STATE OF WEST VIRGINIA
DEPARTMENT OF HEALTH AND HUMAN RESOURCES
Office of the Secretary
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Earl Ray Tomblin
Governor

Michael J. Lewis, M.D., Ph.D.
Cabinet Secretary

July 21, 2011

The Honorable Jeffrey V. Kessler, Acting Senate President
West Virginia Senate
State Capitol Building, Room 229-M
Charleston, West Virginia 25305

The Honorable Richard Thompson, Speaker
West Virginia House of Delegates
State Capitol Building, Room 234-M
Charleston, West Virginia 25305

Dear President Kessler and Speaker Thompson:

Please find enclosed the second annual report for the West Virginia Maternal Mortality Review Team (MMRT). West Virginia Code §48-25A establishes an expectation for a formalized review of maternal deaths by a team of experts. Through December 2010, the MMRT completed reviews of maternal deaths that occurred in 2007, 2008 and 2009. Using data obtained from the maternal mortality reviews, the annual report contains an analysis of factors related to maternal deaths.

If additional information is needed, you may contact Anne Williams, Director, Office of Maternal, Child and Family Health, via telephone at (304) 356-4442 or e-mail at Anne.A.Williams@wv.gov.

Sincerely,

Michael J. Lewis, M.D., Ph.D.
Cabinet Secretary

MJL:djc

Enclosure

cc: Chris Curtis, M.P.H.
Anne Williams
Gregory M. Gray
Darrell Holmes

West Virginia Maternal Mortality Review




December 2010

WEST VIRGINIA Department of Health & Human Resources

West Virginia Maternal Mortality Review Team
350 Capitol Street, Room 427
Charleston, WV 25301

Earl Ray Tomblin, Governor
Michael J. Lewis, M.D., Ph.D. Cabinet Secretary

WEST VIRGINA MATERNAL MORTALITY REVIEW TEAM
December 2010

Membership

The Maternal Mortality Review Team (MMRT) is multidisciplinary with representatives from medical specialties and public health. The Team first met in July 2009 and has had 4 subsequent meetings, last being October 7, 2010. The current MMRT members are:

Michael Adelman, DO
VP Academic Affairs Dean
West Virginia School of Osteopathic Medicine

Luis A. Bracero, MD, FACOG
(Designee for Fernando Indacochea, MD)
West Virginia Chapter
American Academy of Pediatrics

James Brick, MD, Chairman
West Virginia University School of Medicine
Robert C. Byrd Health Sciences Center

Stephen Bush, MD, Director
Department of Obstetrics and Gynecology
CAMC Women and Children's Hospital

David G. Chaffin, Jr., MD
Director and Associate Professor
Department of Obstetrics and Gynecology
Joan C. Edwards School of Medicine

Chris Curtis, MPH, Acting Commissioner
Bureau for Public Health

Renee Domanico, MD
(Designee for Joe Werthammer, MD)
University Pediatrics
Marshall University Medical Center

Brenda Dawley, MD
West Virginia Chapter
American College of Obstetrics and Gynecology

James A. Kaplan, MD, Chief Medical Examiner
Office of the Chief Medical Examiner

Stefan Maxwell, MD, Director
CAMC Neonatal Intensive Care Unit

Staff: Kathy Cummons, MSW, Director of Research
Evaluation and Planning, OMCFH

Charles McKown, Jr. MD, Dean
Joan C. Edwards School of Medicine

Pam Neal, RN, MSN-NA, CFNP, President
West Virginia Nurses Association

Angelita Nixon, CNM
West Virginia Chapter of the American
College of Nurse Midwives

Giovanni Piedimonte, MD, Chair
WVU Department of Pediatrics
Robert C. Byrd Health Sciences Center

Mark Polak, MD, Chief
Neonatology Section, WVU

Linda Savory, MD
West Virginia Academy of Family Physicians

Victoria Shuman, DO, President
West Virginia Society of Osteopathic Medicine

Mary Beth Stewart, RN, BSN
Clinical Manager of Obstetric Department
St. Mary's Medical Center

Michael L. Stitely, MD
WVU Department of OB/Gyn
WV State Medical Association

Gary Thompson, State Registrar
Vital Registration
Alternate: Brandy Byrnside, Deputy State Registrar

Gerry Thompson, RNC, Nurse Manager
Labor and Delivery Cabell Huntington Hospital

Anne Williams, RN, BSN, MSHCA, Chair
Director of Maternal, Child & Family Health

Staff: Annette Roberts, BA, RN, Review Nurse
Research Evaluation and Planning, OMCFH

Legislation

The West Virginia Legislature passed Senate Bill 234 on March 6, 2008. In effect ninety days from passage, a new article, designated §48-25A-1, §48-25A-2 and §48-25A-3, all relating to the creation of a Maternal Mortality Review Team, established its members and responsibilities and gave the Bureau for Public Health rule-making authority for the team.

The Legislature found that there was a need for a process to study the causes of maternal deaths. It has been found that comprehensive studies indicate that maternal mortalities are more extensive than first appear on death certificates. The Legislature believed that more extensive studies would enable development of a plan to avoid these deaths in the future.

Responsibilities of the Maternal Mortality Review Team

The Maternal Mortality Review Team shall:

(1) identify maternal death cases; (2) review medical records and other relevant data; (3) determine preventability of death; (4) establish trends, patterns and risk factors and develop recommendations for the prevention of maternal deaths; (5) provide statistical analysis regarding the causes of maternal fatalities in West Virginia; (6) disseminate findings and make recommendations to policymakers, health care providers and facilities; and (7) promote public awareness of the incidence and causes of maternal fatalities, including recommendations for their reduction.

The Maternal Mortality Review Team shall submit an annual report to the Governor and to the Legislature concerning its activities and the incidence of maternal fatalities within the state. The report is to include statistics setting forth the number of maternal fatalities, identifiable trends in maternal fatalities in the state, including possible causes, if any, and recommendations to reduce the number of preventable maternal fatalities in the state.

Definitions

Maternal Mortality: Death of a woman during pregnancy, at the time of birth or within one year of the birth of a child from any cause related to or aggravated by pregnancy or its management, but not from accidental or incidental causes.

Review: The process by which all facts and circumstances about a deceased woman who has died during pregnancy, at the time of birth or within one year of the birth of a child are known and discussed among members of a team.

In 1986, the Centers for Disease Control and Prevention (CDC) and the American College of Obstetricians and Gynecologists (ACOG) collaborated to issue a statement recommending the use of two enhanced surveillance definitions as an approach to more accurately identify deaths among women in which pregnancy was a contributing factor.

Pregnancy-Associated Death: (ACOG/CDC) The death of a woman while pregnant or within one year of termination of pregnancy, irrespective of cause.

Pregnancy-Related Death: (ACOG/CDC) The death of a woman while pregnant or within one year of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by her pregnancy or its management, but not from accidental or incidental causes.

Pregnancy-related deaths are caused by:

- Complications of the pregnancy itself
- A chain of events initiated by the pregnancy
- The aggravation of an unrelated condition or event by the physiologic effects of pregnancy

The Kotelchuck Index: Also called the Adequacy of Prenatal Care Utilization (APNCU) Index, the Kotelchuck Index uses two crucial elements obtained from birth certificate data: when prenatal care began and the number of prenatal visits from when prenatal care began until delivery.

Maternal death identification in West Virginia

Pregnancy-associated deaths are identified by linking death certificates of women ages 10-50 years with birth certificates and fetal/infant death certificates. All deaths occurring during pregnancy or within 365 days of pregnancy conclusion are subsequently designated as pregnancy-associated and further investigated.

Cases for review are limited to women of childbearing age who were residents of West Virginia at the time of their death. West Virginia residents who died in other jurisdictions are counted in the official Vital Statistics reports, but not included in the case reviews because of the difficulty in obtaining records across jurisdictions. During the years reviewed, 2007-2009, West Virginia maternal deaths occurring in other states accounted for three deaths, one in each year or approximately 10 percent of the total pregnancy-associated deaths.

A staff nurse reviews the death and birth certificates for all pregnancy-associated deaths. Once cases are identified as potentially pregnancy-related, medical records are obtained from all healthcare facilities that provided care before, during and after the pregnancy conclusion. Hospital records at the time of death and autopsy reports are included when applicable. Medical records are de-identified and a summary of events is developed. The de-identified case information is made available to all review team members prior to the meeting.

The MMRT reviews pregnancy-associated deaths caused from medical complications. The team determines whether the maternal death was preventable, not preventable and/or pregnancy-related. Opportunities for prevention are determined through discussion.

Maternal mortality findings in West Virginia

In West Virginia, fifty-seven pregnancy-associated deaths were identified by Vital Statistics from 2004 to 2009. This includes all maternal deaths within one year of pregnancy conclusion.

Year	Pregnancy-associated (All)	Pregnant women who died of a medical condition	Medical conditions determined pregnancy-related by the Review Team.	Resident Births
2004	3	1	N/A	20,911
2005	12	5	N/A	20,834
2006	13	5	N/A	20,931
2007	13	5*	2	22,017
2008	10	5**	2	20,914
2009	6	2	1	20,881***
Total	57	23	5	126,488

*1 additional death received out-of-state care, medical records unavailable.
**1 additional death occurred out-of-state, medical records unavailable.
*** Tentative data

2007

In 2007, the first year reviewed by the Maternal Mortality Review Team, there were thirteen maternal deaths. Five deaths with medically-related causes and one undetermined cause of death were reviewed.

Of these six cases, the Maternal Mortality Review Team determined that two were pregnancy-related but not medically preventable and three cases were deemed pregnancy-associated, but not medically preventable. The last case was an undetermined cause of death. After review of the autopsy, this death was deemed pregnancy-associated and not medically-related or preventable. It was the Team's opinion that social service intervention may have been of benefit in preventing this teen death.

The remaining seven deaths were determined to be pregnancy-associated as the mothers died of causes unrelated to their pregnancies within a year of their pregnancy conclusion, i.e. moving vehicle accidents, gunshot wounds, etc.

The resulting estimated pregnancy-related mortality ratio was two maternal deaths per 22,017 resident births.

2008
In 2008, there were ten maternal deaths. Six deaths were due to medical conditions and five were reviewed by the Maternal Mortality Review Team. The sixth death occurred out-of-state and records were unobtainable. Of the five cases reviewed, three deaths were determined to be pregnancy-associated and not preventable, while one death was deemed pregnancy-related and medically preventable and one death was deemed pregnancy-related but not preventable.

The remaining four deaths were determined to be pregnancy-associated as the mothers died of causes unrelated to their pregnancies within a year of their pregnancy conclusion.

The resulting estimated pregnancy-related mortality ratio was two maternal deaths per 20,914 resident births.

2009
In 2009, there were six maternal deaths. Two deaths were due to medical conditions and reviewed by the Maternal Mortality Review Team. One case was determined to be pregnancy-associated, but not preventable and the second case was deemed pregnancy-related, but not preventable.

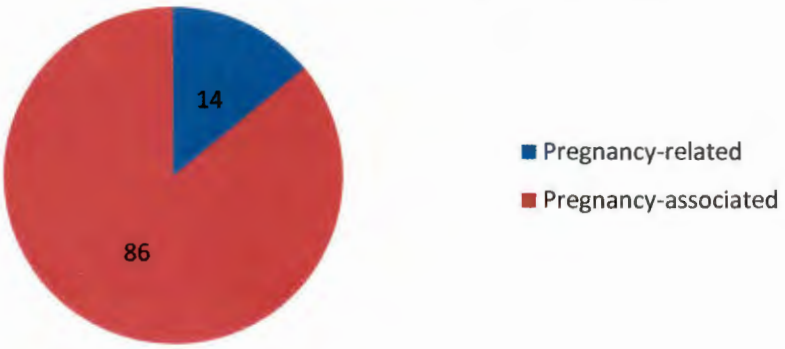
The remaining four deaths were categorized as pregnancy-associated as the mothers died of causes unrelated to their pregnancies within a year of their pregnancy conclusion.

The resulting estimated pregnancy-related mortality ratio was one maternal death per 20,881 resident births. (2009 resident birth data is tentative.)

Pregnancy-related Deaths

Pregnancy-related deaths accounted for fourteen percent of all maternal deaths between 2004-2009. Eighty-six percent were deemed pregnancy-associated.

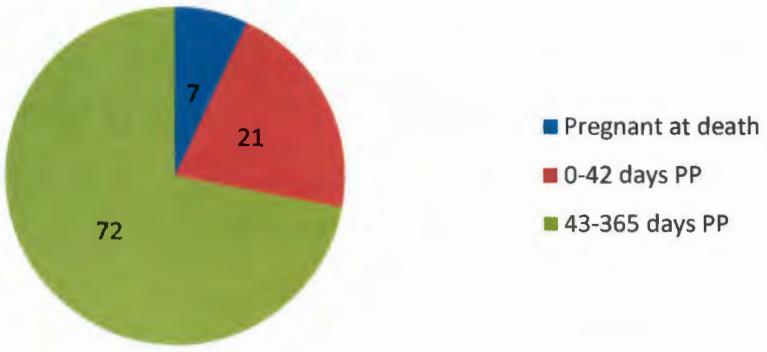
Percentage of pregnancy-related and pregnancy-associated death distributions, WV, 2004-2009



Maternal deaths by timing 2004-2009

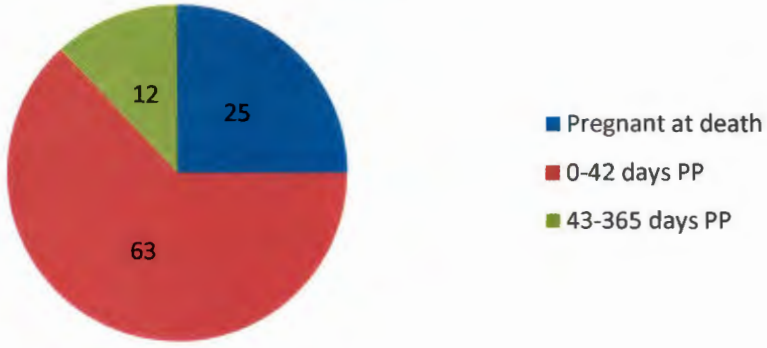
The majority of all maternal deaths in the six-year period, 2004 through 2009, occurred after 42 days postpartum. Of all maternal deaths, seven percent occurred during pregnancy, twenty-one percent within six weeks postpartum and the remaining seventy-two percent occurred between 43 and 365 days postpartum (PP).

Percentage of pregnancy-associated deaths by timing, WV, 2004-2009



All pregnancy-related deaths occurred within 46 days of the pregnancy conclusion. Two mothers were pregnant at the time of their deaths; five died within 42 days and one mother died on day 46.

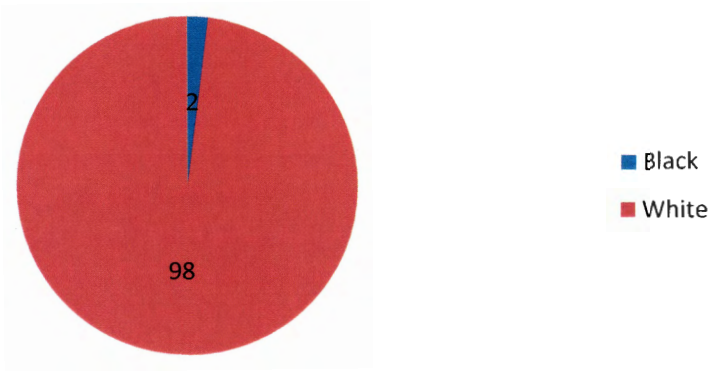
Percentage by of pregnancy-related deaths by timing, WV, 2004-2009



Maternal deaths by race

Of the fifty-seven maternal deaths from 2004-2009, ninety-eight percent were to Caucasian women and two percent were attributed to Black mothers.

Percentage of pregnancy-associated maternal deaths by race, WV, 2004-2009



Causes of maternal deaths in the six-year period between 2004-2009

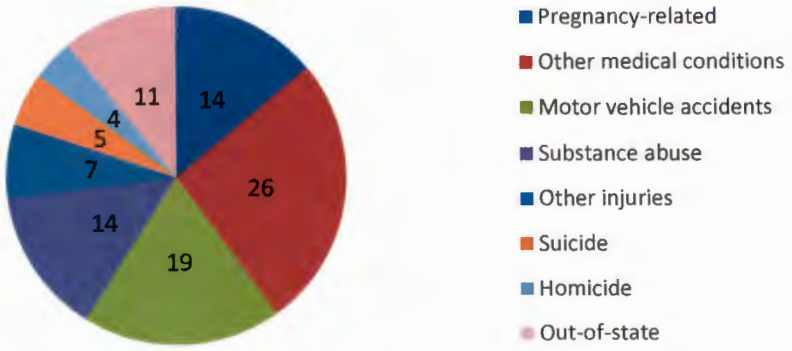
Eight maternal deaths were due to pregnancy-related conditions, accounting for fourteen percent of all maternal deaths. Preeclampsia/HELLP complications accounted for half of these deaths. Intracranial hemorrhage, pulmonary thrombosis embolism, hypertension, seizure disorder and unexplained death postpartum were deemed causes of death directly related to these remaining four pregnancies.

The leading causes of pregnancy-associated deaths were natural causes related to medical conditions comprising twenty-six percent. The most prevalent conditions were cancer at six percent and cardiovascular disease at five percent. Motor vehicle accidents were the second highest cause of death at nineteen percent. Sixty-three percent of the motor vehicle accidents occurred within six months of the pregnancy conclusion.

Substance abuse was directly related to fourteen percent of pregnancy-associated deaths and contributed to eleven percent of maternal deaths that were classified as homicide, suicide, natural causes and those women who died out-of-state.

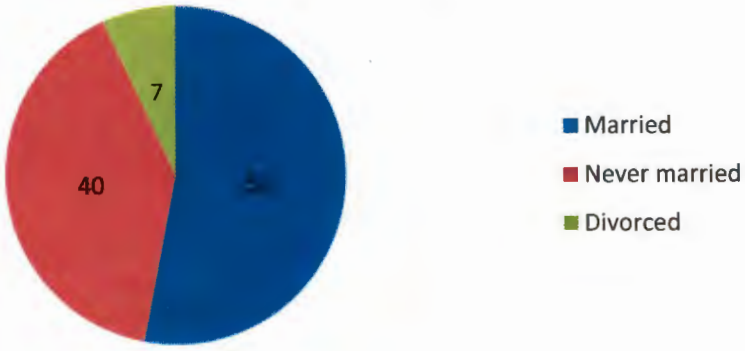
Forty-six percent of all mothers smoked. Smoking was also associated with substance abuse.

Percentage of all maternal deaths by cause
WV, 2004-2009



Maternal mortality by marital status

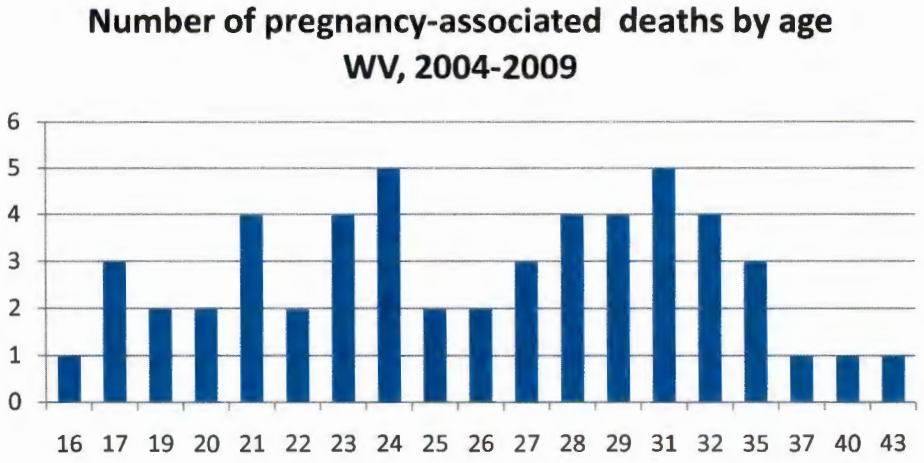
Percentage all maternal deaths by marital status, WV, 2004-2009



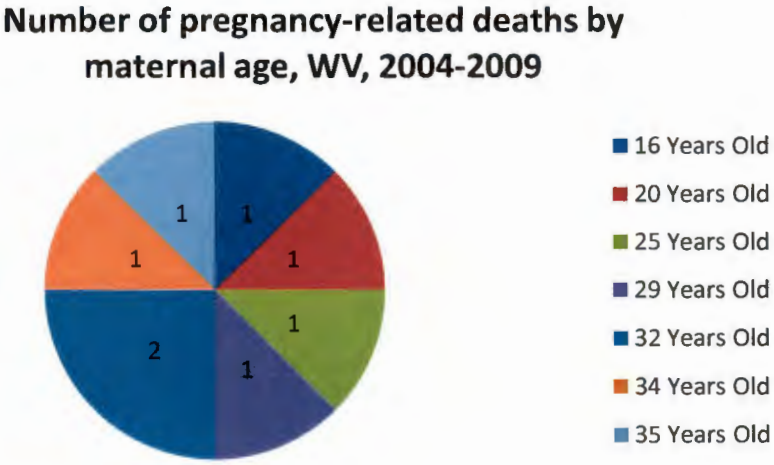
The marital status for all maternal deaths were compared to the cause of death in each group. Never married and divorced categories accounted for sixty percent of the motor vehicle accidents; eighty percent of injuries; seventy-five percent of suicides and fifty percent of the homicides.

Pregnancy-associated maternal deaths by age

The ages of all maternal deaths ranged from 16 to 43 years, as shown in the following graph:



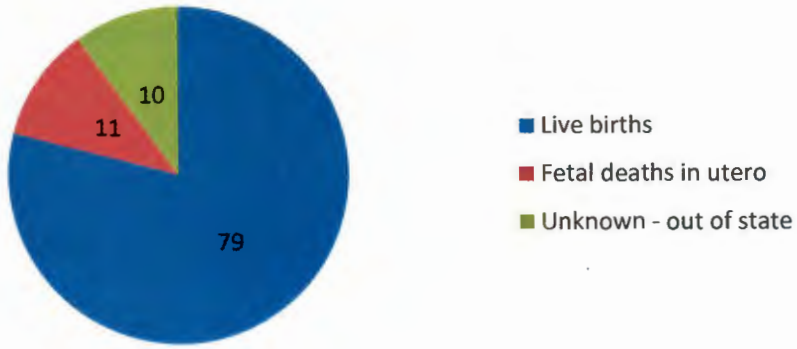
Pregnancy-related deaths ranged from ages 16 to 35 years, as shown in the following graph.



Maternal deaths by pregnancy outcomes

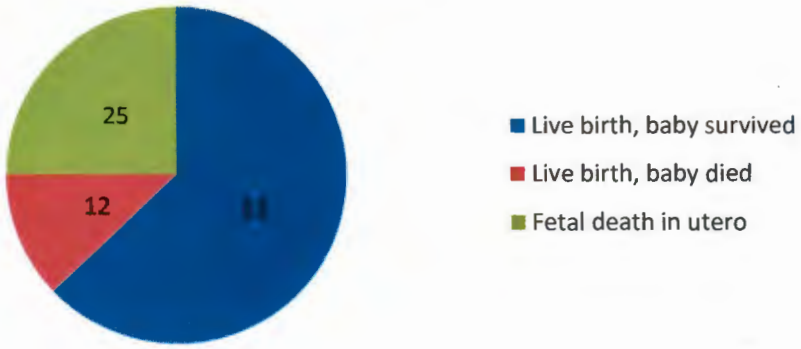
In the six-year period, 2004-2009, outcomes of the fifty-seven pregnancies were as follows: live births occurred in seventy-nine percent; pregnant at the time of death with fetal deaths at eleven percent; and unknown outcomes related to out-of-state deaths and/or births accounted for ten percent.

Percentage of pregnancy-associated deaths by outcomes, WV, 2004-2009



Outcomes for the eight pregnancy-related deaths were as follows: five live births with baby surviving accounted for sixty-three percent; one baby died after birth accounting for twelve percent and two fetal deaths occurred before delivery accounting for twenty-five percent.

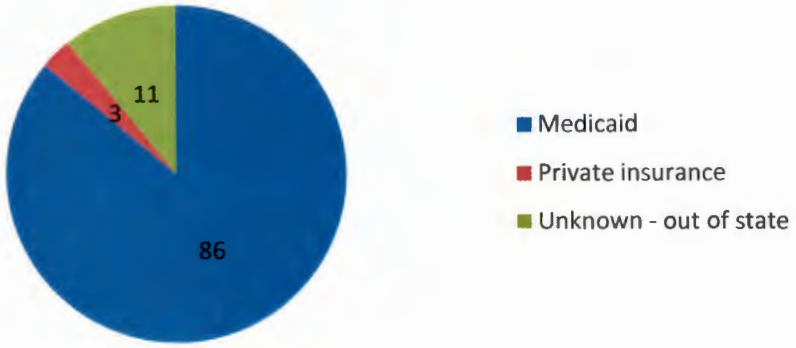
Percentage of pregnancy-related deaths by outcomes, WV, 2004-2009



Maternal deaths by medical coverage

Medicaid was the primary medical coverage in eighty-six percent of all maternal deaths. Private insurance coverage accounted for only three percent. Medical coverage for out-of-state care was unknown at eleven percent.

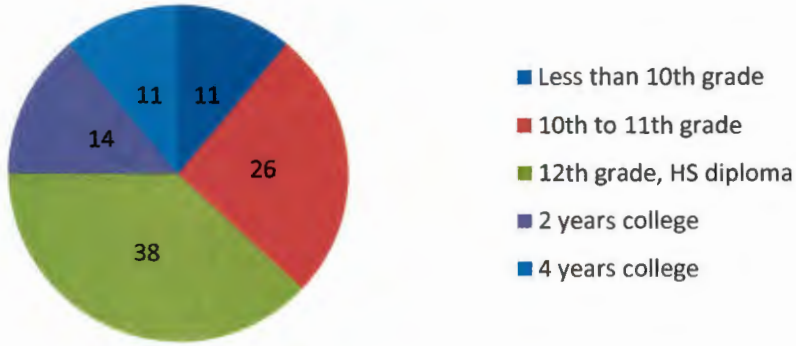
Percentage of maternal deaths by medical coverage, WV, 2004-2009



Maternal deaths by educational attainment

Educational attainment for all maternal deaths were categorized as follows: less than 10th grade, eleven percent; grades 10 and 11, twenty-six percent; high-school graduate, thirty-eight percent; two-years college, fourteen percent and four-years college, eleven percent.

Percentage of all maternal deaths by educational attainment, WV, 2004-2009



Maternal mortality by adequacy of prenatal care

Prenatal visit information found on the birth and fetal/infant death certificates was used to determine the adequacy of prenatal care.

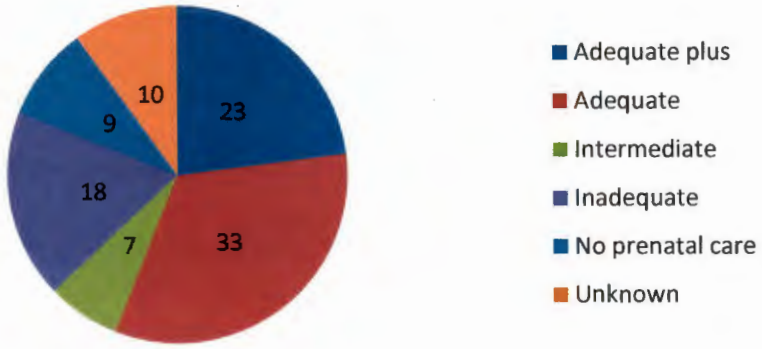
Using the Kotelchuck Index, a ratio of expected visits is calculated and grouped into four categories:

1. Inadequate (received less than 50% of expected visits),
2. Intermediate (50%-79% of expected visits),
3. Adequate (80%-109% of expected visits),
4. Adequate Plus (110% or more of expected visits).

Thirty-three percent of the mothers received adequate care, while another twenty-three percent received adequate plus care. Overall, fifty-six percent of these WV mothers received adequate prenatal care.

Unfortunately, seven percent received intermediate care; eighteen percent received inadequate care and nine percent received no prenatal care. Combining these categories, thirty-four percent received inadequate or no prenatal care. Ten percent of prenatal care was unknown.

Percentage of maternal deaths by adequacy of prenatal care, WV, 2004-2009



Recommendations

Issue: A need for women and physicians to be educated about danger signs in pregnancy.

Solution: Expand education of the danger signs of pregnancy to physicians in primary care and emergency rooms through medical school curriculum and reinforcement of education/behavior messages across service systems (health, social service, and community supports).

Issue: A need for universal pregnancy risk screenings.

Solution: The Maternal Risk Screening Advisory Committee, chaired by the Office of Maternal, Child and Family Health, has developed a uniform universal screening instrument and training on how to use. Use of the screening instrument is to be implemented January 1, 2011.

Issue: Supports for adolescents who become pregnant.

Solution: Adolescents who become pregnant often lack the emotional maturity for parenting, and those teens lacking an adequate support system are at even higher risk for maternal mortality as well as other negative health and social issues. The hospital social workers will be encouraged to evaluate the needs of all adolescent mothers and refer them to state-wide and local support agencies as well as DHHR social services.

Issue: The Team questioned lack of uniform protocols for deep vein thrombosis (DVT) prophylaxis for regional anesthesia. Are birthing hospitals using prophylaxis-pneumatic venodyne system after regional anesthesia? Doctors present at meetings reported that their hospitals are using DVT prophylaxis.

Solution: Team consensus/recommendation was to follow the Joint Commission on the Accreditation of Healthcare Organizations' (JCAHO) protocols for DVT prophylaxis.

Issue: Medical personnel, especially emergency medical personnel, are not consistently evaluating possible causes that may or may not be related to the pregnancy when women are presenting with symptoms of:

a. Nausea, vomiting and other vague abdominal symptoms.
b. Hypertension, whether chronic or pregnancy-induced.
c. Post-partum symptoms that may be related to cardiomyopathy.

Diagnostic tests to rule-out other disease processes are not being performed consistently, leaving some women misdiagnosed resulting in complications that cause or contribute to their deaths.

Solution: These problems are being addressed through creation of subcommittees to develop educational materials, checklists and protocols for use by medical professionals and patients. Once materials are finalized they will be distributed to emergency rooms, clinics and physician offices. Team members felt that many of the maternal mortality outcomes that could have been prevented were influenced by lack of knowledge of physiological changes that occur during pregnancy.

In 2011, the Maternal Mortality Review Team will review the 2010 maternal deaths. Although this data is incomplete, six cases have been identified for review.