20.0%	13.1	2	4.1%	2.1
Interval Between End of Pregnancy and Death												
Pregnant at the time of death	5	20.0%	7.2	9	47.4%	47.8	2	40.0%	26.2	16	32.7%	16.7
0-42 days	13	52.0%	18.8	4	21.1%	21.2	2	40.0%	26.2	19	38.8%	19.9
43 days – 365 days	7	28.0%	10.1	6	31.6%	31.9	1	20.0%	13.1	14	28.6%	14.6
Health Services Area												
Central	8	32.0%	82.9	5	26.3%	95.3	5	100.0%	302.3	13	26.5%	78.6
Eastern	5	20.0%	41.9	8	42.1%	105.7	0	0.0%	0.0	13	26.5%	60.0
Northern	6	24.0%	37.1	2	10.5%	55.0	0	0.0%	0.0	13	26.5%	43.6
Northwest	4	16.0%	34.4	1	5.3%	52.6	0	0.0%	0.0	5	10.2%	33.4
Southwest	2	8.0%	19.2	3	15.8%	172.2	0	0.0%	0.0	5	10.2%	39.6
Rural vs. Urban												
Rural	2	8.0%	27.6	1	5.3%	56.5	4	80.0%	660.0	4	8.2%	41.6
Urban	23	92.0%	43.3	18	94.7%	110.2	1	20.0%	6.1	45	91.8%	52.3

Table 2: Natural Pregnancy-Associated Deaths, 2022: Selected Characteristics

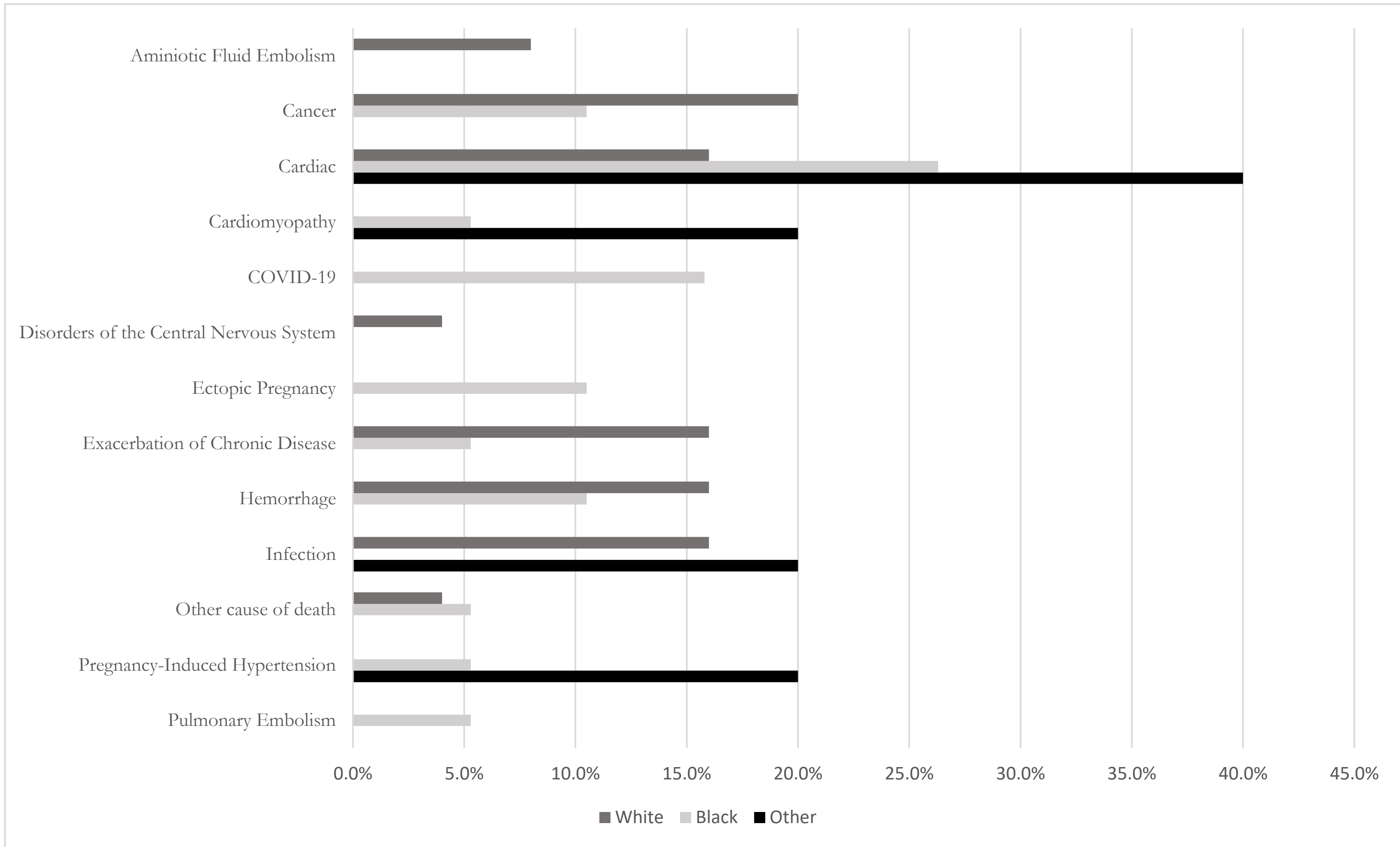


Figure 4: Natural Causes of Death by Race

ACCIDENTAL DEATHS

The pregnancy-associated death rate for accidental causes decreased from 14.6 in 2021 to 12.6 in 2022. Approximately 83% of these deaths were from accidental overdoses. In 2022, there were 10 total pregnancy-associated deaths caused by accidental overdoses. Many of these deaths occurred due to the combined use of illicit and prescription drugs. Fentanyl was the most used substance and was present in 7 out of the 10 accidental overdose cases. Unlike previous years, the pregnancy-associated death rate from accidental overdoses was higher among Black women when compared to White women (21.2 vs. 7.2, respectively). The Southwestern Health Services Area had the highest proportion of accidental deaths at 33.3% followed by the Eastern and Northwestern Health Services Areas at 20.1%. The highest rates of accidental death occurred in the Southwestern and Northwestern Health Services Areas at 31.7 and 20.1, respectively (see Table 3).

Table 3: Accidental Pregnancy-Associated Mortality in Virginia, 2022: Selected Characteristics

	White (n=7)			Black (n=4)			Other (n=1)			Total (n=12)		
Pregnancy-Associated Rate	**10.1**			**21.2**			**13.1**			**12.6**		
	No.	**%**	**rate[5]**	**No.**	**%**	**Rate**	**No.**	**%**	**rate**	**No.**	**%**	**rate**
Cause of Death												
Motor Vehicle (Driver/Passenger) Accident	2	28.6%	2.9	0	0.0%	0.0	0	0.0%	0.0	2	16.7%	2.1
Poison	5	71.4%	7.2	4	100.0%	21.2	1	100.0%	6.3	10	83.3%	10.5
Age												
19 and under	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
20-24	1	14.3%	9.7	0	0.0%	0.0	1	100.0%	229.9	2	16.7%	13.6
25-29	2	28.6%	10.7	1	25.0%	19.1	0	0.0%	0.0	3	25.0%	11.8
30-34	1	14.3%	4.5	3	75.0%	58.5	0	0.0%	0.0	4	33.3%	13.1
35-39	2	28.6%	15.6	0	0.0%	0.0	0	0.0%	0.0	2	16.7%	11.3
40 and over	1	14.3%	35.1	0	0.0%	0.0	0	0.0%	0.0	1	8.3%	23.8
Education												
Less than High School	1	14.3%	1.7	0	0.0%	0.0	0	0.0%	0.0	1	8.3%	1.0
High School Diploma	5	71.4%	8.4	4	100.0%	21.2	1	100.0%	6.3	10	83.3%	10.5
More than High School	1	14.3%	1.7	0	0.0%	0.0	0	0.0%	0.0	1	8.3%	1.0
Interval Between End of Pregnancy and Death												

[5] Rates calculated from small case amounts (< 5) are considered unreliable and should be interpreted with caution.

	White (n=7)			Black (n=4)			Other (n=1)			Total (n=12)		
Pregnancy-Associated Rate	**10.1**			**21.2**			**13.1**			**12.6**		
Pregnant at the time of death	3	42.9%	5.1	1	25.0%	4.9	0	0.0%	0.0	4	33.3%	4.2
0-42 days	1	14.3%	1.7	2	50.0%	9.7	0	0.0%	0.0	3	25.0%	3.1
43 days – 365 days	3	42.9%	5.1	1	25.0%	4.9	1	100.0%	6.3	5	41.7%	5.2
Health Services Area												
Central	0	0.0%	0.0	2	50.0%	38.1	0	0.0%	0.0	2	16.7%	12.1
Eastern	1	14.3%	8.4	2	50.0%	26.4	0	0.0%	0.0	3	25.0%	13.8
Northern	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
Northwestern	3	42.9%	25.8	0	0.0%	0.0	0	0.0%	0.0	3	25.0%	20.1
Southwestern	3	42.9%	28.7	0	0.0%	0.0	1	100.0%	226.2	4	33.3%	31.7
Rural vs. Urban												
Rural	2	28.6%	27.6	0	0.0%	0.0	1	100.0%	165.0	3	25.0%	31.2
Urban	5	71.4%	9.4	4	100.0%	24.5	0	0.0%	0.0	9	75.0%	10.5

Table 3: Accidental Pregnancy-Associated Mortality in Virginia, 2022: Selected Characteristics

HOMICIDES

The rate of pregnancy-associated deaths caused by homicides decreased from 5.2 in 2021 to 4.2 in 2022. The rate of homicide deaths among Black women continues to be significantly higher than the rate among White women (10.6 vs. 2.9, respectively, $p<.05$). The fatal agent used in each case was a firearm. Homicides occurred in the Eastern and Southwestern Health Services Area. The Southwestern Area had the highest rate of homicides at 15.8 (see Table 4).

Table 4: Homicide Pregnancy-Associated Mortality in Virginia, 2022: Selected Characteristics

	White (n=2)			Black (n=2)			Other (n=0)			Total (n=4)		
Pregnancy-Associated rate[6]	2.9			10.6			0.0			4.2		
	No.	%	rate	No.	%	rate	No.	%	rate	No.	%	rate
Fatal Agent												
Firearm	2	100.0%	2.9	2	100.0%	10.6	0	0.0%	0.0	4	100.0%	4.2
Age												
19 and under	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
20-24	0	0.0%	0.0	1	50.0%	25.5	0	0.0%	0.0	1	25.0%	6.8
25-29	0	0.0%	0.0	1	50.0%	19.1	0	0.0%	0.0	1	25.0%	3.9
30-34	1	50.0%	4.5	0	0.0%	0.0	0	0.0%	0.0	1	25.0%	3.3
35-39	1	50.0%	7.8	0	0.0%	0.0	0	0.0%	0.0	1	25.0%	5.7
40 and over	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
Education												
Less than High School	0	0.0%	0.0	1	50.0%	4.9	0	0.0%	0.0	1	25.0%	1.0
High School Diploma	1	50.0%	1.7	1	50.0%	4.9	0	0.0%	0.0	2	50.0%	2.1
More than High School	1	50.0%	1.7	0	0.0%	0.0	0	0.0%	0.0	1	25.0%	1.0
Interval Between End of Pregnancy and Death												
Pregnant at the time of death	1	50.0%	1.7	2	100.0%	9.7	0	0.0%	0.0	3	75.0%	3.1
0-42 days	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
43 days – 365 days	1	50.0%	1.7	0	0.0%	1.0	0	0.0%	0.0	1	25.0%	1.0
Health Services Area												
Central	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
Eastern	0	0.0%	0.0	2	100.0%	26.4	0	0.0%	0.0	2	50.0%	9.2
Northern	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
Northwestern	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0

[6] Rates calculated from small case amounts (< 5) are considered unreliable and should be interpreted with caution.

	White (n=2)			Black (n=2)			Other (n=0)			Total (n=4)		
Pregnancy-Associated rate[6]	**2.9**			**10.6**			**0.0**			**4.2**		
Southwestern	2	100.0%	19.2	0	0.0%	0.0	0	0.0%	0.0	2	50.0%	15.8
Rural vs. Urban												
Rural	1	50.0%	13.8	0	0.0%	0.0	0	0.0%	0.0	1	25.0%	10.4
Urban	1	50.0%	1.9	2	100.0%	12.2	0	0.0%	0.0	3	75.0%	3.5

Table 4: Homicide Pregnancy-Associated Mortality in Virginia, 2022: Selected Characteristics

SUICIDES

In 2022, the pregnancy-associated death rate from suicides decreased from 3.1 in 2021 to 2.1 in 2022. All suicides in 2022 occurred 43 to 365 days after the end of pregnancy among women ages 15-29. The fatal agents used in these cases were firearms and hanging/strangulation/suffocation. Suicide deaths occurred in the Eastern and Central Health Services Areas (See Table 5).

Table 5: Suicide Pregnancy-Associated Mortality in Virginia, 2022: Selected Characteristics

	White (n=1)			Black (n=1)			Other (n=0)			Total (n=2)		
Pregnancy-Associated rate[7]	**1.4**			**5.3**			**0.0**			**2.1**		
	No.	**%**	**rate**	**No.**	**%**	**rate**	**No.**	**%**	**rate**	**No.**	**%**	**rate**
Cause of Death												
Firearm	1	100.0%	1.4	0	0.0%	0.0	0	0.0%	0.0	1	50.0%	1.0
Hanging/Strangling/Suffocation	0	0.0%	0.0	1	100.0%	5.3	0	0.0%	0.0	1	50.0%	1.0
Age												
19 and under	0	0.0%	0.0	1	100.0%	115.2	0	0.0%	0.0	1	50.0%	32.4
20-24	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
25-29	1	100.0%	5.4	0	0.0%	0.0	0	0.0%	0.0	1	50.0%	3.3
30-34	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
35-39	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
40 and over	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
Education												
Less than High School	0	0.0%	0.0	1	100.0%	5.3	0	0.0%	0.0	1	50.0%	1.0

[7] Rates calculated from small case amounts (< 5) are considered unreliable and should be interpreted with caution.

	White (n=1)			Black (n=1)			Other (n=0)			Total (n=2)		
Pregnancy-Associated rate[7]	**1.4**			**5.3**			**0.0**			**2.1**		
High School Diploma	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
More than High School	1	100.0%	1.4	0	0.0%	0.0	0	0.0%	0.0	1	50.0%	1.0
Interval Between End of Pregnancy and Death												
Pregnant at the time of death	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
0-42 days	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
43 days – 365 days	1	100.0%	1.4	1	100.0%	5.3	0	0.0%	0.0	2	100.0%	2.1
Health Services Area												
Central	1	100.0%	10.4	0	0.0%	0.0	0	0.0%	0.0	1	50.0%	6.0
Eastern	0	0.0%	0.0	1	100.0%	13.2	0	0.0%	0.0	1	50.0%	4.6
Northern	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
Northwestern	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
Southwestern	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
Rural vs. Urban												
Rural	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0	0	0.0%	0.0
Urban	1	100.0%	1.9	1	100.0%	6.1	0	0.0%	0.0	2	100.0%	2.3

Table 5: Suicide Pregnancy-Associated Mortality in Virginia, 2022: Selected Characteristics

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SECTION 3: PREVENTABILITY, PREGNANCY-RELATEDNESS AND CONTRIBUTORS TO MORTALITY FROM 2021 PAD CASE REVIEW

The MMRT is currently completing the review of 2021 cases. During case review, the MMRT comprehensively and thoroughly assesses the woman's life, health, and healthcare utilization in the five years prior to her death. The MMRT reviews each case to determine the community-related, patient-related, healthcare facility-related and/or healthcare provider-related factors that contributed to the woman's death. The MMRT also assesses and/or recommends needed changes in the care received that may have led to better outcomes. The MMRT then uses consensus decision making to determine whether the death was preventable and/or related to the pregnancy. This section will outline the preliminary contributors to mortality, preventability, pregnancy-relatedness, and recommendation themes determined from the review of 2021 cases.[8]

PRELIMINARY FINDINGS ON CONTRIBUTORS TO MORTALITY

The review of 2021 cases uncovered that 53.3% of all pregnancy-associated deaths had at least one facility/Systems-related factor contribute to the death (see Figure 5). Facility-related factors refer to the individual facility's or system's infrastructure, policies, and the availability of personnel, equipment, and technology. The most prevalent facility-related factors from 2021 cases include "lack of continuity of care" (20.0%) and "inadequate or unavailable personnel or services" (16.7%) (see Appendix C for the full list of contributors assessed in each case).

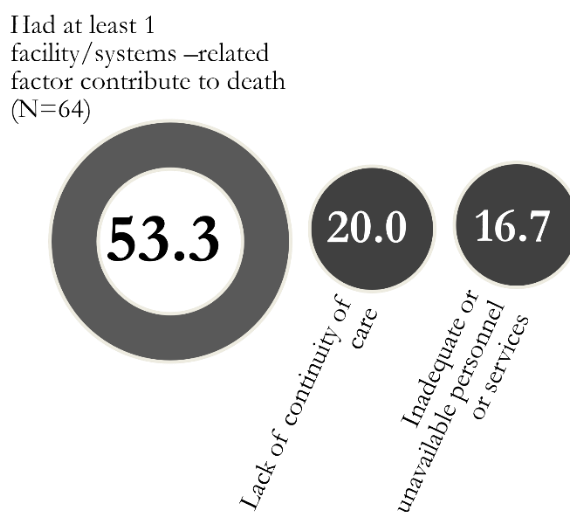

Figure 5: Percent of Women with a Facility-Related Factor Contributing to Their Death, 2021

Community-related factors involve the availability and accessibility of services in the community, law enforcement response, community outreach and availability of subsidized care. Forty percent of all pregnancy-associated deaths had a community-related factor contribute to the

[8] The team is currently completing the review of 2021 cases. The data presented here is preliminary. Final data on contributors to mortality, preventability and pregnancy-relatedness will be available in 2025.

death in 2021 (See Figure 6). The most prevalent community-related factors included "services inaccessible or unavailable" (23.3%) and "inadequate community outreach" (16.7%).

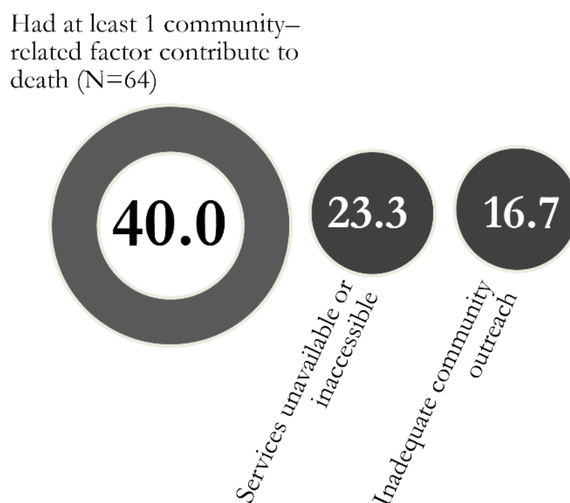

Figure 6: Percent of Women with a Community-Related Factor Contributing to Their Death, 2021

Over 73% of cases were found to have at least one provider-related contributor to mortality (See Figure 7). Provider-related factors are factors associated with the care and/or treatment provided by a healthcare provider to individual birthing persons. The most prevalent provider-related contributors to mortality included "delay in or lack of diagnosis, treatment, or follow-up" (43.3%), "failure to follow evidence-based standards of care" (26.7%), and "inadequate patient education or preconception counseling" (20.0%).

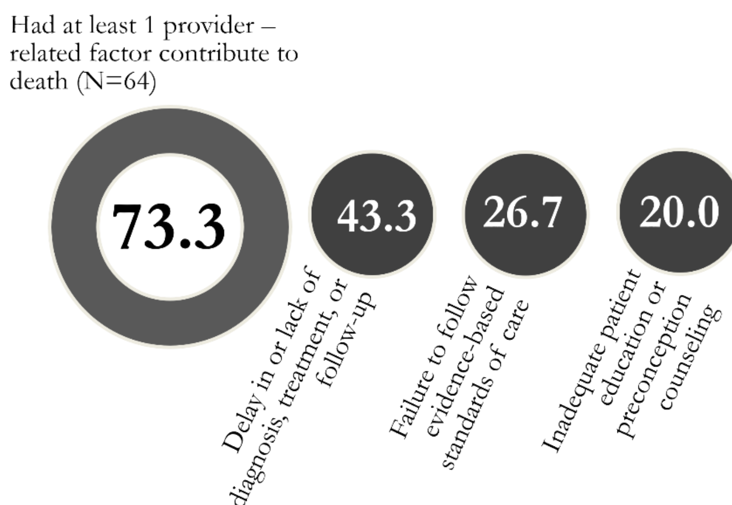

Figure 7: Percent of Women with Provider-Related Factor Contributing to Their Death, 2021

All cases from 2021 had at least one patient-related contributor to mortality (See Figure 8). Patient-related factors are factors associated with the individual's health behaviors, personal history, social support, and healthcare utilization. The most prevalent patient-related factors were "delay or failure to seek care – medical services" (43.3%), "lack of knowledge" (43.3%), "mental illness" (40.0%), and "history of trauma or abuse" (36.7%).

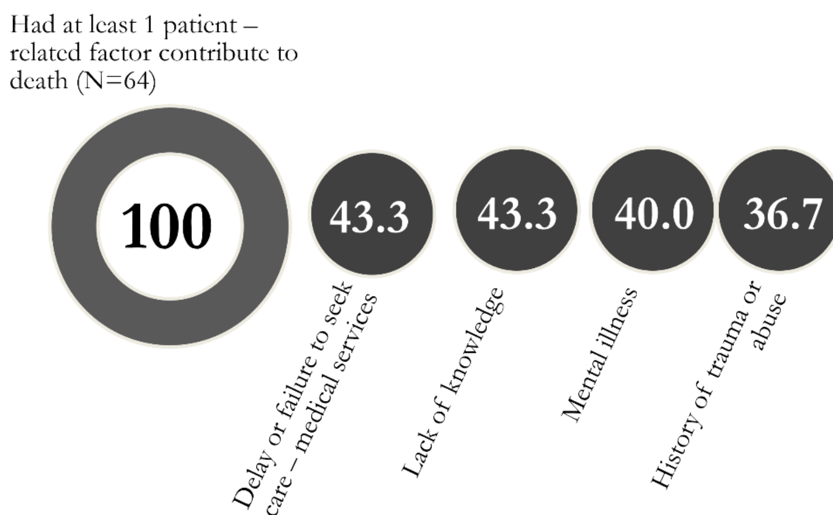

Figure 8: Percent of Women with a Patient-Related Factor Contributing to Their Death, 2021

PRELIMINARY FINDINGS ON PREVENTABILITY AMONG 2021 CASES

A preventable death is a death that may have been averted by one or more reasonable changes in clinical care, facility infrastructure, community and/or patient factors. Based on the completed 2021 case reviews to date, the preliminary analysis indicates that just over 86% of the 2021 pregnancy-associated death cases (n=64) reviewed thus far were determined to be preventable. Among these, over 82% of cases involving White women were found to be preventable, while 100% of cases among Black women and women of other races were deemed preventable. It's important to note that these findings are based only on cases that have undergone a complete MMRT review.[9]

PRELIMINARY FINDINGS ON PREGNANCY-RELATED DEATH IN 2021

Based on the completed case reviews to date, preliminary analyses indicate that just over 53% of deaths in 2021 were determined to be pregnancy-related. The MMRT was unable to determine pregnancy-relatedness for 10.3% of the reviewed 2021 cases. Approximately 59% of pregnancy-related deaths occurred among White women, 35% occurred among Black women and 6% occurred among women of other races. The estimated pregnancy-related death rate for 2021 was

[9] The team is currently completing the review of 2021 cases. At the time of this submission, the team has completed 51 of 64 case reviews for 2021. The data presented here is preliminary. Final data on contributors to mortality, preventability and pregnancy-relatedness will be available in 2025.

35.5. The estimated rate for Black women (49.5) was 1.3 times the rate for White women (36.9). Most pregnancy-related deaths occurred while the decedent was pregnant or within 0 to 42 days of the end of the pregnancy (35.3% and 47.1%, respectively). Just over 82% of pregnancy-related cases were determined to be preventable based on the MMRT review.

Most pregnancy-related deaths in 2021 (76.5%) were from natural causes (see *Figure 9*). These causes included hemorrhage, pulmonary embolism, infection, cardiac-related conditions and other natural causes of death. Pulmonary embolism was the leading cause of natural pregnancy-related deaths at 23.1% followed by infections (15.4%) and cardiac-related conditions (15.4%). Suicides accounted for 17.6% of pregnancy-related deaths while accidental overdoses accounted for 5.9% of pregnancy-related cases.

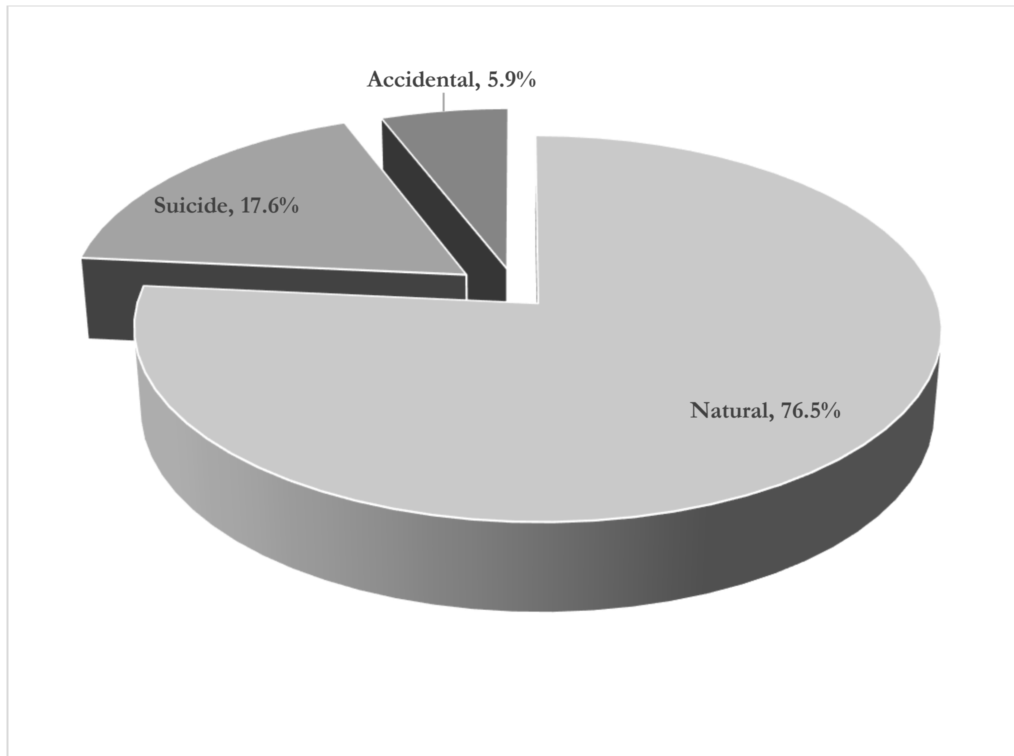

Figure 9: Preliminary Percentage of Pregnancy-Related Deaths by Manner of Death, 2021

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DRAFT RECOMMENDATIONS BASED ON THE REVIEW OF 2021 CASES[10]

Given the portrait of pregnancy-associated and pregnancy-related mortality in the state of Virginia, pre-conception care, routine health care and support for the social determinants of health needs for every woman of childbearing age is critical. Data from the MMRT review of pregnancy-associated and pregnancy-related deaths reveal that many women of child-bearing age do not enter pregnancy in optimal health and often experience multiple risk factors such as mental illness, substance misuse and a lack of access to care. The data also reveal that there is a lack of coordination of care, with many women not receiving the appropriate screenings, referrals and/or being left to navigate the complicated health care system on their own. There is a need for a system of affordable, accessible and coordinated care that is institutionalized in the U.S. as a cultural value, a medical standard of care and a human right. Women's health is part of a system of care that includes women and their families, their communities, standard practices and institutions. Improving the health outcomes of pregnant and postpartum women involves change at the community, provider, facility and system level.

The following draft recommendations were developed by the Virginia MMRT in fulfillment of its mission and in honor of the women who died and from whom the MMRT are privileged to have learned these lessons. The MMRT hopes the information published in this report along with its recommendations will be used in the continued effort to prevent maternal deaths among women in Virginia. Recommendations are organized by topic area and grouped by the agencies or association that would be best equipped to implement the recommendation(s) presented. A formal Recommendations Report is scheduled for release in 2025.

EVIDENCE BASED STANDARDS OF CARE

1. Virginia Neonatal Perinatal Collaborative

    a. We recommend that the Virginia Neonatal Perinatal Collaborative maintain an updated list of evidence-based maternal care protocols and links on their website that can easily be accessed by providers and hospital systems.

2. Virginia Hospital and Healthcare Association

    a. We recommend that the appropriate state agencies, including the Virginia Department of Health Professions, collaborate closely with the Virginia Neonatal and Perinatal Collaborative (VNPC) as well as the Medical Society of Virginia, Virginia Chapter of the American College of Obstetricians and Gynecologists, Virginia Hospital and Healthcare Association, Virginia Nurses Association and other professional organizations to reinforce the need for hospital systems and clinicians to utilize evidence-based protocols from the Alliance for Innovation on

[10] As a part of each case review, the Team assesses and/or recommends needed changes in the care received that may have led to better outcomes. The analysis of recommendation themes that emerge from the individual case review is the first step in the MMRT process for developing formal recommendations that are targeted towards specific agencies and/or organizations. Formal recommendations are then vetted by the target audience. The MMRT is currently working to finalize and vet the draft recommendations included in this report. A final report with these recommendations will be distributed separately when this process is complete.

Maternal Health (AIM) Patient Safety Bundles. These include protocols for postpartum hemorrhage, massive transfusion, perinatal mental health and others as needed to address the clinical trends identified in the Maternal Mortality Review Team case reviews.

i. These entities should encourage hospitals and health systems to participate in the Virginia Neonatal Perinatal Collaborative (VNPC) led initiative and quality improvement projects that would support the Center for Medicare and Medicaid Services Maternal Morbidity Structural Measure in the Hospital Inpatient Quality Reporting (IQR) Program.

ii. The previously mentioned entities should also recommend and encourage non-birth hospitals to adopt the Association of Women's Health, Obstetric and Neonatal Nursing Post-Birth Warning Signs Education Program.

MATERNAL LEVELS OF CARE

3. Virginia General Assembly

    a. We recommend that the Virginia General Assembly require all hospitals to participate in the Virginia Neonatal Perinatal Collaborative's survey of Levels of Maternal Care using the Center for Disease Control's (CDC) Levels of Care Assessment Tool (LOCATe) and that the information be publicly available.

4. Virginia Department of Health, Virginia Hospital and Healthcare Association and Virginia Neonatal Perinatal Collaborative

    a. We recommend that the Virginia Department of Health (VDH), Virginia Hospital and Healthcare Association (VHHA), and Virginia Neonatal Perinatal Collaborative (VNPC) collaborate with the payer systems, hospitals and professional societies in the Commonwealth with the goal for all hospitals to identify their CDC Level of Maternal Care using the CDC's Levels of Care Assessment Tool (LOCATe) and develop strategies to foster communication between obstetric caregivers and hospitals to assure that pregnant women have the opportunity to deliver in the location where their medical, obstetric, and social needs are best met. By prioritizing this, women with high-risk pregnancies are able to be provided with the specialized care required at appropriate facilities, effectively reducing the risk of severe complications and maternal mortality.

CARE COORDINATION

5. Virginia Hospital and Healthcare Association

    a. We recommend that the Virginia Hospital and Healthcare Association (VHHA), in partnership with the Virginia Association of Health Plans (VAHP) and the Department of Medical Assistance Services (DMAS), encourage healthcare systems and Hospitals to provide care coordination for pregnant and post-partum patients following discharge from the hospital to ensure that the appropriate

referrals are completed, and treatment plans are followed. Systems and processes should be in place to assist patients in making appointments for referrals. Additionally, providers should communicate the patient status/urgency, medical history and needs to the referred provider to ensure timely care. Funding and reimbursement should also be provided.

i. Healthcare systems and hospitals should ensure the scheduling of follow-up or postpartum appointments for the patient either in person or via telemedicine.

ii. The Virginia Hospital and Healthcare Association should evaluate the current postpartum care policies and protocols across hospitals and healthcare systems in the state. This evaluation should aim to identify best practices for conducting and documenting postpartum risk assessments and ensuring appropriate referrals prior to discharge. These referrals should include home visiting services and other community-based organizations that support birthing and postpartum individuals.

b. We recommend that hospital systems and providers who see patients with multiple risk factors, including chronic conditions with a history of poor disease management, multiple stressors, history of trauma, mental illness or substance abuse, and/or socio-economic needs should provide referrals for services during the admission for delivery. These services should include but are not limited to home visiting, social work, postpartum doula, and care coordination/patient navigation services.

i. Maternity support providers, such as community health workers, doulas, home visiting teams and payer care coordinators, should be encouraged to participate as key members of the hospital team with access to the facility and the postpartum patient (as well as their family/support system) prior to discharge from the hospital.

6. Virginia Association of Health Plans and Department of Medical Assistance Services

a. We recommend that all public and private payer systems in the Commonwealth provide postpartum care coordination support for all high-risk postpartum discharges from hospitals.

b. We recommend that all payer systems encourage and incentivize the utilization of the Smartchart Network Program by all provider types for notifications of Emergency Room visits and deliveries by their patients.

c. We recommend that all public and private payer systems provide behavioral health coordinators to assist individuals with mental health diagnoses with family-based residential or outpatient treatment, as appropriate, and provide education on the treatment options available.

MENTAL HEALTH AND SUBSTANCE USER DISORDER SERVICES

7. Virginia General Assembly

    a. There is a need for mental health and substance misuse treatment systems that encourage seeking residential and outpatient treatment and include the entire family (including partners and spouses). The MMRT recommends that the General Assembly fund the development of at least one evidence-based residential program for families including partners and children within every health district in the state. These programs should be developed in partnership with relevant community stakeholders, including, but not limited to, the Department of Behavioral Health and Developmental Services (DBHDS), Community Service Boards (CSBs), community-based organizations (CBOs), and other relevant local or regional organizations.

8. The Virginia Department of Health Professions (DHP)

    a. We recommend that board certifiers promote and incentivize integrating regular postnatal patient appointments into the existing pediatric appointments during the 365-day postpartum period. These appointments, conducted by either the pediatrician or an appropriate care extender such as a nurse or social worker, should include screenings for depression, substance use, suicidal ideation, and other high-risk behaviors, along with brief interventions and referrals to services as needed.

    b. We recommend that anyone who dispenses medication for an Opioid Treatment Program should be required to report to the Prescription Monitoring Program. There should also be a system in place through the Prescription Monitoring Program that will allow providers to see and follow up on prescriptions that are not being filled as prescribed. This is particularly important for medications used in medication-assisted addiction treatment.

COMMUNITY OUTREACH, PUBLIC EDUCATION AND AWARENESS

9. Virginia Department of Health (VDH) and Community Services Boards (CSBs)

    a. We recommend that the Virginia Department of Health and Community Services Boards collaborate to increase public awareness of the safety of using of opioid antagonists, such as Narcan, in pregnancy and postpartum periods.

    b. Although opioid antagonists are available over the counter, it is still costly for most individuals. We recommend that the Virginia Department of Health work to increase the supply as well as accessibility and affordability of opioid antagonists throughout the Commonwealth. This can be done through providing opioid antagonists at Women, Infants, and Children program (WIC) clinics, pediatricians' offices, family planning clinics, Alcoholics Anonymous, Narcotics Anonymous and other self-help meetings, and other public and community settings such as post offices, libraries, fire and rescue departments and schools.

c. We recommend that the Virginia Department of Health should collaborate with community-based organizations to conduct public health campaigns to bring greater awareness to pregnancy and postpartum risks and health promoting practices with the goal of increasing community awareness and engagement. This should include public education and community discussions on the value of prenatal care and education on urgent maternal warning signs. The Virginia Department of Health should incorporate the community-targeted messaging highlighted in the Center for Disease Control's Hear Her Campaign into these efforts.

PROVIDER EDUCATION

10. Virginia Department of Health (VDH)

    a. We recommend that the Virginia Department of Health collaborate with the Virginia Section of the American College of Obstetricians and Gynecologists, the Department of Behavioral Health and Developmental Services and Early Impact Virginia to provide medical providers, nurses, therapists, social workers, case managers, care coordinators and community health workers with foundational training in Motivational Interviewing and the Harm Reduction Model for perinatal substance use and addiction for the patient who declines referral to treatment services.

11. Virginia Department of Health Professions (DHP)

    a. We recommend that the Department of Health Professions work collaboratively with the State Council for Higher Education in Virginia to provide guidance and recommendations on the development and incorporation of a person-centered, multicultural lens, biomedical addiction model, and framework for providing services that include all medical and behavioral professionals who serve this population.

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CONCLUSION

Analysis of the Virginia PAMSS data for 2022 reveals that the pregnancy-associated death rate in Virginia has increased from 66.9 in 2021 to 70.1 in 2022. Just over 73% of these deaths were natural deaths, representing an increase from 64.1% in 2022. Accidental deaths accounted for nearly 18% of deaths in 2022, a decrease from 21.9% in 2021. The proportion of deaths from suicide and homicide also decreased in 2022. Overall, the pregnancy-associated death rates for all manners of pregnancy-associated deaths, except for natural deaths, declined in 2022.

Significant racial disparities continue to be identified among pregnancy-associated deaths in the Commonwealth of Virginia. Overall, in 2022, Black women had higher rates of pregnancy-associated deaths when compared to their White counterparts (138.1 vs. 50.6, respectively). This disparity is most pronounced when looking specifically at cases with natural causes of deaths. For natural causes of death, Black women had rates of death 2.8 times higher than their White counterparts (100.9 vs. 36.2, respectively). Unlike previous years of data, in 2022 Black women were found to have higher rates of accidental deaths when compared to their White counterparts (21.2 vs. 10.1, respectively). It is important to note that over 70% of all accidental pregnancy-associated deaths were caused by fatal drug overdoses. The most used substance in these overdose deaths was Fentanyl.

Analysis of the various causes of natural deaths reveal additional differences by race. Approximately 73% of the pregnancy-associated deaths in 2022 were from natural causes. Over half of the natural deaths were caused by cardiac conditions, cancer, the exacerbation of chronic disease, hemorrhage or infection. Black women had a significantly higher rate of death caused by cardiac conditions compared to their White counterparts (26.6 vs. 5.8, respectively). Black women were also found to have higher rates of death caused by hemorrhage and COVID-19.

The MMRT review of 2021 cases revealed several community-, patient-, provider-, and facility/system-related contributors to mortality in these cases. All cases had at least one patient-related factor. Over 73% of cases were found to have at least one provider related factor, while community-related and facility-related contributors were identified in 40.0% (2021) and 53.3% (2022) of cases, respectively. A majority of 2021 cases were determined to be preventable (83%) while 55.2% were found to be pregnancy-related. Recommendations that emerged from the review of these cases centered around the development of a system of affordable, accessible and coordinated care that meets the care coordination, mental health and substance use and social determinants of health needs of women and their families and improves the health outcomes of pregnant and postpartum women in the Commonwealth.

NEXT STEPS

In accordance with the Code of Virginia, § 32.1-283.8, the MMRT will complete thorough reviews of 2021 pregnancy-associated deaths to determine the contributors to mortality, whether the death was preventable and the pregnancy-relatedness of the death. Additionally, the MMRT will continue to develop and disseminate recommendations for the prevention of future deaths with a formal Recommendations Report scheduled for 2025. The MMRT will begin the review of 2022 cases in January of 2025.

APPENDIX A – CODE OF VIRGINIA § 32.1-283.8

§ 32.1-283.8. Maternal Mortality Review Team; duties; membership; confidentiality; penalties; report; etc.

A. As used in this section, "maternal death" means the death of a woman who was pregnant at the time of death or within one year prior to the time of death, regardless of the outcome of the pregnancy, including any death determined to be a natural death, unnatural death, or violent death or for which no cause of death was determined.

B. There is hereby created the Maternal Mortality Review Team (the Team), which shall develop and implement procedures to ensure that certain maternal deaths occurring in the Commonwealth are analyzed in a systematic way. The Team shall review every maternal death in the Commonwealth. The Team shall not initiate a maternal death review until the conclusion of any law-enforcement investigation or criminal prosecution. The Team shall (i) develop and revise as necessary operating procedures for maternal death reviews, including identification of cases to be reviewed and procedures for coordinating among the agencies and professionals involved; (ii) improve the identification of and data collection and record keeping related to causes of maternal deaths; (iii) recommend components of programs to increase awareness and prevention of and education about maternal deaths; and (iv) recommend training to improve the review of maternal deaths. Such operating procedures shall be exempt from the Administrative Process Act (§ 2.2-4000 et seq.) pursuant to subdivision B 17 of § 2.2-4002.

C. The Team shall consist of the following persons or their designees: the Chief Medical Examiner, the Director of the Office of Family Health of the Department of Health, the State Registrar of Vital Records, and the Commissioner of Behavioral Health and Developmental Services. In addition, the Governor shall appoint one representative of each of the following entities: local law enforcement, local fire departments, local emergency medical services providers, local departments of social services, community services boards, attorneys for the Commonwealth, the Medical Society of Virginia, the Virginia Hospital and Healthcare Association, the Virginia College of Emergency Physicians, the Virginia Section of the American College of Obstetricians and Gynecologists, the Virginia Affiliate of the American College of Nurse-Midwives, the Virginia Chapter of the Association of Women's Health, Obstetric and Neonatal Nurses, the Virginia Neonatal Perinatal Collaborative, the Virginia Midwives Alliance, and the Virginia Academy of Nutrition and Dietetics. The Chief Medical Examiner and the Director of the Office of Family Health of the Department of Health shall serve as co-chairs of the Team and may appoint additional members of the Team as may be needed to complete maternal death reviews pursuant to this section.

After the initial staggering of terms, members other than the Chief Medical Examiner, the Director of the Office of Family Health of the Department of Health, the State Registrar of Vital Records, the Commissioner of Behavioral Health and Developmental Services, and the Director of the Department of Criminal Justice Services shall be appointed for a term of three years. Appointments to fill vacancies, other than by expiration of a term, shall be for the unexpired terms. Vacancies shall be filled in the same manner as the original appointments. All members may be reappointed. The Chief Medical Examiner, the Director of the Office of Family Health of the Department of

Health, the State Registrar of Vital Records, the Commissioner of Behavioral Health and Developmental Services, and the Director of the Department of Criminal Justice Services shall serve terms coincident with their terms of office.

D. Upon the request of the Chief Medical Examiner in his capacity as a co-chair of the Team, made after the conclusion of any law-enforcement investigation or prosecution, the Chief Medical Examiner or his designee may inspect and copy information and records regarding a maternal death, including (i) any report of the circumstances of the maternal death maintained by any state or local law-enforcement agency or medical examiner, and (ii) information or records about the woman maintained by any social services agency or court. Information, records, or reports maintained by any attorney for the Commonwealth shall be made available for inspection and copying by the Chief Medical Examiner or his designee pursuant to procedures that shall be developed by the Chief Medical Examiner and the Commonwealth's Attorneys' Services Council established by § 2.2-2617. Any presentence report prepared pursuant to § 19.2-299 for any person convicted of a crime that led to the death of the woman shall be made available for inspection and copying by the Chief Medical Examiner or his designee. In addition, the Chief Medical Examiner or his designee may inspect and copy from any health care provider in the Commonwealth, on behalf of the Team, (a) without obtaining consent, subject to any limitations on disclosure under applicable federal and state law, the health and mental health records of the woman and those prenatal medical records relating to any child born to the woman and (b) upon obtaining consent, from each adult regarding his records.

E. All information and records obtained or created by the Team or on behalf of the Team regarding a review shall be confidential and excluded from the Virginia Freedom of Information Act (§ 2.2-3700 et seq.) pursuant to subdivision 7 of § 2.2-3705.5. All such information and records shall be used by the Team only in the exercise of its proper purpose and function and shall not be disclosed. In preparing information and records for review by the Team, the Department shall remove any individually identifiable information or information identifying a health care provider, as those terms are defined in 45 C.F.R. § 160.103. Such information shall not be subject to subpoena, subpoena duces tecum, or discovery, be admissible in any civil or criminal proceeding, or be used as evidence in any disciplinary proceeding or regulatory or licensure action of the Department of Health Professions or any health regulatory board. If available from other sources, however, such information and records shall not be immune from subpoena, discovery, or introduction into evidence when obtained through such other sources solely because the information and records were presented to the Team during a maternal death review. The findings of the Team may be disclosed or published in statistical or other form, but shall not identify any individual. Upon conclusion of the maternal death review, all information and records concerning the woman and the woman's family shall be shredded or otherwise destroyed by the Office of the Chief Medical Examiner in order to ensure confidentiality.

The portions of meetings in which individual maternal deaths are discussed by the Team shall be closed pursuant to subdivision A 21 of § 2.2-3711. In addition to the requirements of § 2.2-3712, all Team members and other persons attending closed Team meetings, including any persons presenting information or records on specific maternal deaths to the Team during closed meetings, shall execute a sworn statement to (i) honor the confidentiality of the information, records, discussions, and opinions disclosed during meetings at which the Team reviews a specific maternal

death and (ii) not use any such information, records, discussions, or opinions disclosed during meetings at which the Team reviews a specific maternal death for any purpose other than the exercise of the proper purpose and function of the Team. Violations of this subsection are punishable as a Class 3 misdemeanor.

F. Upon notification of a maternal death, any state or local government agency maintaining records on the woman or the woman's family that are periodically purged shall retain such records for the longer of 12 months or until such time as the Team has completed its review of the case.

G. The Team shall compile annual statistical data, which shall be made available to the Governor and the General Assembly. Any statistical compilations prepared by the Team shall be public record and shall not contain any personal identifying information.

H. Members of the Team, as well as their agents and employees, shall be immune from civil liability for any act or omission made in connection with participation in a review by the Team, unless such act or omission was the result of gross negligence or willful misconduct. Any organization, institution, or person furnishing information, data, testimony, reports, or records to the Team as part of such review shall be immune from civil liability for any act or omission in furnishing such information, unless such act or omission was the result of gross negligence or willful misconduct.

APPENDIX B – GLOSSARY, ACRONYMS AND ABBREVIATIONS

This is a listing of the terms, acronyms and abbreviations appearing throughout the report and its appendices.

Accident – The manner of death used when there is no evidence of intent; and unintentional, sudden, and unexpected death.

AIM – Alliance for Innovation on Maternal Health

Cause of Death – The disease, injury, or poison that results in a physiological derangement or biochemical disturbance that is incompatible with life. The result of post-mortem examination, including autopsy and toxicological findings, combined with information about the medical history of the decedent, serves to establish the cause of death.

CDC – Centers for Disease Control

CSB – Community Services Boards

Fatal Agent – The means, fatal agency or item causing death, present at the time of injury or death. This is specific to homicides, suicides, and accidental deaths.

Homicide – The manner of death in which death results from the intentional harm of one person by another.

IQR – Hospital Inpatient Reporting Program

LOCATe – Levels of Care Assessment Tool

Manner of Death – The general category of the circumstances of the event which causes the death. The categories are accident, homicide, natural, suicide, and undetermined.

MMRT – Maternal Mortality Review Team

Natural – The manner of death used when a disease alone causes death. If death is hastened by an injury, the manner of death is not considered natural.

OCME – Office of the Chief Medical Examiner

OFHS – Office of Family Health Services

Other Vehicle (Driver/Passenger) Accidental Death – A death involving a vehicle other than a motor vehicle. This includes ATVs and other off-road vehicles. The decedent is usually a driver of, a passenger in, or a pedestrian who is struck by the other vehicle.

Pregnancy-Associated Death (PAD) – The death of a woman while pregnant or within one year of pregnancy regardless of the outcome of the pregnancy or the cause of death.

Pregnancy-Associated Death Rate – Calculated by dividing the number of pregnancy-associated deaths by the number of live births for the same time period and multiplying by 100,000. The rate provides the number of deaths for every 100,000 live births to women who were residents of the state at the time of their deaths. Rates for race, age, and Health Planning Region (HPR) are category specific. Rates for manner and cause of death are overall rates/100,000 live births.

Pregnancy-Related Death – 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.

Preventable Death - A death that may have been averted by one or more reasonable changes in clinical care, facility infrastructure, community and/or patient factors. These determinations were made with the benefit of retrospective review and current clinical practice guidelines.

Suicide – The manner of death in which death results from the purposeful attempt to end one's life.

Undetermined – The manner of death for deaths in which there is insufficient information to assign another manner. An undetermined death may have an undetermined cause of death and an unknown manner, an undetermined cause of death and a known manner, or a determined cause of death and an unknown manner.

VDH – Virginia Department of Health

Virginia's Pregnancy-Associated Mortality Surveillance System (PAMSS) – This surveillance system allows for the identification and monitoring of patterns and trends related to pregnancy-associated deaths in Virginia, provides a snapshot of how, when and to whom these deaths occur, and helps inform policy decisions of public health importance.

VNPC – Virginia Neonatal Perinatal Collaborative

VVDRS – Virginia Violent Death Reporting System

WIC – Women, Infants, and Children Program

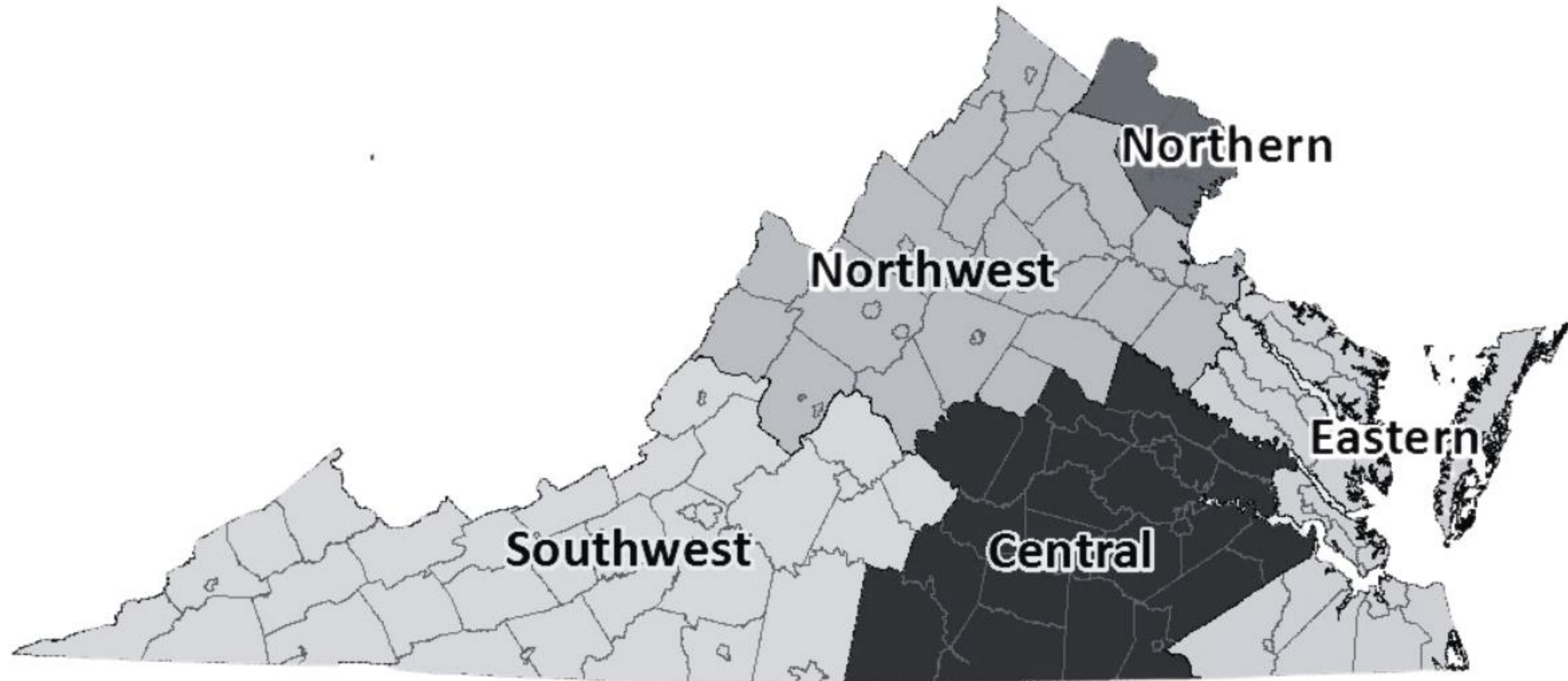
APPENDIX C – CONTRIBUTORS TO MORTALITY FORM

VIRGINIA DEPARTMENT OF HEALTH
OFFICE OF THE CHIEF MEDICAL EXAMINER
MATERNAL MORTALITY REVIEW TEAM
CONTRIBUTORS TO MORTALITY

1. COMMUNITY STRUCTURE & SYSTEMS FACTORS	**Check if Yes**
a. Services unavailable (specify needed services such as case management, care coordination, transportation):	
b. Services inaccessible (due to. . .)	
c. Inadequate law enforcement response	
d. Inadequate legal protection	
e. Inadequate community outreach	
f. Neighborhood demographics/community environment	
g. Temporary Shelter – inaccessible or unavailable	
h. Accessible/Available/Affordable permanent housing	
i. Other (specify)	
2. PATIENT FACTORS	**Check if Yes**
a. (i) Delay or failure to seek care/services – medical care	
(ii) Delay or failure to seek care/services – legal protection/assistance	
(iii) Delay or failure to seek care/services – social services	
(iv) COVID related delay to seeking care	
b. Noncompliance	
c. Lack of knowledge regarding importance of event	
d. Lack of knowledge of treatment or follow-up	
e. Lack of access to birth control	
f. (i)Environmental Hazards – Work	
(ii) Environmental Hazards – Home	
(iii) Environmental Hazards – Other (ex. Interpersonal Relationships)	
g. Intimate partner violence	
h. (i) Incarceration - History of Incarceration	
(ii) Incarceration - Incarcerated at time of death	
i. Mental illness	
j. (i) Substance use – Alcohol, illicit drugs, prescription abuse	
(ii) Substance use – Tobacco, Vaping	
k. Intellectually delayed/Cognitive impairment	
l. History of brain injury	
m. (i) Chronic medical condition - Congenital	
(ii) Chronic medical condition - Acquired	
n. Obesity	
o. History of sexual abuse (specify time-period)	
p. History of trauma (specify time-period)	
q. Other history of violence	
o. Uninsured	
p. Lack of financial resources	
r. Unstable housing	
s. Isolation: Lack of family/friend support system	
t. Cultural/ Religious barriers (specify)	
u. Multiple stressors (specify)	
v. Multiple risk factors (specify)	

w. Active Military/Veteran (specify)	
x. Personal Association with Individuals with criminal/substance abuse history (describe relationship)	
y. Social isolation d/t COVID: societal & interpersonal level	
z. COVID diagnosis (timing)	
aa. COVID Vaccine declined	
ab. Other (specify)	
3. HEALTHCARE SYSTEMS/ORGANIZATIONAL FACTORS	**Check if Yes**
a. Inadequately trained personnel	
b. Inadequate or unavailable equipment/technology	
c. Policies contributed to delay or inadequate treatment	
d. Unavailable facilities	
e. Poor communications	
f. Unavailable or inadequate response by EMS	
g. Lack of continuity of care (ex. transferring from inpatient mental health care to outpatient care)	
h. Inadequate or unavailable personnel or services, including translation services (specify)	
i. COVID policies: limited support available	
j. Other (specify)	
4. HEALTHCARE PROFESSIONAL FACTORS	**Check if Yes**
a. Delay in or lack of diagnosis, treatment, or follow-up	
b. Use of ineffective treatment	
c. Misdiagnosis	
d. Failure to refer or seek consultation	
e. Lack of continuity of care	
f. Inadequate patient education	
g. Lack of communication between providers	
h. Inadequate preconception counseling	
i. Failure to screen for risk	
j. Inadequate assessment of risk	
k. Poor provider-patient communication	
l. Failure to utilize translation services with non-English speakers	
m. Failure to follow Evidence-Based Standards of Care	
n. Other (specify)	

APPENDIX D – VIRGINIA HEALTH SERVICES AREAS MAP



APPENDIX E – MATERNAL MORTALITY PROGRAMS CONTACT INFORMATION

For more information related to the Virginia Maternal Mortality Programs and Maternal Mortality Review Team, please contact:

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