Examination of Pregnancy-Associated Deaths by Perinatal Region in Virginia, 1999-2005 (N=307)

Healthy People 2020 goals for the United States include reducing the infant and maternal mortality rates. The infant mortality rate for 2008 in Virginia was 6.9 deaths per 1,000 live births making Virginia the 25th highest in the nation. The Virginia Department of Health has placed reduction of the numbers of infant deaths among its top priorities.

The most recently published maternal mortality rate for Virginia was 8.0 per 100,000 live births for a ranking of 17th in the nation. The maternal mortality rate (MMR) is defined by the World Health Organization as the number of deaths per 100,000 live births from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes). The MMR includes deaths during pregnancy, childbirth, or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, for a specified year. In 1986, the Centers for Disease Control and Prevention and the American College of Obstetricians and Gynecologists developed the term "pregnancy-associated death" to expand the definition of maternal mortality. A pregnancy-associated death refers to a death that occurs during pregnancy or within one year of pregnancy regardless of the outcome of the pregnancy or the cause or manner of death.

Virginia currently has five Regional Perinatal Councils (RPCs) making up a statewide network of public/private partnerships that assess the needs of infants and

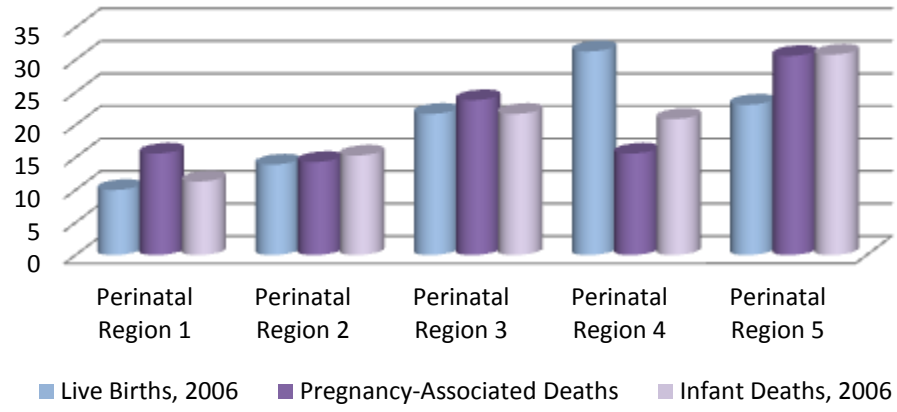
women of reproductive age.[1] One source for assessing these needs has been multidisciplinary reviews of fetal and infant deaths (FIMR) which include interviews with the decedent's mother. FIMR reviews are conducted in the region in which the decedent lived. From these reviews, work plans have been developed to address perinatal issues specific for each region. Virginia also conducts multidisciplinary reviews of all pregnancy-associated deaths of residents of the state. These reviews, conducted by the Maternal Mortality Review Team (MMRT), are held at the state level and include recommendations for improvements targeted toward policy makers and practitioner organizations on a more macrosystems level. The MMRT reviews de-identified case summaries compiled from examination of records which include mother's death certificate and infant birth/death certificates, providers of prenatal and delivery care, primary care, emergency room, and death investigation records.

Examination of data on pregnancy-associated deaths at the level of perinatal region may be useful for informing local efforts to improve the health of both women and their infants. Also, combining insights from FIMR with the findings from the Maternal Mortality Review Team may support a more fine-tuned understanding of at-risk populations. Using Maternal Mortality Review Team data, this report provides a description of characteristics of pregnant and recently pregnant women who died in each of the perinatal regions in Virginia. The purpose of this report is to use information collected through review of pregnancy-associated deaths to broaden our understanding of perinatal care at the regional level.

[1] See Attachment 2 for a map of Virginia outlining its five Regional Perinatal Councils (RPC). See Attachment 3 for a listing of Virginia localities in each of the five RPCs.

As shown in Figure 1, comparison of the proportion of pregnancy-associated deaths and infant deaths to live births for each perinatal region reveals that Region 5 had proportionately more deaths, both infant and maternal, to live births than any other region. Region 4 had the lowest proportion of deaths to live births. Region 1 had a higher proportion of pregnancy-associated deaths to live births than infant deaths.

Figure 1. Percent of Live Births, Pregnancy-Associated Deaths, and Infant Deaths by Perinatal Region in Virginia



Looking at numbers of deaths for each of the seven years by perinatal region (Figure 2) shows that Region 5 was the location of the highest number of pregnancy-associated deaths almost every year. Region three had the second highest number of deaths across the seven year period.

Figure 2. Numbers of Pregnancy-Associated Deaths By Year by Perinatal Region in Virginia, 1999-2005 (N=307)

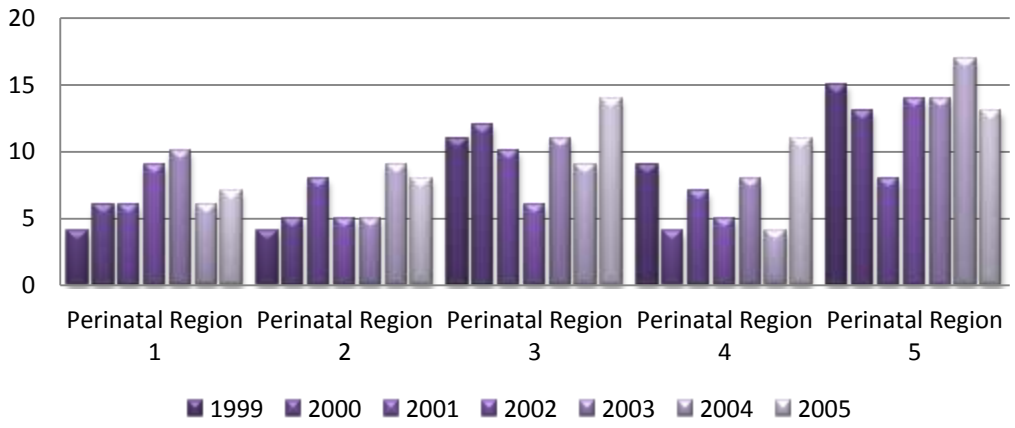


Figure 3 shows the number of pregnancy-associated deaths due to natural causes and violent/accidental causes for each of the five perinatal regions. Region 5 had the highest number of deaths overall, most due to natural causes. The number of natural deaths in Region 5 was almost twice the number for the next highest regions. The highest number of deaths from violence occurred in Region 3.

Figure 3. Number of Pregnancy-Associated Deaths by Perinatal Region in Virginia, 1999-2005 (N=307)

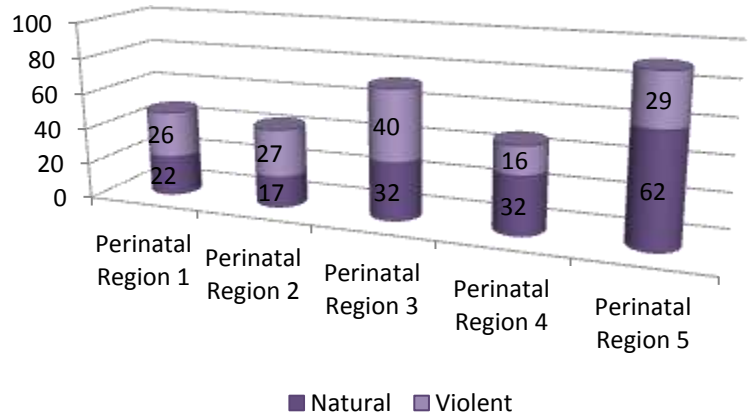


Table 1 shows the leading causes and/or manners of pregnancy-associated death for each of the perinatal regions. All causes or manners of death accounting for at least 10.0% of the total deaths for the region are shown.

Table 1. Leading Causes and/or Manners of Pregnancy-Associated Death By Perinatal Region

	Cause/Manner of Death	Number of Deaths in the Region	Percent of Deaths in the Region
Region 1	Accidental Overdose	8	16.7
	Homicide	6	12.5
	Motor Vehicle Accident	6	12.5
	Cardiac Disorders	5	10.4
	Cancer	5	10.4
Region 2	Motor Vehicle Accident	11	25.0
	Homicide	9	20.0
Region 3	Homicide	16	21.9
	Motor Vehicle Accident	13	17.8
	Cardiac Disorders	8	11.0
Region 4	Cardiac Disorders	6	12.5
	Disorders of the Central Nervous System	6	12.5
	Motor Vehicle Accident	5	10.4
Region 5	Cardiac Disorders	15	16.0
	Cancer	13	13.8
	Motor Vehicle Accident	12	12.8
	Homicide	10	10.6

Table 2 below shows demographic characteristics of the women who died in each of the five perinatal regions. There are a few notable differences between regions. A preponderance of the women who died in Regions 1 and 2 were White while Regions 3 and 4 had slightly higher percentages of Black women than White women who died.

Region 4 had few Black women die but nearly 20% were Asian or of another race. Region 4 had more women over 30 years old and more highly educated women among those who died than any of the other regions.

Table 2. Demographic Characteristics Among Pregnancy-Associated Deaths by Perinatal Region in Virginia, 1999-2005 (N=307)

	Region 1		Region 2		Region 3		Region 4		Region 5	
	#	%	#	%	#	%	#	%	#	
Age										
19 and <	6	12.5	6	13.6	7	9.6	4	8.3	6	6.4
20-24	12	25.0	14	31.8	22	30.1	7	14.6	28	29.8
25-29	8	16.7	11	25.0	22	30.1	7	14.6	24	25.5
30-34	11	22.9	6	13.6	13	17.8	14	29.2	22	23.4
35-39	9	18.8	5	11.4	7	9.6	12	25.0	12	12.8
40 and >	2	4.2	2	4.2	2	2.7	4	8.3	2	2.1
Race										
White	42	87.5	32	72.7	30	41.1	25	52.1	38	40.4
Black	6	12.5	11	25.0	41	56.2	14	29.2	53	56.4
Asian	0	0	0	0	0	0	6	12.5	1	1.1
Other	0	0	1	2.3	2	2.8	3	6.3	2	2.1
Marital Status										
Never Married	19	39.6	17	38.6	34	46.6	15	31.3	42	44.7
Married	23	47.9	26	59.1	32	43.8	27	56.3	45	47.9
Divorced	5	10.4	1	2.3	5	6.8	6	12.5	7	7.4
Widowed	1	2.1	0	0	2	2.7	0	0	0	0
Education										
< High School	12	25.0	7	16.3	21	28.8	9	18.8	19	20.2
High School	25	52.1	25	58.1	31	42.5	14	29.2	46	48.9
>High School	11	22.9	11	25.6	21	28.8	25	52.1	29	30.9

Examination of characteristics related to care and delivery, shown in Table 3, reveals that a majority of women in Region 1 were covered by Medicaid while most women in Region 4 were covered by private health insurance. Ten percent of women in

Region 5 were listed as self pay for care and a smaller proportion of women in that region entered prenatal care in the first trimester than in any other region. Women in Regions 2 and 4 had the highest percentage of women dying during pregnancy or on the day of delivery as well as having the lowest proportion to deliver a live infant which would also impact the fetal and infant death rates.

Table 3. Characteristics of Care and Delivery Among Pregnancy-Associated Deaths by Perinatal Region in Virginia, 1999-2005 (N=307)

	Region 1		Region 2		Region 3		Region 4		Region 5	
	#	%	#	%	#	%	#	%	#	%
Payment for Care										
No Medical Care	0	0.0	1	2.3	3	4.1	2	4.2	1	1.1
Self Pay	3	6.3	4	9.1	7	9.6	3	6.3	10	10.6
Private Insurance	30	20.8	11	25.0	27	37.0	30	62.5	39	41.5
Medicaid	30	62.5	20	45.5	30	41.1	10	20.8	35	37.2
Unknown	5	10.4	8	18.2	6	8.2	3	6.3	9	9.6
Began Care in First Trimester										
Yes	28	70.0	25	75.8	37	68.5	34	82.9	45	60.8
Interval Between Delivery and Death										
Pregnant at Time of Death or Died Day of Delivery	7	14.6	14	31.8	11	15.1	18	37.5	26	27.7
1-7 days	3	6.3	3	6.3	5	6.8	5	10.4	7	7.4
8-14 days	4	8.3	0	0.0	6	8.2	1	2.1	4	4.3
15-42 days	5	10.4	2	4.5	5	6.8	1	2.1	8	8.5
>42 days	29	60.4	25	56.8	46	63.0	23	47.9	49	52.1
Delivered a Live Infant										
Yes	40	83.4	27	61.4	58	79.4	31	64.6	67	71.2

In conclusion, information collected for review of maternal deaths can be useful for understanding issues related to perinatal care in each perinatal region. For example, the percentage of women who died in Region 5 who started prenatal care in

the first trimester was well below the State average of approximately 84% suggesting efforts to improve early entry into care may be useful. In Region 3, most women died from violence and they died after the end of the postpartum period. This finding suggests a need for violence prevention efforts as part of routine postpartum care. Table 4 (attached) provides key characteristics of women dying maternal deaths in each perinatal region. Improved coordination of findings among fatality review efforts at the state, regional, and local level may yield valuable insights leading to better understanding and prevention of these deaths.

Attachments:

1. Table 4. Key Characteristics of Women Dying Maternal Deaths By Perinatal Region in Virginia, 1999-2005 (N=307).
2. Map of Virginia delineating the Five Perinatal Regions.
3. Perinatal Regions of Virginia by City/County

For information on Fatality Review and Surveillance Projects in Virginia please visit: http://www.vdh.state.va.us/medExam/FatalityReviewSurveillance.htm.

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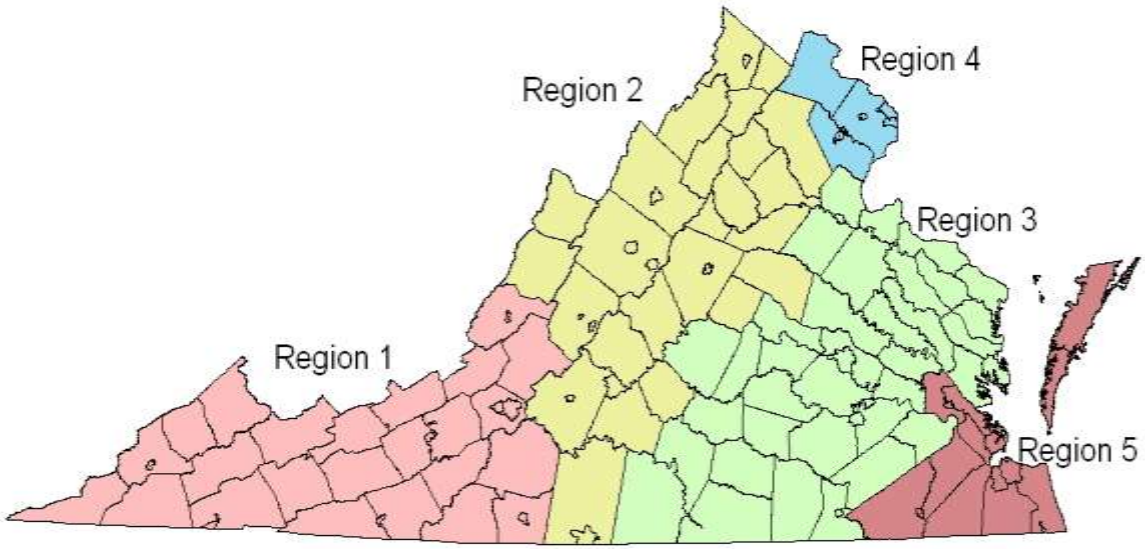
Attachment 1.

Table 4. Key Characteristics of Women Dying Pregnancy-Associated Deaths By Perinatal Region in Virginia, 1999-2005 (N=307)					
	Region 1 (n=48)	**Region 2 (n=44)**	**Region 3 (n=72)**	**Region 4 (n=48)**	**Region 5 (n=91)**
Average Age of Decedent	28.4 years	26.7 years	27.1 years	30.8 years	27.5 years
Percent 19 years old and under	12.5%	13.6%	9.6%	8.3%	6.4%
Percent Advanced Maternal Age (35 and above)	23.0%	15.6%	12.3%	33.3%	14.9%
Most Common Race/Ethnicity	White (87.5%)	White (72.7%)	Black (56.2%)	White (52.1%)	Black (56.4%)
Percent with Less Than a High School Education	25.0%	16.3%	28.8%	18.8%	20.2%
Most Common Cause of Natural Death	Cancer, Cardiac Disorders (n=5 each)	Pulmonary Embolism, Eclampsia (n=3 each)	Cardiac Disorders (n=8)	Cardiac Disorders, Disorders of Central Nervous System (n=6 each)	Cardiac Disorders (n=15)
Most Common Cause of Violent Death	Accidental Overdose (n=8)	Motor Vehicle Collision (n=11)	Homicide (n=16)	Motor Vehicle Collision (n=5)	Motor Vehicle Collision (n=12)
Most Common Source of Payment for Care	Medicaid (62.5%)	Medicaid (45.5%)	Medicaid (41.1%)	Private Insurance (62.5%)	Private Insurance (41.5%)
Percent With First Trimester Care	70.0%	75.8%	68.5%	82.9%	60.8%
Percent Delivering a Live Infant	83.4%	61.4%	79.4%	64.6%	71.2%
Percent Dying While Pregnant or within 42 Days of Delivery	39.6%	43.2%	37.0%	52.1%	47.9

Attachment 2. Perinatal Regions in Virginia

Perinatal Regions in Virginia



Attachment 3. Perinatal Regions of Virginia by City/County

Region 1 Alleghany County, Bland County, Botetourt County, Buchanan County, Carroll County, Craig County, Dickenson County, Floyd County, Franklin County, Giles County, Grayson County, Henry County, Lee County, Montgomery County, Patrick County, Pulaski County, Roanoke County, Russell County, Scott County, Smyth County, Tazewell County, Washington County, Wise County, Wythe County, Bristol City, Covington City, Galax City, Martinsville City, Norton City, Radford City, Roanoke City, Salem City.

Region 2 Albemarle County, Amherst County, Appomattox County, Augusta County, Bath County, Bedford County, Campbell County, Clarke County, Culpeper County, Fauquier County, Fluvanna County, Frederick County, Greene County, Highland County, Louisa County, Madison County, Nelson County, Orange County, Page County, Pittsylvania County, Rappahannock County, Rockbridge County, Rockingham County, Shenandoah County, Warren County, Bedford City, Buena Vista City, Charlottesville City, Danville City, Harrisonburg City, Lexington City, Lynchburg City, Staunton City, Waynesboro City, Winchester City.

Region 3 Amelia County, Brunswick County, Buckingham County, Caroline County, Charles City County, Charlotte County, Chesterfield County, Cumberland County, Dinwiddie County, Essex County, Gloucester County, Goochland County, Greensville County, Halifax County, Hanover County, Henrico County, King and Queen County, King George County, King William County, Lancaster County, Lunenburg County, Mathews County, Mecklenburg County, Middlesex County, New Kent County, Northumberland County, Nottoway County, Powhatan County, Prince Edward County, Prince George County, Richmond County, Spotsylvania County, Stafford County, Surry County, Westmoreland County, Colonial Heights City, Emporia City, Fredericksburg City, Hopewell City, Petersburg City, Richmond City.

Region 4 Arlington County, Fairfax County, Loudoun County, Prince William County, Alexandria City, Fairfax City, Falls Church City, Manassas City, Manassas Park City.

Region 5 Accomack County, Isle of Wight County, James City County, Northampton County, Southampton County, York County, Chesapeake City, Franklin City, Hampton City, Newport News City, Norfolk City, Poquoson City, Portsmouth City, Suffolk City, Virginia Beach City, Williamsburg City.