Fetal and Infant Mortality Review

2009 Annual Report

Alabama Perinatal Program

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Alabama Department of Public Health

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Acknowledgements

We would like to thank the members of the State Perinatal Advisory Council, Regional Perinatal Advisory Councils (RPACs), Case Review Teams (CRTs) and Community Action Teams (CATs) for volunteering their time and expertise. Thank you also to the March of Dimes and MedImmune for their support. The objectives of the Fetal and Infant Mortality Review (FIMR) Program could not be achieved without the commitment, assistance, and ongoing support of these members and organizations.

We would like to thank Kathleen Buckley, M.S.N., C.N.M., Director of the National Fetal and Infant Mortality (NFIMR) Program. Her knowledge, understanding, and guidance in the implementation of the Fetal and Infant Mortality Review (FIMR) Program in Alabama were invaluable.

A special thanks to the parents who have shared their most personal experiences in the expectation that they may help other families. Thank you for opening up your hearts and homes. We commend you for the courage and willingness to share your experiences with us.

Forward

The purpose of this report is to describe Alabama FIMR Program activities in 2009. FIMR is a process of identification and analysis of factors that contribute to fetal and infant death through chart review and interview of individuals. FIMR complements other studies of infant death but uses an approach that is community-based and designed to bring together local health providers, consumers, advocates, and leaders. FIMR identifies strengths and areas for improvement in overall service systems and community resources for women, children, and families. FIMR also provides direction towards the development of new policies to safeguard families. Through the regular collection, analysis, and sharing of health data and information about risks and resources in a community, the FIMR program identifies trends in infant mortality and the factors that may be involved.

The National Fetal and Infant Mortality Review Program is a partnership between the American College of Obstetricians and Gynecologists and the federal Maternal and Child Health Bureau. (Grant # U08 MC00136)

Mobile County's FIMR, the Alabama Baby Coalition (ABC), was established in 1998. The ABC reviews fetal (over 20 weeks gestational age) and infant deaths of Mobile County residents only. When the program began, the infant mortality rate (IMR) was very high and exceeded the state and national averages. The Alabama Department of Public Health initiated the FIMR Program statewide on January 21, 2009. Mobile was using a modified version of the ACOG protocol prior to 2009, but adopted the full ACOG model in 2009. Alabama now has a statewide FIMR program.

FIMR has proven beneficial to many communities. The program has helped identify gaps in current services and collaborates to fill those gaps. Services have been expanded and improved through cooperative programming and joint funding. Enhanced coordination of services through interagency networking, communication and collaboration has occurred in communities that have implemented the program. FIMR helps communities prepare and deliver culturally appropriate interventions to improve service systems and resources for their multi-ethnic populations. FIMR has contributed to a greater understanding of maternal and child health community needs by assisting the community in seeing not just a part but the whole picture. FIMR offers a means to implement needs assessment, quality assurance and policy development which are essential public health functions.

A Letter from the State Health Officer

June 7, 2011

A fetal or infant death is a catastrophic event for the family, the community, the state and our nation. The death of an infant has always been viewed as a sentinel event that serves as a measure of a community's overall social and economic well-being as well as its health. A standardized process for in-depth review of fetal and infant deaths allows us to better understand the factors that contribute to infant death and take actions to prevent future deaths. This is the task that has been given to the State Perinatal Program (SPP).

In 2009, the Fetal and Infant Mortality Review (FIMR) Program was implemented statewide as an initiative to address the state's high infant mortality of 10.0 deaths per 1,000 live births in 2007. FIMR is a community-owned, action-oriented process that results in improved service systems and resources for women, infants and families. The FIMR process brings a community team together to examine confidential, de-identified cases of infant deaths. The purpose of these reviews is to understand how a wide array of local, social, economic, public health, educational, environmental and safety issues relate to the tragedy of infant loss.

Alabama FIMR is modeled after the National Fetal and Infant Mortality Review (NFIMR) Program. NFIMR was established in 1990 through collaboration of the federal Maternal and Child Health Bureau and the American Congress of Obstetricians and Gynecologists (ACOG) to facilitate the understanding of fetal and infant mortality as well as to systematically develop strategies at the local level to address the issue. Many states and communities, through the implementation of FIMR, have over time seen improved maternal and child health outcomes.

It is with great pleasure that I present the FIMR 2009 Annual Report. This report represents the data collected and analyzed related to fetal and infant deaths in Alabama in 2009. Our goal is to decrease the number of such deaths in Alabama. I encourage you to carefully read this report and to continue to take an active role in improving the health and lives of women, infants and families in Alabama.

Sincerely,

Donald E. Williamson, M.D.
State Health Officer

A LETTER FROM THE DIRECTOR OF NATIONAL FIMR RESOURCE CENTER

Dear Colleagues:

The infant mortality rate has long been used by communities and states as an effective measure of a society's well-being as well as its overall health, including the state of a community's health system, the economic status of the inhabitants, and the condition of the community's environment. Deaths of infants are not only associated with medical conditions, but also multiple social factors such as poverty, lack of access to health services, ineffective social service programs for families in need, substandard housing, poor nutrition, environmental hazards or some combination of these and other factors. Many of the causes of infant deaths relate to a lack of cohesive community systems and resources.

Fetal and Infant Mortality Review (FIMR) is a comprehensive, community-based qualitative approach to examining the services and resources available to women and families through death reviews followed by the development of action steps that can be implemented by the community to improve services and resources and strengthen the system of care. FIMR information complements local population-based fetal and infant mortality data. The FIMR approach has undergone a rigorous national evaluation and results have shown that FIMR has important value as a qualitative method of improving perinatal care for women and infants.

The continued maternal and child health benefits from the community FIMR-based process are tremendous. The information derived from local review efforts has the potential to influence local, state and national understanding about the factors that cause infant death, and consequently, improve policy and program development at all levels. Given the fiscal constraints states and local communities currently face, local officials need practical and useful information on system changes that can be implemented. FIMR develops recommendations that can be implemented over time with other community partners. When local agencies work together through FIMR, they are always able to identify a broader array of existing service systems and resources and make them available for women, infants and families.

I commend the Alabama Department of Public Health for its foresight in developing the FIMR program throughout the state as one important strategy to improve the health and wellbeing of all of the state's childbearing families, especially those at highest risk. The state's advocacy and leadership for mothers and infants through FIMR will help shape a better tomorrow for these youngest and most fragile of Alabama's citizens.

Sincerely,

Kathleen Buckley, MSN, CNM
Director, National FIMR Resource Center

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Introduction

The loss of a baby during pregnancy or in early infancy can be devastating and life changing. The Alabama Fetal and Infant Mortality Review (FIMR) Program is a community-based case review process that concentrates on fetal and infant mortality. The purpose of the program is to improve maternal and child health outcomes through community based actions.

Infant mortality is defined as the death of an infant before his or her first birthday. It is an indicator used to compare the health and social well-being of populations across and within countries, states and communities. Also, it is a critical gauge of the health status of a population and reflects the overall state of maternal health as well as the quality and accessibility of primary health care available to pregnant women and infants in their community and state. Consequently, it is a reflection of the current health status of a large segment of the U.S. population and also a predictor of the health of the next generation.

Most often, there is no single factor that causes the death of the infant which is predominantly the result of a number of contributing factors. Identifying the contributing factors and implementing strategies to address them can lead to fewer fetal and infant deaths; thus, over time, improving birth outcomes.

This report will describe the Alabama FIMR Program and share the program findings and recommendations to address fetal and infant mortality in 2009.

Alabama FIMR Process

FIMR reviews fetal death occurring at 20 weeks gestation or greater and infant deaths up to one year of age. Annually there are approximately 1,000 fetal and infant deaths statewide. The FIMR program was implemented by the State Perinatal Program (SPP) staff. Because of the in-depth nature of the reviews and the newness of the program, it was estimated that the current staff could collect data and review only about 300 cases. Consequently, the program chose to review neonatal deaths (infants born alive who die before 28 days of life). However, the program received vital statistics data on all fetal and infant deaths of Alabama residents in 2009.

Data gathering includes the reviewing of records and information obtained from the voluntary maternal/family interview. When a fetal or infant death occurs, fetal records and death certificates are received by the Center for Health Statistics (CHS). Fetal records, birth, and death certificates are provided by CHS to the FIMR program. Upon receiving the information from CHS, the case abstraction process begins. FIMR gathers and reviews information related to death from a variety of sources including birth and death certificates, medical records, physician office records, autopsy reports, police records, and social records. A FIMR Coordinator (a public health nurse) contacts the mother and invites her to participate in a voluntary interview. If the mother consents, the interview is conducted to record the mother's and family's experiences with the care they received. Confidentiality is important in the FIMR process. All information is confidential and in compliance with Health Insurance Portability and Accountability Act. All abstracted medical and related records are stored in locked files and all identifiers are deleted from abstracted records.

The FIMR Coordinator prepares a case summary from the gathered data. All identifiers (patient names, hospital or clinic sites, and provider names) are removed and the case summary is presented to the Case Review Team (CRT). The CRT is a multidisciplinary team that reviews the data. The team represents a range of professional organizations and public and private agencies that provide services to women, infants, and families. Alabama is divided into five perinatal regions and a CRT is in each. A map of the perinatal regions is shown in Appendix A. A list of the CRT members is included in Appendix B. The Regional Perinatal Advisory Councils (RPAC) served as the CRTs. Most of the RPACs met monthly instead of quarterly to review the case summaries. All CRT members sign a pledge of confidentiality at each meeting, which prohibits them from discussing review specifics outside the team meetings. After the case summaries are reviewed, the CRT identifies health system and community factors that may have contributed to the death and make recommendations for community change.

The CRT presents recommendations to the Community Action Team (CAT). The CAT creates an action plan based on the recommendations and participates in implementation of interventions designed to address the identified system and resource issues. The CAT may include members of the CRT, representatives of organizations and agencies and community leaders. In the course of its work, the CAT may respond to issues that are broad to politically complex, that change over time, and that require substantial time and resources to implement change. There are seven CATs, at least one in each region and two in Regions III and IV. A list of CAT members in included in Appendix B.

Summary of FIMR Process

The FIMR process described above is often referred to as the Cycle of Improvement (Figure 1). The continuous nature of the process provides a feedback mechanism that can help identify the extent to which the recommendations and actions are working. Over time, the review of new cases will reveal how successful interventions, programs and policies have been because the change, or lack thereof, will be evident in future case reviews. As such, FIMR can function as a mechanism for continuous quality improvement.

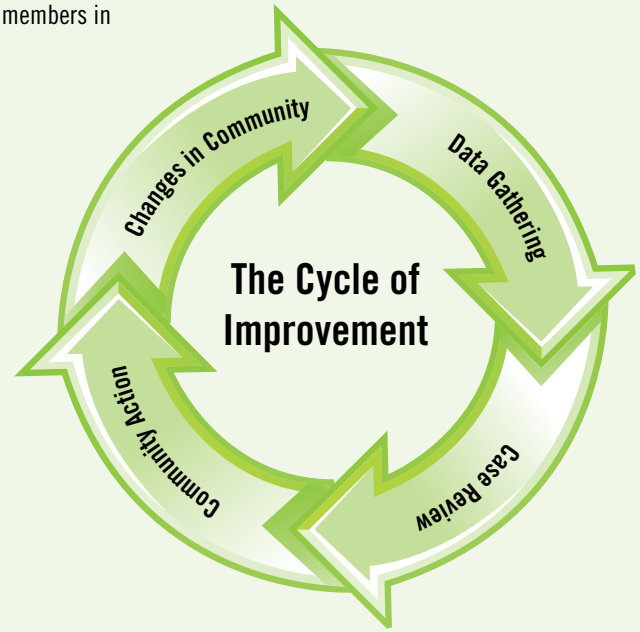


Figure 1. The Cycle of Improvement

Vital Statistics Data in 2009

In 2009, there were 62,476 resident live births (Appendix C), 548 fetal deaths, and 513 infant deaths in Alabama (Appendix D). Of the 513 infant deaths, 313 were neonatal deaths and 200 were postneonatal deaths. Table 1 displays fetal and infant mortality rates in comparison to national data and national goals.

Table 1. Fetal, Neonatal, Postneonatal and Infant Mortality Rates for Alabama, United States and Healthy People 2010 National Goal

	Alabama (2004-2008)	Alabama (2009)	United States (2005)	Healthy People 2010 National Goal
Fetal Mortality Rate[a]	9.0	8.7	6.2[(1)]	4.1
Neonatal Mortality Rate[b]	5.8	5.0	4.5[(2)]	2.9
Postneonatal Mortality Rate[c]	3.5	3.2	2.2[(2)]	1.2
Infant Mortality Rate[d]	9.3	8.2	6.9[(2)]	4.5

a Fetal Mortality Rate: Number of fetal deaths at 20 or more weeks of gestation per 1,000 live births plus fetal deaths
b Neonatal Mortality Rate: Number of neonatal deaths per 1,000 live births
c Postneonatal Mortality Rate: Number of postneonatal deaths per 1,000 births
d Infant Mortality Rate: All infant deaths (within 1 year) per 1,000 live births

Leading Causes of Infant Death in 2009

The causes of death were grouped by International Classification of Diseases (ICD-10) codes. The leading causes of infant deaths ranked 1-3 below were disorders related to short gestation and low birth weight (P07), congenital malformations, deformations and chromosomal abnormalities (Q00-Q99), and sudden infant death syndrome (R95). These three leading causes accounted for 43.9% (225/513) of all infant deaths in 2009 (Table 2).

Table 2. Number of Infant Deaths and Percentage of Total Infant Deaths for Leading Causes of Infant Death in 2009

Rank	Cause of Death	ICD-10	Number (n=513)	% of Total Death
1	Disorders Related to Short Gestation and Low Birth Weight	P07	93	18.1
2	Congenital Malformations, Deformations and Chromosomal Abnormalities	Q00-Q99	77	15.0
3	Sudden Infant Death Syndrome	R95	55	10.7
4	Newborn Affected by Maternal Complications of Pregnancy	P01	22	4.3
5	Respiratory Distress of Newborn	P22	17	3.3
6	Bacterial Sepsis of Newborn	P36	16	3.1
7	Diseases of the Circulatory System	I00-I99	15	2.9
8	Accidents	V01-X59	14	2.7
8	Necrotizing Enterocolitis of Newborn	P77	14	2.7
10	Newborn Affected by Complications of Placenta, Cord and Membranes	P02	11	2.1
10	Atelectasis	P28.0-P28.1	11	2.1
10	Intrauterine Hypoxia and Birth Asphyxia	P20-P21	11	2.1
10	Neonatal Hemorrhage	P50-P52, P54	11	2.1
	All Others		146	39.8

Selected Characteristics of FIMR Cases

Maternal Age

Of 276 FIMR cases, 53.6% were born to mothers 20-29 years of age, 22.8% to 30-39 years of age, 21.4% to <20 years of age, and 1.8% to ≥40 years of age.

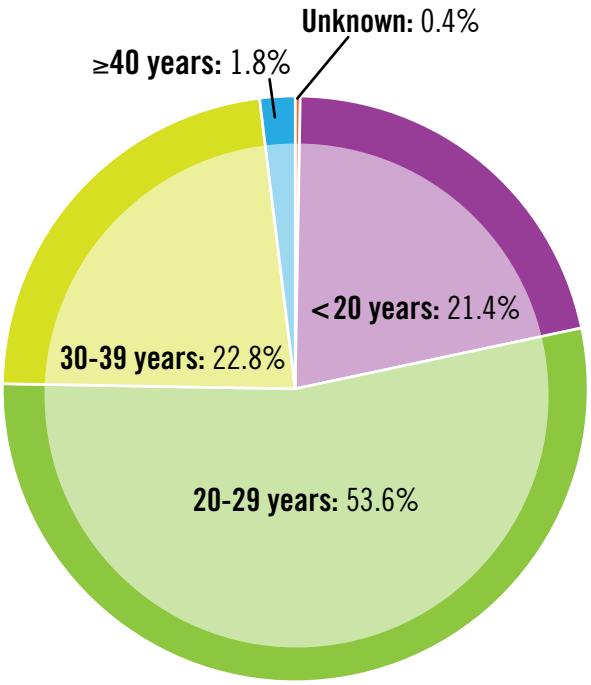


Figure 2. Percentage of FIMR Cases by Maternal Age (n=276)

Entry into Prenatal Care

Entry into prenatal care in the first trimester had the highest percentage with 69.9% followed by entry in the second trimester with 17.0% and entry in the third trimester with 1.1%. Twelve percent of mothers were unknown for prenatal care.

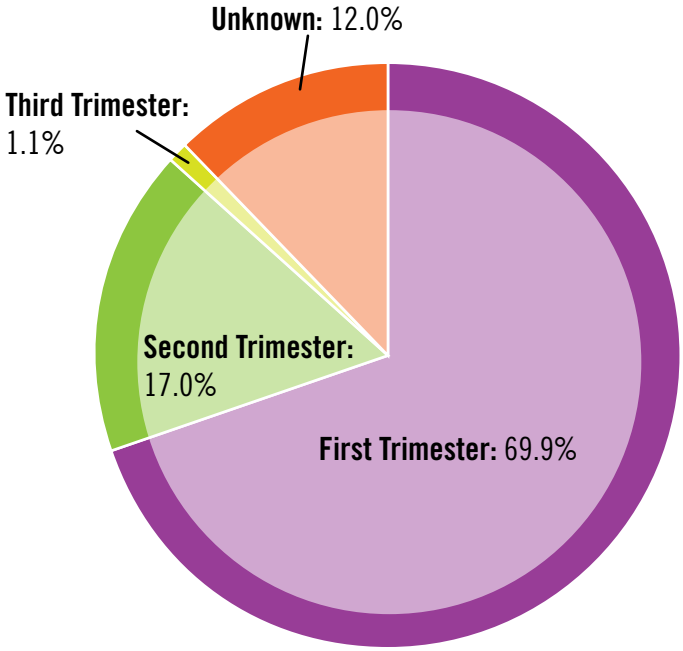


Figure 3. Percentage of FIMR Cases by Entry into Prenatal Care (n=276)

Method of Payment for Prenatal Care

Medicaid payment for prenatal care had the highest percentage at 53.6% followed by private insured at 29.3%, self-payers at 10.9%, and other methods at 1.4%.

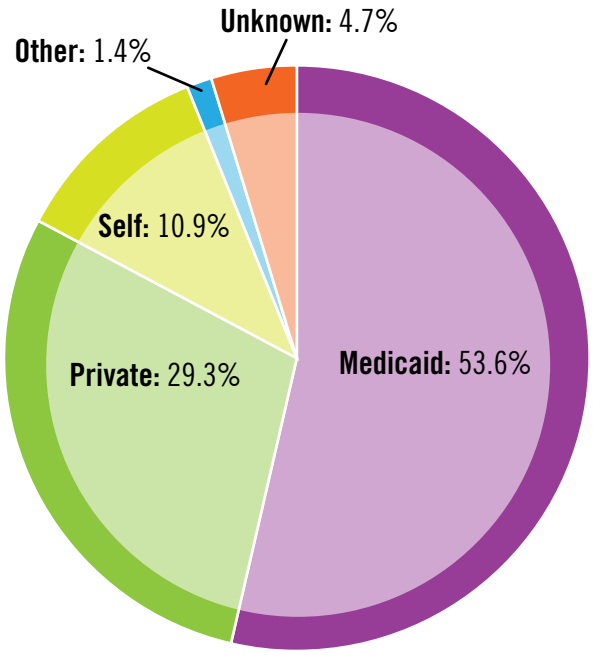


Figure 4. Percentage of FIMR Cases by Method of Payment for Prenatal Care (n=276)

Age of Infant Death

Among infant cases reviewed, 22.8% of infants died within 1 hour, 33.3% between 1 hour and 24 hours, and 42.7% between 1 day and 28 days.

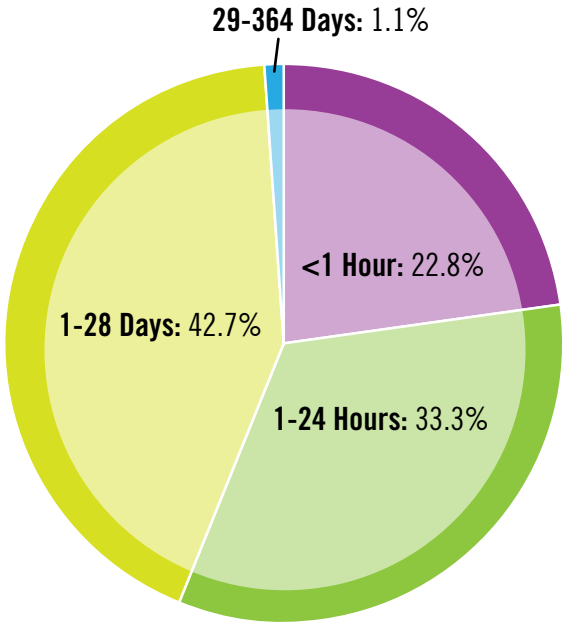


Figure 5. Percentage of FIMR Cases by Age of Infant Death (n=267)

Table 3 shows selected characteristics of the total FIMR cases reviewed.

Table 3. Characteristics of FIMR Cases

	# of Total FIMR Cases (n=276)	%	# of Fetal Deaths (n=9)	%	# of Infant Deaths (n=267)	%
Perinatal Region						
Region I	53	19.2	0	0.0	53	19.9
Region II	34	12.3	0	0.0	34	12.7
Region III	106	38.4	0	0.0	106	39.7
Region IV	34	12.3	9	100.0	25	9.4
Region V	49	17.8	0	0.0	49	18.4
Maternal Marital Status						
Single	173	62.7	6	66.7	167	62.5
Married	102	37.0	3	33.3	99	37.1
Divorced	1	0.4	0	0.0	1	0.4
Maternal Race						
White	141	51.1	4	44.4	137	51.3
Black and Other	135	48.9	5	55.6	130	48.7
Maternal Age (years)						
< 20	59	21.4	3	33.3	56	21.0
20-29	148	53.6	4	44.4	144	53.9
30-39	63	22.8	2	22.2	61	22.8
≥ 40	5	1.8	0	0.0	5	1.9
Unknown	1	0.4	0	0.0	1	0.4
Maternal Education (years)						
≤ 8	13	4.7	0	0.0	13	4.9
9-11	66	23.9	3	33.3	63	23.6
12	94	34.1	4	44.4	90	33.7
13-15	55	19.9	1	11.1	54	20.2
≥ 16	40	14.5	1	11.1	39	14.6
Unknown	8	2.9	0	0.0	8	3.0
Entry into Prenatal Care						
First Trimester	193	69.9	9	100.0	184	68.9
Second Trimester	47	17.0	0	0.0	47	17.6
Third Trimester	3	1.1	0	0.0	3	1.1
Unknown	33	12.0	0	0.0	33	12.4

	# of Total FIMR Cases (n=276)	%	# of Fetal Deaths (n=9)	%	# of Infant Deaths (n=267)	%
Method of Payment for Prenatal Care						
Medicaid	148	53.6	7	77.8	141	52.8
Private	81	29.3	2	22.2	79	29.6
Self	30	10.9		0.0	30	11.2
Other	4	1.4		0.0	4	1.5
Unknown	13	4.7		0.0	13	4.9
Fetus or Infant Gender						
Male	139	50.4	7	77.8	132	49.4
Female	137	49.6	2	22.2	135	50.6
Plurality						
Single	208	75.4	3	33.3	205	76.8
Plural	50	18.1	0	0.0	50	18.7
Unknown	18	6.5	6	66.7	12	4.5
Birthweight (g)						
< 500	98	35.5	2	22.2	96	36.0
500-1,499	109	39.5	3	33.3	106	39.7
1,500-2,499	30	10.9	0	0.0	30	11.2
≥ 2,500	31	11.2	0	0.0	31	11.6
Unknown	8	2.9	4	44.4	4	1.5
Gestational Age (weeks)						
≤ 28	196	71.0	4	44.4	192	71.9
29-33	24	8.7	0	0.0	24	9.0
34-36	13	4.7	0	0.0	13	4.9
≥ 37	34	12.3	0	0.0	34	12.7
Unknown	9	3.3	5	55.6	4	1.5
Age of Infant Death						
<1 Hour					61	22.8
1-24 Hours					89	33.3
1-28 Days					114	42.7
29-364 Days					3	1.1

Key Findings in 2009

Leading Contributing Factors Identified by FIMR

In total, 276 FIMR cases have been reviewed as of June 30, 2010. These cases comprised 9 fetal deaths and 267 infant deaths. Leading contributing factors identified by FIMR are presented in Table 4.

Table 4. Leading Contributing Factors in Alabama FIMR Cases in 2009

Contributing Factor	% of Total Cases (n=276)	% of White (n=141)	% of Black & Other (n=135)
Low birthweight	85.9	80.1	91.9
Prematurity	83.0	75.2	91.1
Pre-existing medical conditions such as asthma, hypertension, diabetes, mental health disorders, etc.	75.0	73.0	77.0
Preterm labor	69.6	61.0	78.5
Unplanned pregnancy	54.7	39.7	70.4
Obesity	40.6	31.9	49.6
Substance abuse	39.1	42.6	35.6
Previability	35.5	25.5	45.9
Premature rupture of membranes/preterm premature rupture of membranes	33.7	31.9	35.6
Maternal infection other than sexual transmitted diseases	32.2	26.2	38.5
History of fetal or infant loss	31.2	27.7	34.8
Maternal age < 21	25.7	26.2	25.2
Infection	25.7	23.4	28.1
Anemia (diagnosed after first trimester)	24.6	19.1	30.4
Multiple gestation	19.6	17.0	22.2

Low Birthweight

Low birthweight was a factor associated with 85.9% (237/276) of the FIMR cases reviewed. Among those FIMR infant cases (n=267), 36.0% were less than 500 g, 39.7% were between 500 and 1,499 g, and 11.2% were between 1,500 and 2,499 g.

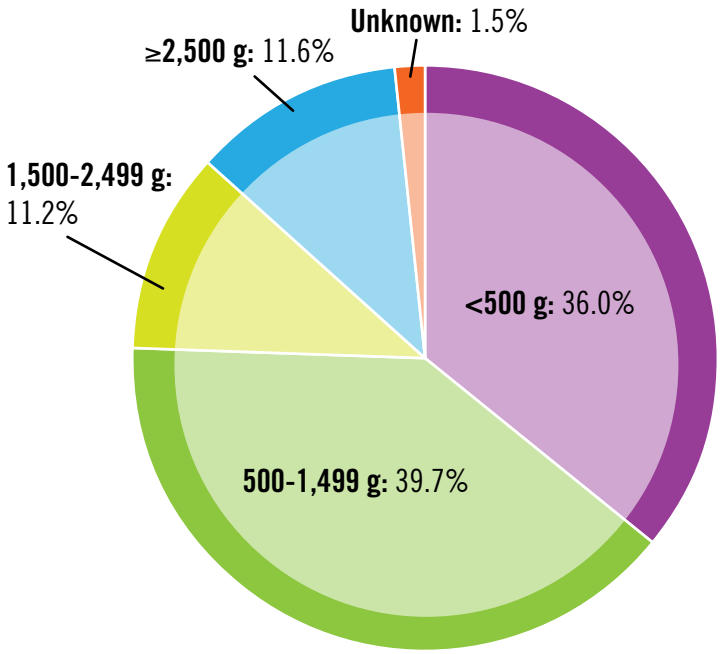


Figure 6. Birthweight Distribution of FIMR Infant Cases (n=267)

Prematurity

The definition of prematurity in this report is a baby born before 37 weeks of gestation. In 83.0% of the FIMR cases reviewed (229/276), prematurity was identified as an important contributing factor. Among black babies, the proportion of those with prematurity was higher at 91.1% (123/135); among white babies, the prevalence of prematurity was 75.2% (106/141). Of the 276 cases, 267 were infant deaths.

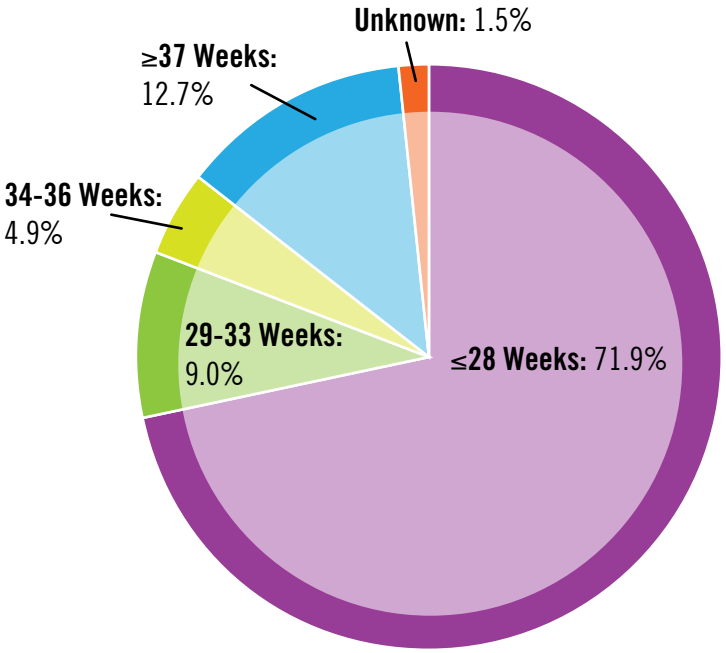


Figure 7. Gestational Age Distribution of FIMR Infant Cases (n=267)

Pre-existing Medical Conditions

In 75.0% of the FIMR cases reviewed (207/276), pre-existing medical conditions were identified as an important contributing factor and this proportion was similar among white (73.0%) and black women (77.0%). Selected pre-existing medical conditions are listed in Table 5.

Of 276 FIMR cases, 113 mothers had a significant gynecological history, such as abnormal Pap smears, cervical dysplasia, dilation and curettage, uterine fibroids, ovarian cysts, endometriosis, and sexually transmitted diseases; 41 mothers had significant mental health issues, such as depression, anxiety, and bipolar disorder; 88 mothers had other medical history such as appendectomy, gallbladder surgery, tonsillectomy, morbid obesity surgery, hernia repair, arthritis, skin cancer, and history of drug abuse; 37 mothers had diabetes; and 33 mothers had hypertension.

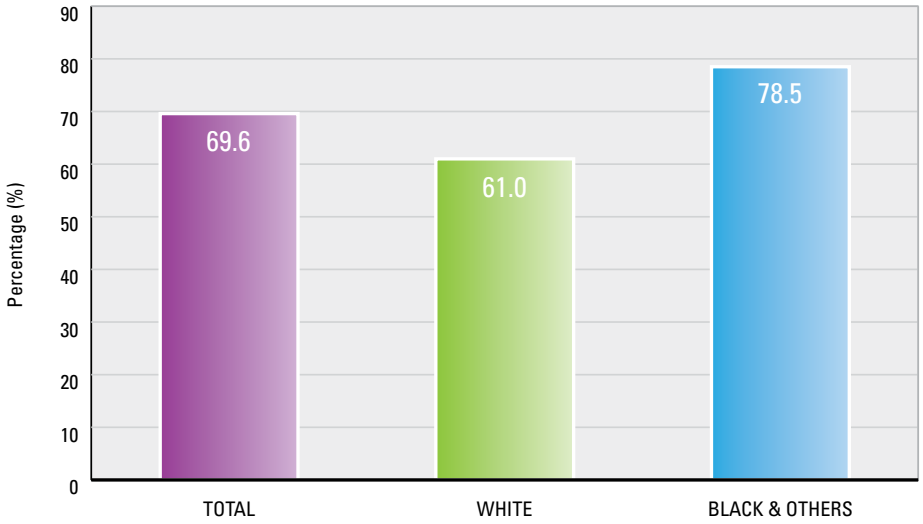
Table 5. Selected Pre-existing Medical Conditions Among FIMR Cases

Pre-existing Medical Condition	# of Cases Involved (n=276)	% of Total
Gynecological issue	113	40.9
Chronic and acute respiratory	52	18.8
High risk social/sexual behavior	45	16.3
Mental health issue	41	14.9
Urinary tract disorder	39	14.1
Diabetes	37	13.4
Gastrointestinal condition	34	12.3
Hypertension	33	12.0
Heart disease	25	9.1
Musculoskeletal Problem	25	9.1
Neurological disorder	24	8.7
Dental/gum infection	22	8.0
Other endocrine disorders such as hyper/hypothyroidism	12	4.3
Genetic disorder	11	4.0
Anemia	10	3.6
Born preterm	7	2.5
Sickle cell disease	7	2.5
Developmental delay or learning disability	3	1.1
Cancer	3	1.1
Lupus	2	0.7
Other Medical History	88	31.9

Preterm Labor

In 69.6% of the FIMR cases reviewed (192/276), mothers went into preterm labor; 78.5% (106/135) of cases were among black women; and 61.0% (86/141) of cases were among white women. Mothers were diagnosed with premature rupture of membranes or preterm premature rupture of membranes in 33.7% of cases reviewed, prolonged rupture of membranes in 12.7%, newly diagnosed incompetent cervix in 10.9%, and had a history of incompetent cervix in 3.3%. In 3.6% of the cases reviewed, the mother had a history of preterm labor. Twenty percent of the cases reviewed involved multiple gestations.

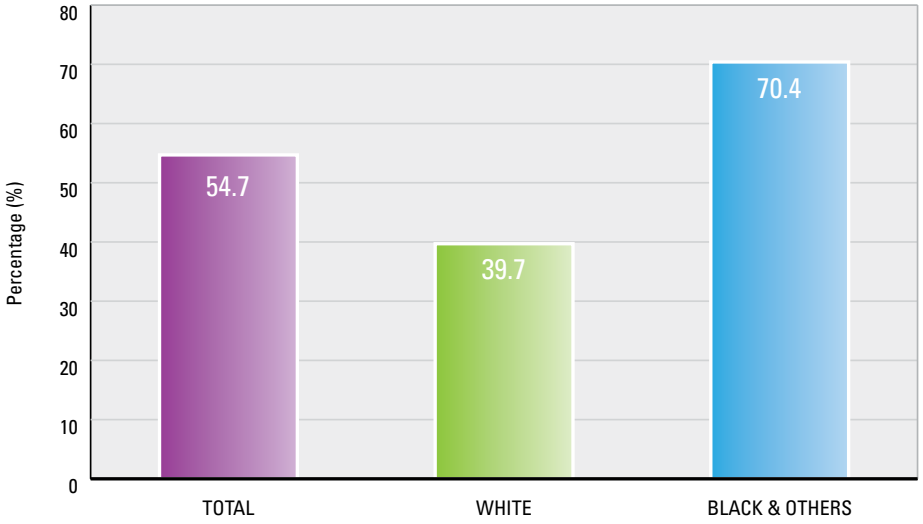
Figure 8. Percentage (%) of Preterm Labor among FIMR Cases in 2009



Unplanned Pregnancy

Pregnancies that are unwanted or mistimed are an important health care issue. The health of the infant is directly affected by the mother's attitude, behaviors, and experiences during the pregnancy[3]. In 54.7% of the FIMR cases (151/276), the CRTs identified unplanned pregnancy as a contributing factor of fetal and infant mortality. The proportion of unplanned pregnancies among black women (70.4%) was greater than that among white women (39.7%).

Figure 9. Percentage (%) of Unplanned Pregnancy among FIMR Cases in 2009

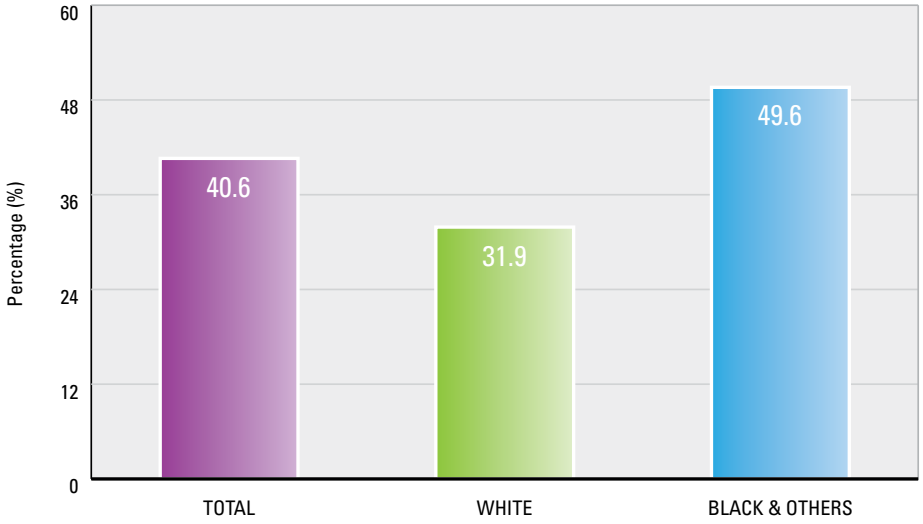


Obesity/Nutrition

In 40.6% of the cases reviewed (112/276), mothers were classified as obese. The proportion of those with obesity among black women at 49.6% (67/135) was greater than that among white women at 31.9% (45/141 women).

In 24.6% of cases reviewed (68/276), mothers were diagnosed as anemic after first trimester. The proportion of anemia among black women at 30.4% was greater than that among white women at 19.1%. In 13.4% of the cases reviewed (37/276), the mothers were classified as having inadequate nutrition and/or anemia in the first trimester. Further education on proper nutrition and weight gain in pregnancy was suggested in 43.5% (120/276) of all cases deliberated by FIMR.

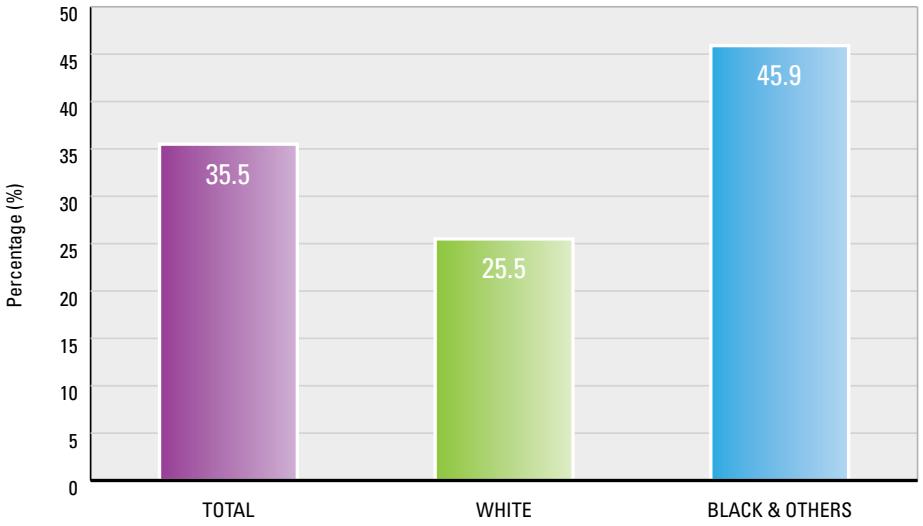
Figure 10. Percentage (%) of Obesity among FIMR Cases in 2009



Previability

Previability indicates that a baby was not sufficiently developed to survive outside the uterus was born before 24 weeks gestation and weighed less than 500 g. In 35.5% of the FIMR cases reviewed (98/276), previability was identified as an important contributing factor. The proportion of previability among black infants at 45.9% (62/135) was greater than that among white infants at 25.5% (36/141).

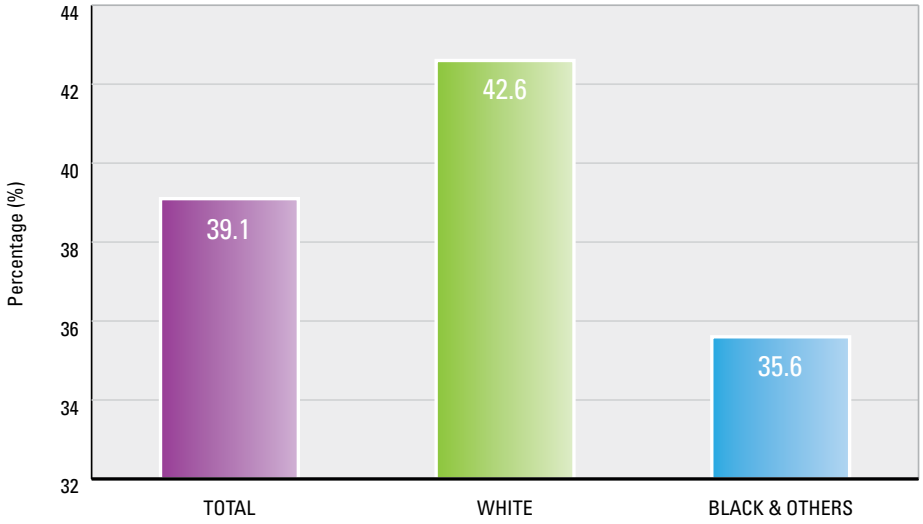
Figure 11. Percentage (%) of Previability among FIMR Cases in 2009



Substance Abuse

In 39.1% of the FIMR cases (108/276), substance abuse was identified as a contributing factor of fetal and infant mortality. The percentage of substance abuse among white women at 42.6% (60/141) was greater than that among black women at 35.6% (48/135).

Figure 12. Percentage (%) of Substance Abuse among FIMR Cases in 2009



The substance and percentage of abuse are listed in Table 6. Substance abuse referral for treatment (include smoking cessation) was suggested for mothers in 35.9% of the FIMR cases (99/276).

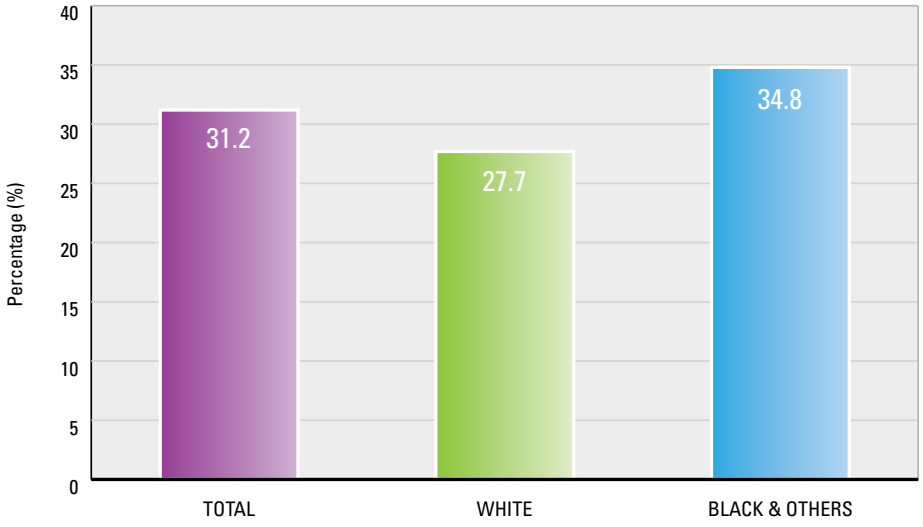
Table 6. Percentage of Substance Abuse among the FIMR Cases

Substance	# of Cases Involved (n=276)	% of Total
Tobacco	74	26.8
Marijuana	25	9.1
Alcohol	20	7.2
Prescription Medicines	5	1.8
Cocaine	4	1.4
Ecstasy	2	0.7
Methamphetamines	2	0.7
Others	26	9.4

History of Fetal or Infant Loss

In 31.2% of the FIMR cases (86/276), mother's history of fetal or infant loss was identified as an important contributing factor. The proportion of mother's history of fetal or infant loss among black women at 34.8% (47/135) was greater than that among white women at 27.7% (39/141).

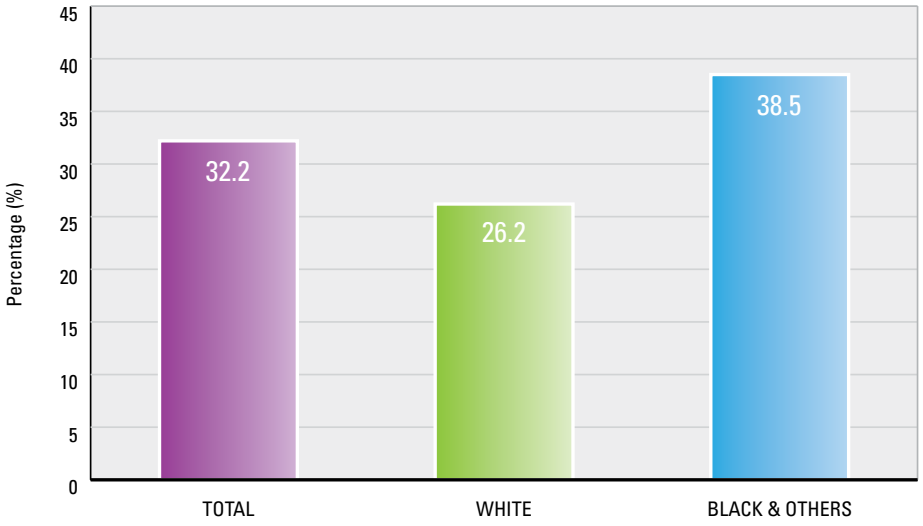
Figure 13. Percentage (%) of Mother's History of Fetal and Infant Loss among FIMR Cases in 2009



Infection

Infections, both maternal and infant, can contribute significantly to infant deaths. Any infection during pregnancy, including dental, genital, and urinary tract can be harmful to the fetus. In 32.2% of the FIMR cases (89/276 women), the CRTs identified maternal infection other than sexual transmitted disease (STD) as a contributing factor. The proportion of maternal infection other than STD's among black women (38.5%) was greater than that among white women (26.2%).

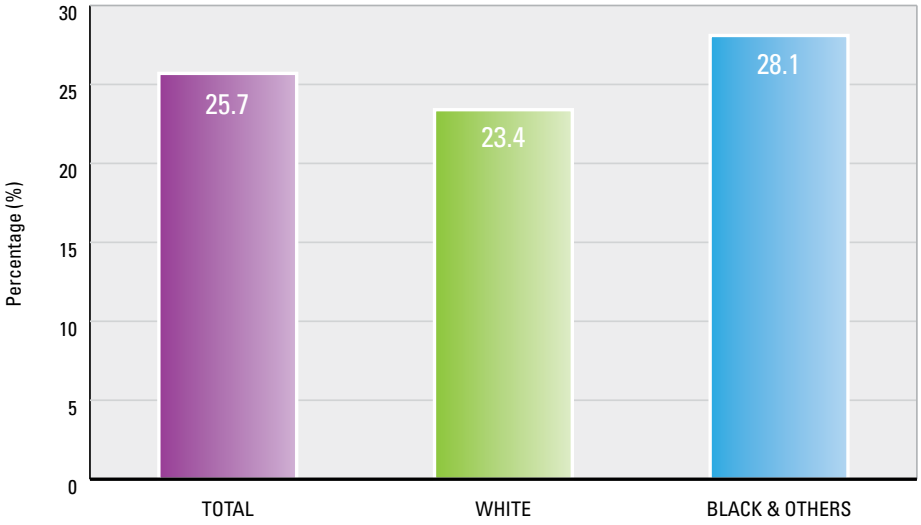
Figure 14. Percentage (%) of Maternal Infection among FIMR Cases in 2009



In 17.4% of the FIMR cases (48/276 women), the mothers had STDs, which include infections of chlamydia, gonorrhea, hepatitis B, herpes, human papillomavirus, syphilis, trichomonas, and HIV. The proportion of STDs among black women (24.4%) was greater than that among white women (10.6%). In 9.8% of the FIMR cases (27/276), the mothers had a history of STDs or other genitourinary infection.

Infection, particularly pneumonia, meningitis and sepsis, is a major contributor to high mortality rates in very young infants[4]. The lungs are not fully developed in a premature infant making them vulnerable to upper respiratory infections. In 25.7% of the FIMR cases (71/276), the CRTs identified infections as an important risk factor. The infections include bronchiolitis, bronchitis, fever, necrotizing enterocolitis, pneumonia, respiratory syncytial virus, sepsis, site infection, and urinary infection. The percentage of infection among black infants at 28.1% was greater than that among white infants at 23.4%.

Figure 15. Percentage (%) of Infection among FIMR Cases in 2009



Leading Contributing Factors and Recommendations from Regional CRTs

Perinatal Region I

Ten leading contributing factors in Perinatal Region I are listed in Table 7.

Table 7. Ten Leading Contributing Factors in Perinatal Region I

Contributing Factor	% of Total Cases (n=53)	% of White (n=39)	% of Black & Other (n=14)
Low birthweight	83.0	76.9	100.0
Prematurity	79.2	71.8	100.0
Pre-existing medical conditions such as asthma, hypertension, diabetes, mental health disorders, etc.	64.2	61.5	71.4
Preterm labor	64.2	53.8	92.9
Maternal age < 21	34.0	35.9	28.6
Unplanned pregnancy	32.1	15.4	78.6
Substance abuse	32.1	35.9	21.4
Inadequate nutrition (includes anemia at first trimester prenatal care visit with hemoglobin < 12 or hematocrit <37)	22.6	20.5	28.6
History of fetal or infant loss	22.6	23.1	21.4
Infection	22.6	20.5	28.6

Recommendations from Region I CRT

Grief Support/Bereavement Services - Provide and increase adequate grief follow-up, referrals/support for women and their families following a fetal or infant loss, determine resources currently available, and disseminate materials related to resources within the community.

Preconception Health Education - Increase information, education, services, comprehensive and consistent nutritional assessment and interventions specifically targeting areas involving the importance of being healthy before pregnancy, adequate nutrition, underweight/overweight and obesity prior to pregnancy.

Family Planning - Increase education of the importance appropriate birth spacing, the importance of family planning/preconception and inter-conceptional care, referral and utilization of family planning options for women experiencing a fetal or infant loss.

Care Coordination - Strengthen coordination between local agencies and programs and increase knowledge of available resources (specifically targeting mental health and substance abuse) among providers, agencies and programs.

Perinatal Region II

Ten leading contributing factors in Perinatal Region II are listed in Table 8.

Table 8. Ten Leading Contributing Factors in Perinatal Region II

Contributing Factor	% of Total Cases (n=34)	% of White (n=9)	% of Black & Other (n=25)
Prematurity	88.2	66.7	96.0
Low birthweight	85.3	66.7	92.0
Preterm labor	73.5	44.4	84.0
Pre-existing medical conditions such as asthma, hypertension, diabetes, mental health disorders, etc.	64.7	55.6	68.0
Obesity	55.9	44.4	60.0
Previability	55.9	33.3	64.0
Multiple gestation	50.0	11.1	64.0
History of fetal or infant loss	47.1	44.4	48.0
Presence of life course perspective risk factors (stressors in childhood, history of abuse, poverty, lack of support, etc.)	47.1	55.6	44.0
Unplanned pregnancy	41.2	33.3	44.0

Recommendations from Region II CRT

Bereavement Services - Provide and increase adequate grief follow-up, referrals/support for women and their families following a fetal or infant loss, improve coordination of bereavement follow-up; provide education to providers, clergy and staff and develop resource guide of available services.

Socioeconomic Issues - Enhance and improve assessment of family's home/socioeconomic situation, early referrals to social services, financial assistance, WIC, food stamps, emergency shelter and others as appropriate.

Nutritional Issues Education - Increase information, education, public awareness and interventions specifically targeting areas involving adequate nutrition, underweight/overweight and obesity.

Preconception Health Education - Provide preconception health training as curricula for middle school students and promote the importance of physical activity.

Family Planning - Promote the increase of adequate health education regarding family planning, birth spacing, preconception and interconception care, referral and utilization of family planning options for women experiencing a fetal or infant loss.

Perinatal Region III

Ten leading contributing factors in Perinatal Region III are listed in Table 9.

Table 9. Ten Leading Contributing Factors in Perinatal Region III

Contributing Factor	% of Total Cases (n=106)	% of White (n=55)	% of Black & Other (n=51)
Low birthweight	89.6	87.3	92.2
Prematurity	86.8	83.6	90.2
Pre-existing medical conditions such as asthma, hypertension, diabetes, mental health disorders, etc.	84.9	85.5	84.3
Preterm labor	80.2	78.2	82.4
Unplanned pregnancy	59.4	49.1	70.6
Anemia (diagnosed after first trimester)	49.1	38.2	60.8
Premature rupture of membranes/preterm premature rupture of membranes	49.1	45.5	52.9
Obesity	45.3	34.5	56.9
Maternal infection other than Sexual transmitted diseases	41.5	36.4	47.1
Substance abuse	38.7	41.8	35.3

Recommendations from Region III CRT

Grief/Bereavement - Enhance and increase bereavement care for mothers and families who have experienced the loss of an infant, raise awareness of services that are available to the families, and offer provider education regarding the importance of post-partum depression screening as recommended by ACOG, which includes medication and counseling options.

Preconception Health Education - Increase awareness of the importance to be healthy before becoming pregnant, preconception education, implement consumer science and physical education curriculum in both middle and high school settings, healthy lifestyles education, nutrition and fitness, risks of obesity, and family planning.

Substance Abuse - Promote identification of substance abuse issues, improve provider referrals for all substance abuse (including smoking), improve resources for referral of substance abuse problems and/or reimbursement for these services, appropriate screening and referral, and use of brief interventions for appropriate treatment.

Socioeconomic Issues - Enhance and improve assessment of family's home/socioeconomic situation, early referrals to social services, financial assistance, WIC, food stamps, emergency shelter and others as appropriate.

Adequate Patient Education - Ensure patients receive adequate health education, to include the importance of prenatal care, preterm labor, rupture of membrane, signs of pre-eclampsia, obesity and maternal infections.

Perinatal Region IV

Ten leading contributing factors in Perinatal Region IV are listed in Table 10.

Table 10. Ten Leading Contributing Factors in Perinatal Region IV

Contributing Factor	% of Total Cases (n=34)	% of White (n=18)	% of Black & Other (n=16)
Low birthweight	73.5	72.2	75.0
Unplanned pregnancy	70.6	61.1	81.3
Prematurity	70.6	66.7	75.0
Pre-existing medical conditions such as asthma, hypertension, diabetes, mental health disorders, etc.	64.7	55.6	75.0
Preterm labor	50.0	50.0	50.0
Obesity	41.2	50.0	31.3
Maternal infection other than sexual transmitted diseases	41.2	38.9	43.8
Premature rupture of membranes/preterm premature rupture of membranes	41.2	38.9	43.8
Substance abuse	41.2	50.0	31.3
Previability	41.2	33.3	50.0

Recommendations from Region IV CRT

Preconception Education - Increase awareness of the importance of early prenatal care, being healthy before becoming pregnant, and the importance of importance of proper nutrition and weight gain during pregnancy to the patient, caregiver and the community.

Grief Support/Bereavement Services - Provide and increase adequate grief follow-up, referrals/support for women and their families following a fetal or infant loss, identify and refer to support groups.

Care Coordinator - Strengthen coordination between emergency room providers and obstetricians of patients that visit the emergency room.

Safe Sleep Education - Provide education and information regarding safe sleep, raise public awareness of the importance of safe sleep including developing public service announcements, use zip code data to place billboards in communities promoting safe sleep education in areas most affected, give education materials to parents during prenatal care and before birth, and distribute Safe Sleep posters to daycares in Mobile County.

Perinatal Region V

Ten leading contributing factors in Perinatal Region V are listed in Table 11.

Table 11. Ten Leading Contributing Factors in Perinatal Region V

Contributing Factor	% of Total Cases (n=49)	% of White (n=20)	% of Black & Other (n=29)
Low birthweight	89.8	80.0	96.6
Prematurity	83.7	70.0	93.1
Pre-existing medical conditions such as asthma, hypertension, diabetes, mental health disorders, etc.	79.6	85.0	75.9
Unplanned pregnancy	67.3	45.0	82.8
Preterm labor	63.3	45.0	75.9
Previability	46.9	40.0	51.7
Obesity	40.8	25.0	51.7
History of fetal or infant loss	40.8	40.0	41.4
Infection	38.8	20.0	51.7
Premature rupture of membranes/preterm premature rupture of membranes	36.7	30.0	41.4

Recommendations from Region V CRT

Preconception Health Education - Increase information involving the importance of being healthy before pregnancy, adequate nutrition, obesity and management of pre-existing medical conditions prior to pregnancy.

Family Planning - Promote the increase of adequate health education regarding family planning, and referral to family planning of mothers who experience a fetal or infant loss.

Adequate Patient Education - Ensure patients receive adequate health education, to include the importance of prenatal care, preterm labor, rupture of membrane, signs of pre-eclampsia, obesity and maternal infections.

Grief/Bereavement - Enhance and increase bereavement care for mothers and families who have experienced the loss of an infant, raise awareness of services that are available to the families, and offer provider education regarding the importance of post-partum depression screening as recommended by ACOG, which includes medication and counseling options.

Summary

In 2009, there were 62,476 resident live births, 564 fetal deaths, and 513 infant deaths in Alabama. Of the 513 infant deaths, 313 were neonatal deaths and 200 were postneonatal deaths. In total, 276 FIMR cases have been reviewed by CRTs as of June 30, 2010. These cases comprised 9 fetal deaths and 267 infant deaths.

Recommendations

The review of cases accomplished by the CRTs has resulted in different recommendations being passed on to the CATs in each perinatal region. Recommendations were made that highlight the importance of family planning, preconception care, access to payment programs for early prenatal care, and reductions in barriers to care. These recommendations also include improving grief support/bereavement services, screening and counseling on substance abuse, continued campaigns to encourage safe sleeping for infants and ongoing support for the FIMR Program.

Selected Characteristics of Reviewed Cases

- Of 276 FIMR cases, 9 were fetal deaths and 267 were infant deaths.
- Of 276 FIMR cases, 53 were reviewed by the Region I CRT, 34 by the Region II CRT, 106 by the Region III CRT, 34 by the Region IV CRT, and 49 by the Region V CRT.
- 62.7% of mothers of reviewed cases were single.
- 51.1% of mothers of reviewed cases were white and 48.9% were black and others.
- 21.4% of maternal age of reviewed cases were <20 years of age.
- 4.7% of maternal education of reviewed cases were <8 years, 23.9% were between 9 and 11 years, 34.1% were 12 years, 19.9% were between 13 and 15 years, and 14.5% were >16 years.
- 69.9% of mothers were entry into prenatal care in the first trimester and 12.0% of mothers were unknown for prenatal care.
- 53.6% of payments for prenatal care of reviewed cases were paid by Medicaid payment, 29.3% by private insured, and 10.9% by self-payers.
- 50.4% of reviewed cases were male and 49.6% were female.
- 35.5% of fetal and infant birthweights were <500 g, 39.5% were 500-1,499 g, 10.9% were 1,500-2,499 g, and 11.2% were ≥2,500 g.
- 22.8% of reviewed infant cases died within 1 hour, 33.3% between 1 hour and 24 hours, and 42.7% between 1 day and 28 days.
- 71.0% of gestational age of reviewed cases were <28 weeks, 8.7% were 29-33 weeks, 4.7% were 34-36 weeks, and 12.3% were ≥37 weeks.

Ten Leading Contributing Factors Identified by FIMR

- 85.9% of reviewed cases had identified low birthweight.
- 83.0% of reviewed cases had identified prematurity.
- 75.0% of mothers of reviewed cases had identified pre-existing medical condition.
- 69.6% of mothers of reviewed cases had identified preterm labor.
- 54.7% of mothers of reviewed cases had identified unplanned pregnancy.
- 40.6% of mothers of reviewed cases had identified obese and 24.6% had identified anemia after first trimester.
- 39.1% of mothers of reviewed cases had identified substance abuse, which include tobacco, marijuana, alcohol, prescription medicines, cocaine, ecstasy, methamphetamines and others.
- 35.5% of reviewed cases had identified previability.
- 33.7% of mothers had identified premature rupture of membranes/preterm premature rupture of membranes.
- 32.2% of mothers had identified infection other than sexual transmitted disease.

Supporting Documents

The appendices include FIMR supporting documents, one of which is an analysis of the "Perinatal Periods of Risk Approach" described and summarized in Appendix E.

Appendices

Appendix A. Alabama Perinatal Region Map

The Alabama Perinatal Program, under the auspices of the Alabama Department of Public Health, has five designated Regional Perinatal Centers. These centers serve as the central perinatal centers for the populations within the designated geographical areas. The designated Perinatal Regions based on their Neonatal Intensive Care Units (NICU's) are:

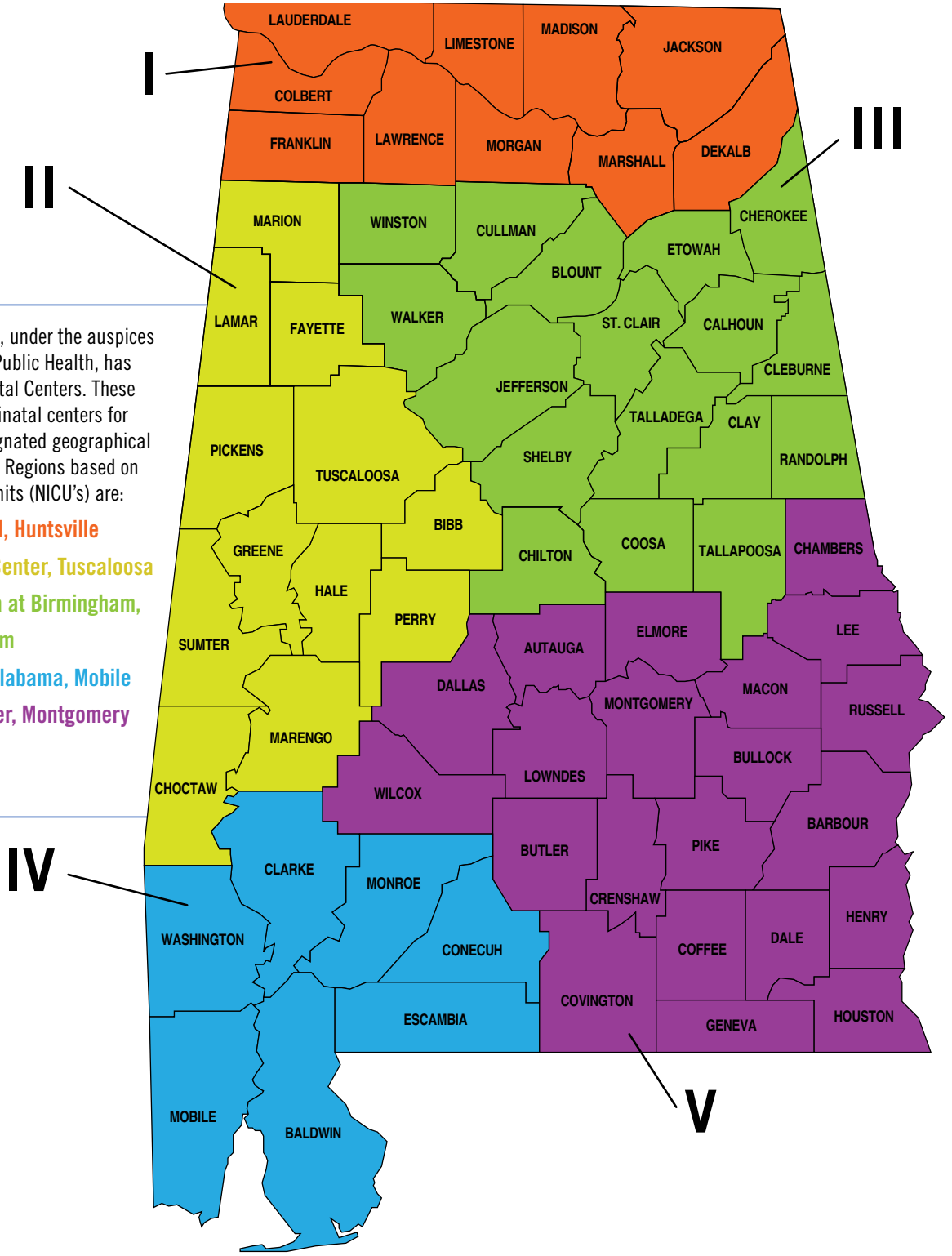
I. Huntsville Hospital, Huntsville

II. DCH Regional Medical Center, Tuscaloosa

III. University of Alabama at Birmingham, Birmingham

IV. University of South Alabama, Mobile

V. Baptist Medical Center, Montgomery



Appendix B. Members of CRTs and CATs

CRT Members of Perinatal Region I

Tammy Anderson	PACT of Morgan County
Barbara Bush, AuD	Alabama A & M University
Janet Clark, RN	Children's Rehabilitation Services
Patricia Collins, CRNP	Decatur Physicians for Women
Mark Cooper, MD	Family Practice
Wesley Crowell, MD	Central Pediatrics
Flora Flood, CRNP, DSN	Oakwood University, School of Nursing
Madeline Hardacre, MD	Decatur Physicians for Women, PC
Karen Harmon-Smith	Mother/Volunteer
Tiki Hubbard, LGSW	Alabama Department of Public Health
Jitendra Jain, MD	Brightstart Pediatrics
James R. Light, MD	University of Alabama at Birmingham
Melanie Malone, CRNP	Santiago Obstetrician-Gynecologist
Yolanda Martinez, RN, BSN	Alabama Department of Public Health
Lee Morris, MD	Tennessee Valley Neonatology
Nita Nichols, RD	Jackson County Health Department
Angie Norwood, LBSW	Huntsville Hospital Women & Children
V. H. Reddy, MD	Pediatrician
Noreen Riley**, MSW, LCSW, PIP	Best Start Care Coordinator
Ann Robertson, RN	Children's Rehabilitation Services
Laura Thompson, RN, BSN	Health Group of Alabama
Charlotte Turner, RN, BSN	DeKalb Regional Medical Center
Debra Williams*, MD	Madison County Health Department
Me'Lissa Young-King, DO	Pediatrician

CAT Members of Perinatal Region I

Laura Bolan	Mother
Twila Carodine, RN, MSN	Hospice Family Care
Shari Crowe, RN, MPH	Huntsville Hospital Women & Children
Sheryl Gilbreath	Madison County HD
Sandy Goode, RN, MSN	Huntsville Hospital Women & Children
Vicki Goodman	Family Strengthening Program
Ellen Harris, RN, BSN	Huntsville Hospital Women & Children
Amber Keith	Madison City Schools
Phyllis McMillan, RN, BSN	Huntsville Hospital Systems & Mother
Jane Mitchell, RN, IBCLC	Crestwood Medical Center
Sandra Rigsby	Huntsville City Schools
Claudia Smith	Family Services Center
Kathy Stampley	Mother
Melissa Taylor, RN, MSN	Huntsville Hospital Women & Children

CRT Members of Perinatal Region II

Dan Avery**, MD	University of Alabama
Brittani Blackston	Tuscaloosa Campaign to Prevent Teen Pregnancy
Mary Beth Bodin	University of Alabama at Birmingham
Melissa Carruth	Northport DCH
Renee Cole	Alabama Department of Public Health
Carla Cowan	Northport Medical Center
Cindy Dedmon, MD	Tuscaloosa Family Practice
Trendle Ford	DCH Regional Medical Center
Guillermo Godoy, MD	DCH Health Care Authority
Ann Moorehead	Northport DCH Medical Center
Barbara Hankins	Children's Rehabilitation Services
April Davis Hansford	Greater Alabama Health Network
Becky Henderson	Greater Alabama Health Network
Carolyn Henley	DCH Northport Medical Center
Kristi Pritchett	Bryan-Whitfield Memorial Hospital
Terry Humphryes	DCH Regional Medical Center
Barbara Jernigan	Northport Medical Center
Kristi Kelly	Greater Alabama Health Network
Jim Leeper*, PhD	University of Alabama
William Lenahan, MD	Obstetrician Women's Clinic of Winfield
Jim Moore	Indian Rivers Mental Health Center
Marcia Pugh	HealthStart Maternity Program
Iris Robertson	DCH Regional Medical Center
Tracy Schofield	Alabama Department of Public Health
Peggy Thornton	DCH Regional Medical Center
Earnestine Tucker	Tuscaloosa City Board of Education
Mary Beth Vick	Early Intervention Community Service
Cindy Wagner	Medela
John Waits, MD	University of Alabama
Sara Webb	Health Start Medicaid Maternity Program

CAT Members of Perinatal Region II

Dan Avery, MD	University of Alabama
Brittani Blackston	Tuscaloosa Campaign to Prevent Teen Pregnancy
Mary Beth Bodin	DCH Health Care Authority
Melissa Carruth	Northport DCH
Carla Cowan	Northport Medical Center
Tracy Croom	Tuscaloosa Mayor Office
Jackie Currie	Stillman College
Cindy Dedmon, MD	Tuscaloosa Family Practice
Audrey Ellis	Tuscaloosa City School System
Jane Eure	Professional Advisor
Trendle Ford	DCH Regional Medical Center
Linda Forte	Stillman College Nursing Program
Pamela Payne Foster, MD, MPH	University of Alabama
Susan Gaskins	University of Alabama
Flora Gay	City of Northport
Guillermo Godoy, MD	DCH Health Care Authority
Sister Carol Gray	Catholic Family Service Center
Barbara Hankins	Children's Rehabilitation Services
Becky Henderson	Greater Alabama Health Network
Carolyn Henley	Northport Medical Center
Gladys Hill	Shelton State Community College
Barbara Jernigan	Northport Medical Center
Laurie Johns	Attorney
Kristi Kelly	Greater Alabama Health Network
Jim Leeper, PhD	University of Alabama
Jim Moore	Indian Rivers Mental Health
Ann Moorehead	Northport DCH
Kathy Oths	University of Alabama
Tracy Schofield	Alabama Department of Public Health
Chris Spencer	University of Alabama
Peggy Thornton	DCH Regional Medical Center
Deborah Tucker	Whatley Health Services

Earnestine Tucker* ..... Tuscaloosa City Board of Education
John Waits, MD ..... University of Alabama

CRT Members of Perinatal Region III

Connie Arnwine ..... Jefferson County Department of Health
Joey Biggio, MD ..... University of Alabama at Birmingham
Shelley Birchfield ..... Regional Medical Center
Reba Brannan ..... Alabama Department of Public Health
Kathy Bryson ..... Servants in Faith and Technology
Wally Carlo, MD ..... University of Alabama at Birmingham
Brenda Causey ..... Alabama Department of Public Health
Freda Centor ..... University of Alabama at Birmingham
Paula Clark ..... Alabama Department of Public Health
Robin Allison Collins ..... March of Dimes
Glenda Dickerson ..... Brookwood Medical Center
Ken Elmer, MD ..... Simon Williamson Clinic
Melissa Graham ..... Gadsden Regional Medical Center
Nell Henderson ..... Jefferson County Department of Human Resources
Elaine St. John, MD ..... University of Alabama at Birmingham
Angela Jukkala ..... University of Alabama at Birmingham
Blyth Keith ..... University of Alabama at Birmingham
Joan Kilpatrick ..... Cullman Regional Medical Center
Byron Phillips, MD ..... Citizen's Baptist Medical Center
Kim Reach ..... VIVA Steps Ahead Program
Ava Rozelle ..... Alabama Department of Public Health
Stephanie Terrell ..... Coosa Valley Medical Center
Ed Whatley ..... Retired Educator
Martha Slay Wingate ..... University of Alabama at Birmingham

CAT Members of Perinatal Region III (Calhoun/Cleburne/North Talladega)

Shelley Birchfield** ..... Regional Medical Center
Adcock, Denise ..... Jacksonville Medical Center
Larry Amerson ..... Sheriff Calhoun County
Lisa Amerson..... Calhoun County Board of Education
Saundra Carter..... Calhoun Cleburne Mental Health Center
Jeff Collins, MD ..... Private Obstetrician
Lesa Cotton ..... Calhoun County Board of Education
Lewis Doggett, MD..... Private Pediatrician
Paulette Gibbs..... Ranburne High School
Doug Heath ..... Calhoun County Department of Human Resources
Susan Langley..... Regional Medical Center
Beth Long..... Wellborn High School
Suzanne Payne ..... Community Advocate
Tim Rolfe ..... Anniston Army Depot
Sandra Sudduth ..... Jacksonville City School Board
Ed Whatley* ..... Retired Educator

CAT Members of Perinatal Region III (Jefferson)

Connie Arnwine ..... Community Volunteer
Bonnie Bradley ..... AllKids
Jennifer Kilburn ..... Children's Policy Council of Jefferson County
Candy Palmer..... Midfield City Schools
Ginger Parsons..... Children's Hospital
Wynn Speir ..... Children's Hospital
Tom Struzick..... UAB Center for the Study of Community Health
Virginia Sweet ..... Children's Policy Council of Jefferson County
Martha Thomas ..... Children's Rehabilitation Services
Charline Whyte ..... Jefferson County Department of Health
Vivian Winters ..... Children's Rehabilitation Services

CRT Members of Perinatal Region IV

Eniola Fagbongbe, MD..... Private Practice, Grove Hill, AL, Obstetrician-Gynecologist
Tony Bondora, MPH..... Mobile County Health Department
Marjorie Nicole Brooks*, DO ..... University of South Alabama (USA), Department of Obstetrics and Gynecology
Paquita Carter..... Social Worker, Mobile County
Meg Cole, DSN..... Springhill College, Mobile, AL
Shirley Colston, RNC, MSN..... Mobile Infirmary, Mobile, AL
Vicki Curtis, RN ..... Thomas Hospital, Fairhope, AL
Nicole Carter Davis..... District Early Intervention Coordinator, Mobile, AL
Paula Drummond, MD ..... Eastern Shore Children's Clinic, Fairhope, AL
Susan Eschete, RN, MSN..... Medicaid Maternity Program, Mobile, AL
Kendal I. Foster, MD..... Private Practice, Obstetrician-Gynecologist, Mobile, AL
Jeanette Gibson..... Gift of Life Maternity Care Program
Melissa Heath, MD ..... Private Practice, Obstetrician-Gynecologist, Brewton, AL
Peg Hilliard ..... Coordinator, Birth Defect Surveillance – USA Pediatrics Department
Carl W. Martens, MD..... Private Practice, Family Practice, Monroeville, AL
Catherine North..... March of Dimes, Mobile, AL
Michele Nowlin, MSN ..... Emergency Management, Baldwin County, AL
Barbie Oliver, RN, WHNP-BC..... USA Center for Strategic Health Innovation
Shannon Payne..... Police Officer/Child Abuse Cases, Mobile, AL
Marsha Raulerson**, MD ..... Lower Alabama Pediatrics, Escambia County, AL
Richard A. Roh, MD ..... Medical Park Obstetrician-Gynecologist, PC Fairhope, AL
Martha Dawn Singleton, NNP ..... D.W. McMillian Hospital, Brewton, AL
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Sherri K. Taylor, MD..... USA Department of Obstetrics and Gynecology
Debbie Thomasson, ... Area Nursing Director Area 7 and 9
James J. Walker, MD ..... Private Practice, Obstetrician-Gynecologist, Brewton, AL
Kelly Warren ..... Director Teen Center, Mobile, AL
James D. West, MD ..... Private Practice, Obstetrician-Gynecologist, Foley, AL
Stephanie M. Woods, BAC, MPH... Director, Women's Center , Mobile, AL
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Casandra Boykin ..... Baldwin County Community Action

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Caroline Dube	Teacher
Sharron Lanham	Women's Care Medical Center
Sue Leavins	Women's Care Medical Center
Catherine North	March of Dimes
Pat Preston, RN	Eastern Shore Obstetrician-Gynecologist, Fairhope, AL
Mary Anne Roh, BSN	Thomas Hospital
Carole Schneider	To Be, Fairhope, AL
Dreama Schofild*, LGSW	Coordinator, Gift of Life

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Sabrina Blackweld	Mobile Infirmary
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Marjorie Nicole Brooks*, DO	Mobile, AL
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Erin Carlisle	USA Children's and Women's Hospital
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Meg Cole, DSN	Springhill College of Nursing
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Shirley Colston	Mobile Infirmary
Catherine Dearman	USA Children's and Women's Hospital
Susan Eschete	Momcare
Shirley Ezell, RN	Springhill Memorial Hospital
Sheryl Falcos, MD	USA Children's and Women's Hospital
Linda Fontenot	The Shoulder Rehabilitation Services
Lisa Forsberg, RN	USA Children's and Women's Hospital
Mac Hardeman	Mobile County Police Department
Ina Hall	Mobile Infirmary
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James Hanley	USA Children's and Women's Hospital
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Debra Hinton, RN	Providence Hospital
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Jacquie DePalma	Board of Education
Shirley Ezell, RN	Springhill Memorial Hospital
Linda Fontenot	The Shoulder Rehabilitation Services
Sheree LaCoste	Mobile Hospital Association
Sharron Lanham	Women's Care Medical Center
Sue Leavins	Women's Care Medical Center
Sommerlyn Mitchell	Mobile County Health Department
Catherine North	March of Dimes
Barbie Oliver	USA Beth Edwards, Providence Hospital
Ashley Peyer	Mobile County Health Department
Pat Preston, RN	Dr. Hunt and Childs
Susan Roberson	Providence Hospital
Renee Rogers	USA Children's and Women's Hospital
Mary Anne Roh	Thomas Hospital
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Nicole Smith	Momcare
Kelly Warren	Mobile County Health Department
Gwen Weed	Alabama Rehabilitation
Stephanie Woods	Mobile County Health Department

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JaWandalyn Brooks	Alabama Coalition Against Domestic Violence
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Jason Gentry, MD	Obstetrician, Montgomery
Martha Jinright*	Gift of Life
Henry Johnson, MD	Obstetrician, Montgomery
Timothy Marlow	Obstetrician, Selma
Darla Poole, RN	Andalusia Hospital
Belfondia Pou, MD	Family Practice, Montgomery
Julie Preskitt	Children's Rehabilitation Services
Marilyn Rhodes	Auburn University Montgomery
Renate Rommell	Center for Child/Adolescent Development
Donna Guin Taylor	Small Wonders Maternity Program
Charles Tompkins, MD	Family Practice, Luverne
Amy Trammell, RN	Baptist South
Greg Waller, MD	Obstetrician, Montgomery
Courtney Watson	March of Dimes
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CAT Members of Perinatal Region V

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Valecia Asberry ..... Montgomery Public Schools
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Twanna Brown ..... Women, Infants and Children (WIC)
Paula Collins ..... Family Guidance Center
LaShanda Craig ..... Montgomery Metro Treatment Center
Carol Duvall ..... Montgomery Metro Treatment Center
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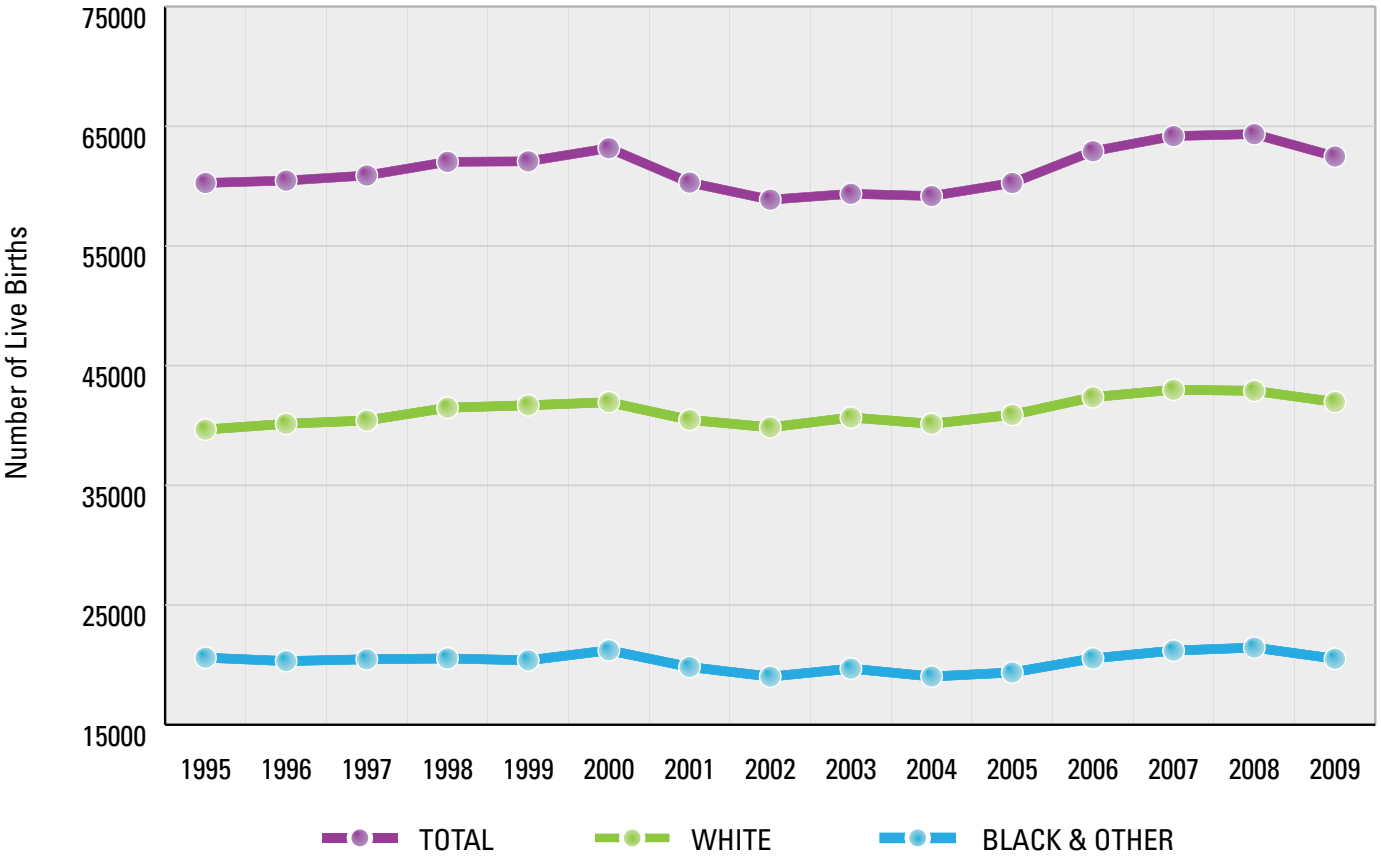
Paige Mitchell ..... Gift of Life
Demecia Moncrief ..... Health Services, Inc.
Lorie Mullins* ..... Counseling Outreach for Pregnancy Emergency Center
Barry Nelson ..... Montgomery Metro Treatment Center
Sarian Ross ..... Health Services, Inc.
Linda Thomas ..... Head Start
Courtney Watson ..... March of Dimes

*** Chair**
**** Vice Chair**

Appendix C. Trend of Live Births from 1995 - 2009

The trend of live births in Alabama during 1995 - 2009 is shown in Figure 16.

Figure 16. The Number of Live Births in Alabama during 1995-2009



Appendix D. Trend of Fetal and Infant Mortality Rates from 1995 - 2009

Trends in the fetal mortality rate and infant mortality rate are shown in Figures 17-24. The data is from 1) Alabama Vital Statistics 2008, 2) Alabama vital statistics birth and death files from the Center for Health Statistics in the Alabama Department of Public Health, and 3) MacDorman and Kimeyer 2009[1].

Figure 17. Fetal Mortality Rates, Alabama and United States, 1995 - 2009

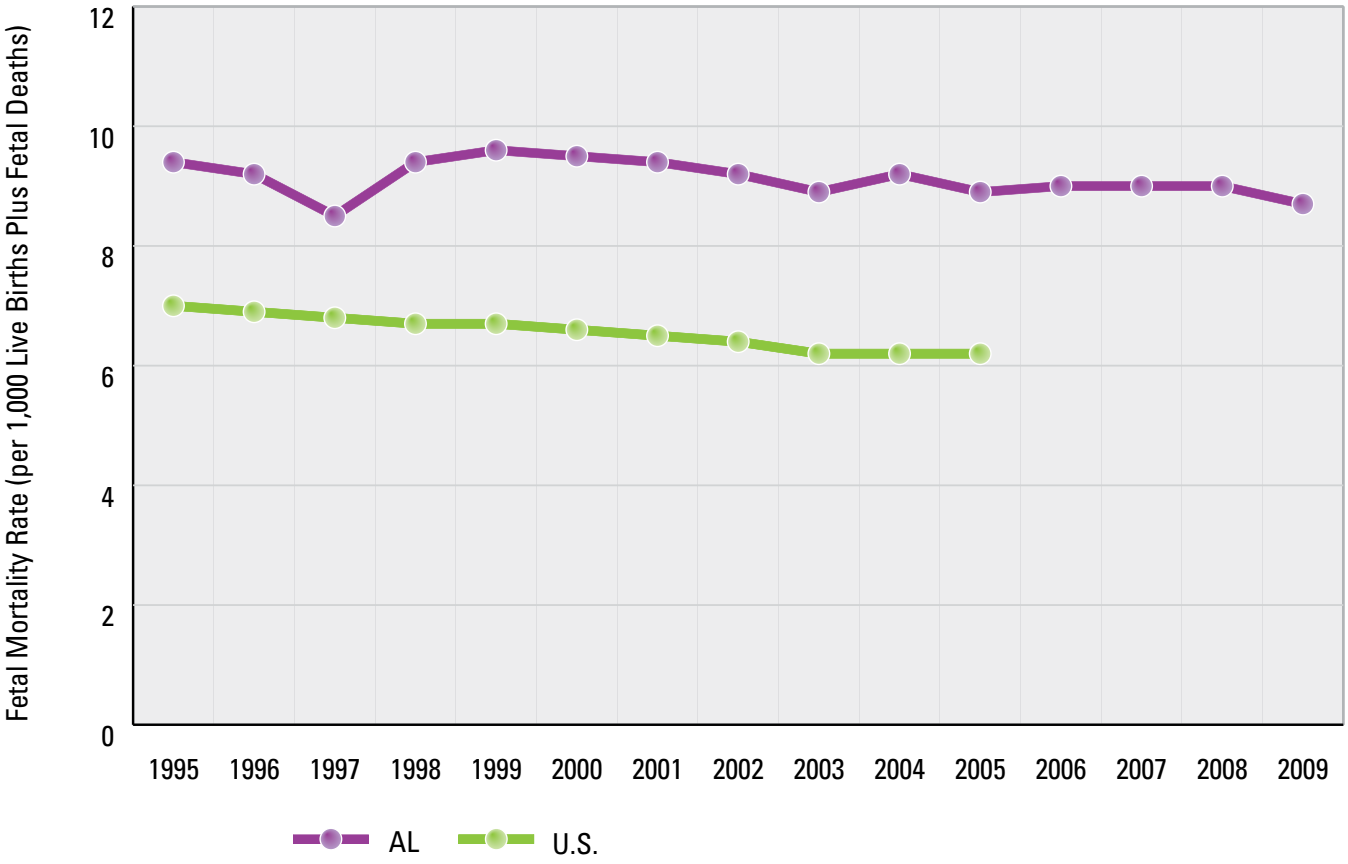


Figure 18. Fetal Mortality Rates by Race, Alabama and United States, 1995 - 2009

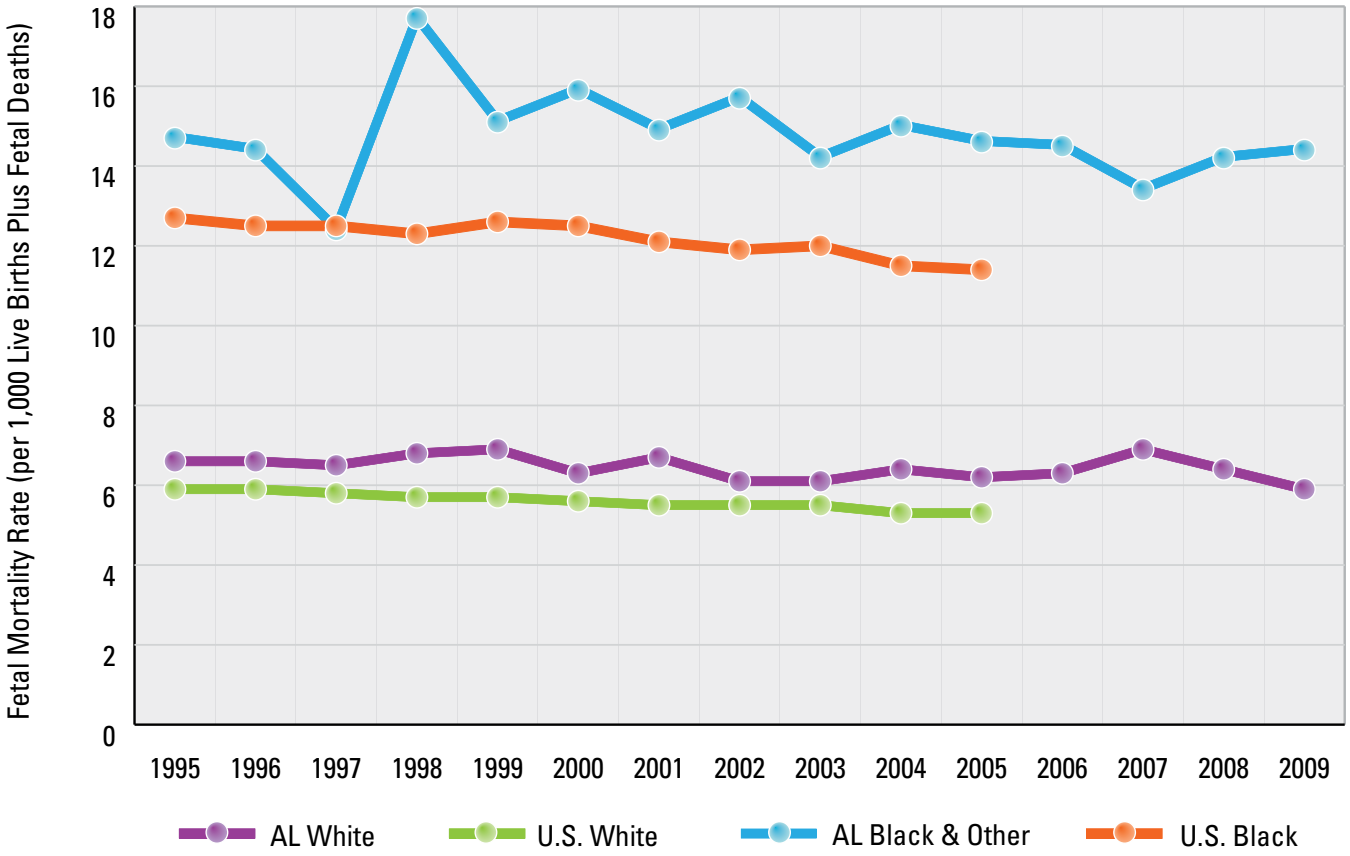


Figure 19. Infant Mortality Rates, Alabama and United States, 1995 - 2009

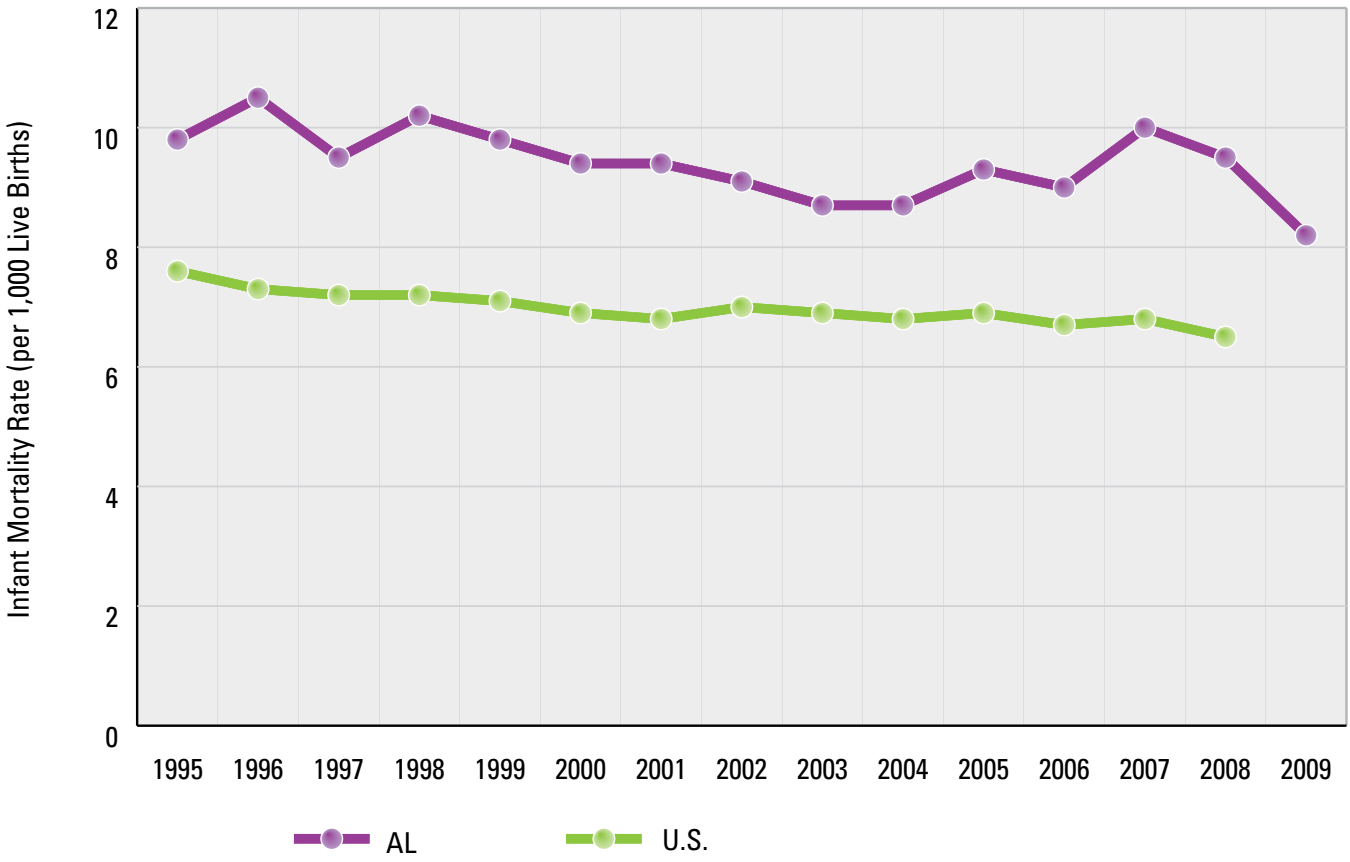


Figure 20. Infant Mortality Rates by Race, Alabama and United States, 1995 - 2009

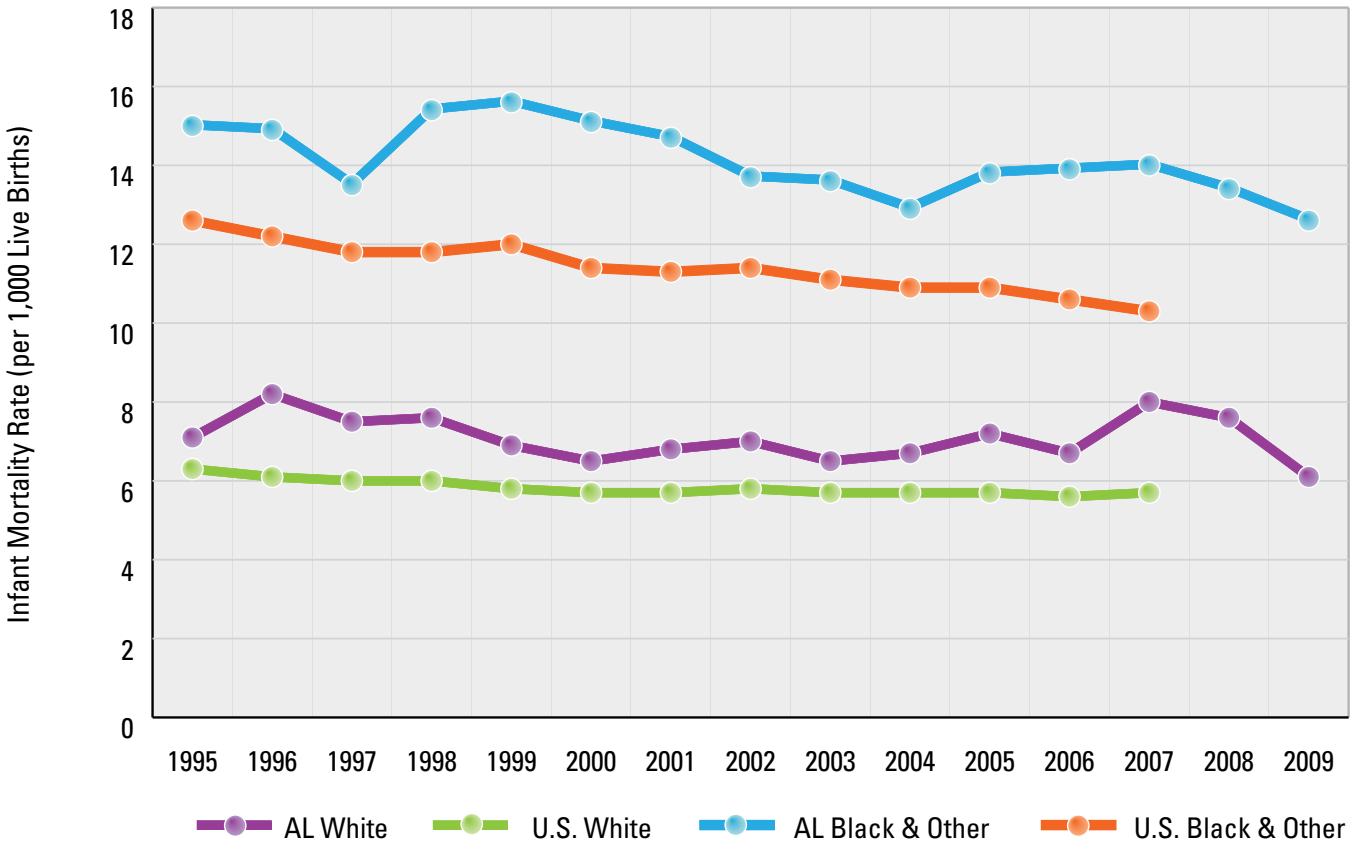


Figure 21. Neonatal Mortality Rates, Alabama and United States, 1995 - 2009

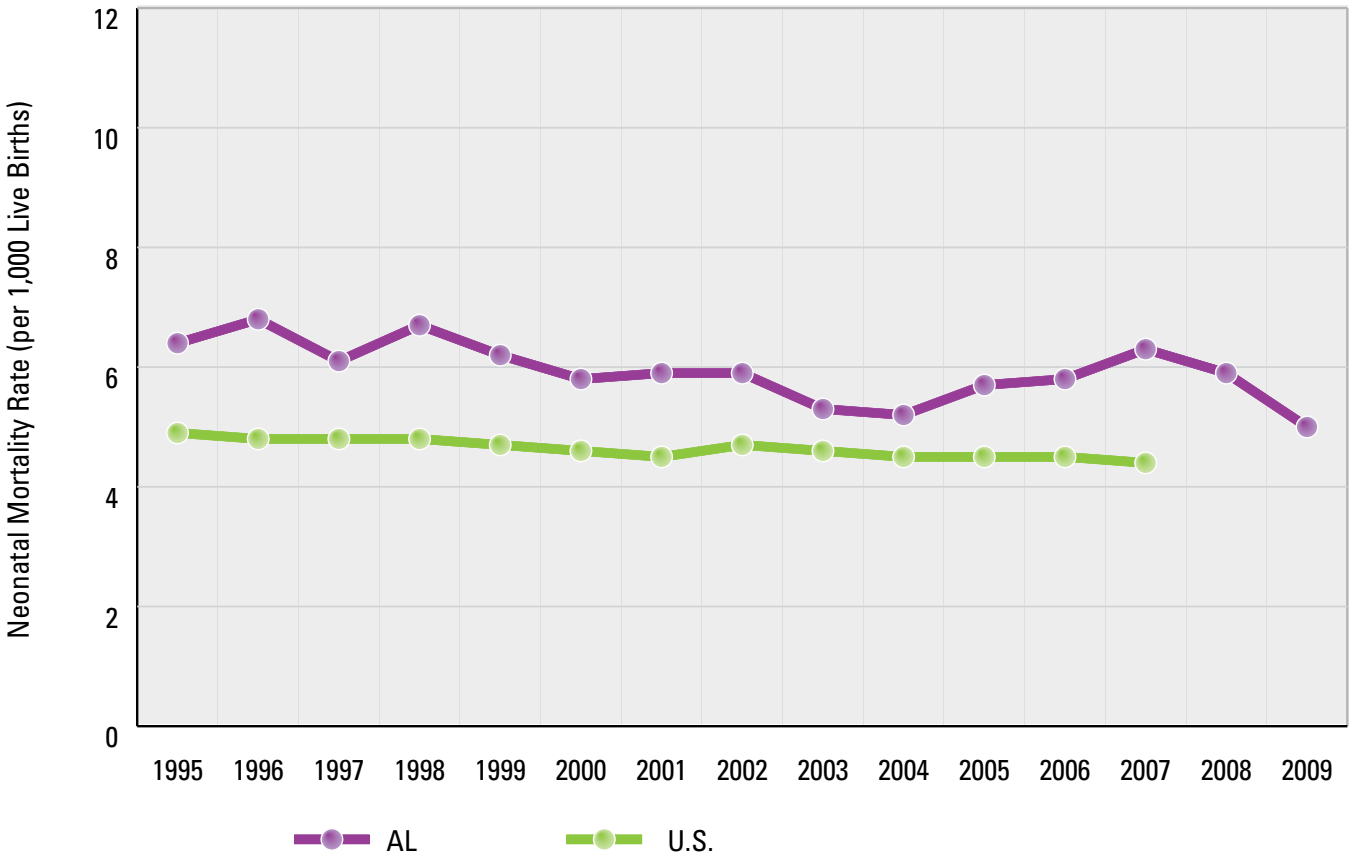


Figure 22. Neonatal Mortality Rates by Races, Alabama and United States, 1995 - 2009

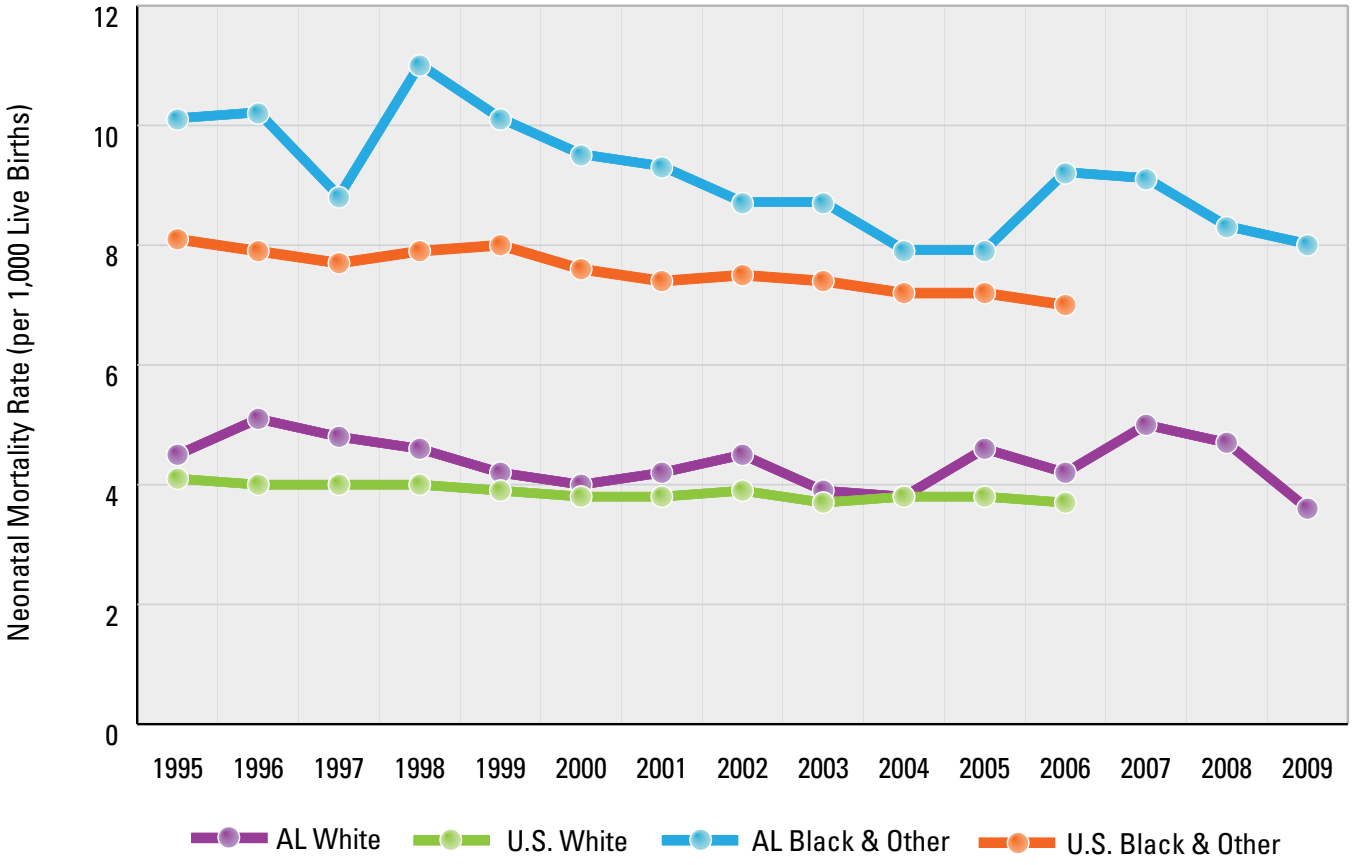


Figure 23. Postneonatal Mortality Rates, Alabama and United States, 1995-2009

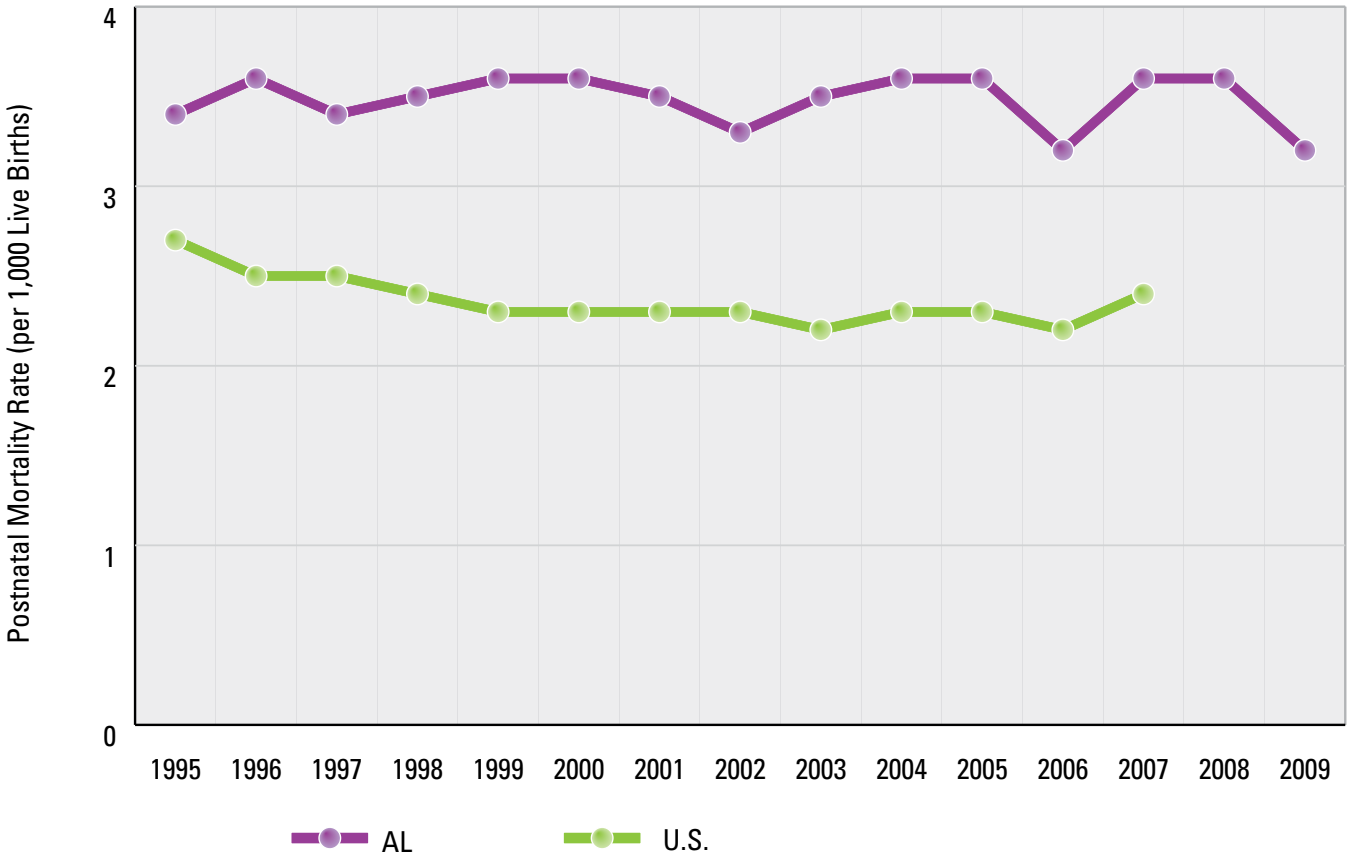
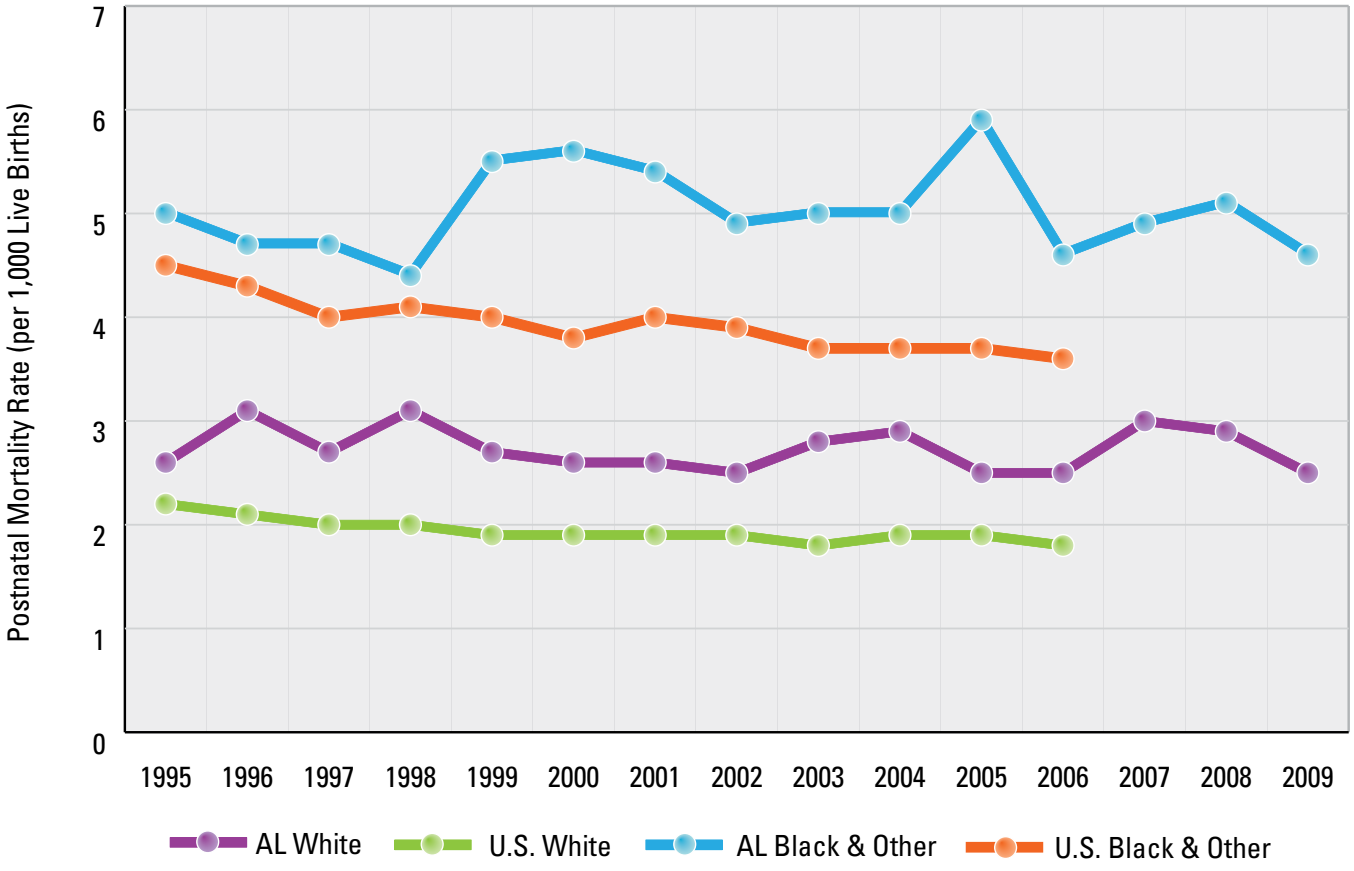


Figure 24. Postneonatal Mortality Rates by Race, Alabama and United States, 1995-2009



Appendix E. Phase 1 Analysis of Perinatal Periods of Risk Approach[5]

Introduction of Perinatal Periods of Risk Approach (PPOR)

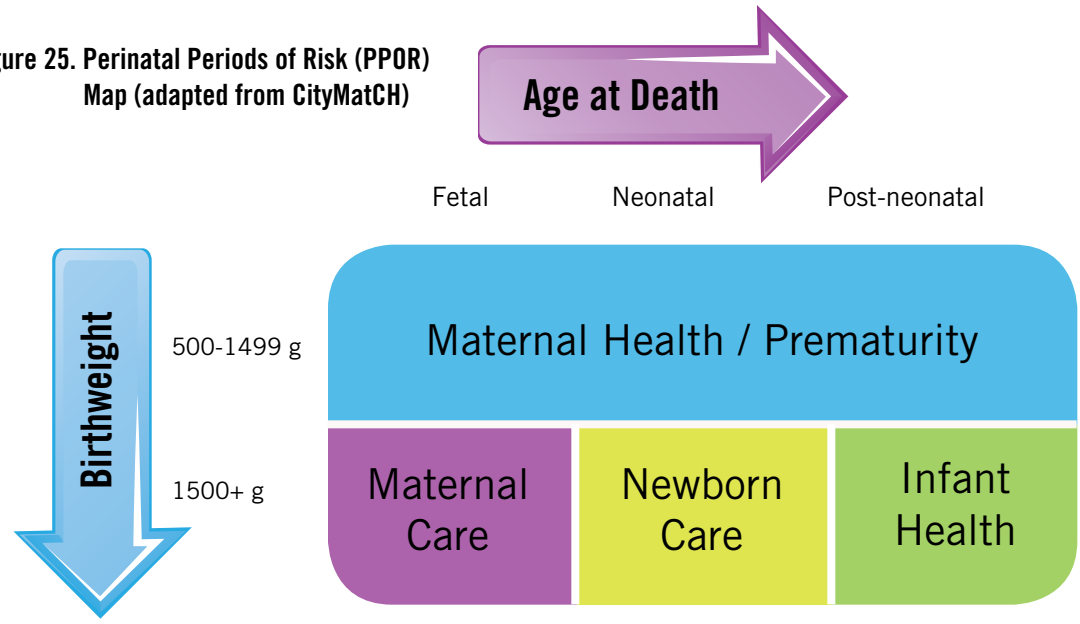
The PPOR approach was developed by Dr. Brian McCarthy from the Centers for Disease Control and Prevention (CDC) and other World Health Organization collaborators and modified for use in US cities by a CityMatch Practice Collaborative to monitor and investigate feto-infant mortality. The PPOR methods provide the necessary framework and tools for large urban communities to investigate feto-infant mortality problems.

The approach offers a new way to monitor and investigate feto-infant mortality. The intent was to develop a simple method that is based on a strong conceptual prevention framework and can be used by community partners to mobilize the community to prioritize prevention efforts. The approach also forms one of the core components of an ongoing maternal and child health surveillance system.

The traditional methods for assessing infant mortality in a community do not readily identify potential gaps in the community for further reductions and do not directly lead to action and prevention activities. The PPOR approach provides newer insight into infant and fetal deaths in two ways: 1) the analysis includes fetal deaths, which is an important perinatal health indicator, but is not a regular practice when examining infant deaths and 2) PPOR divides the overall feto-infant mortality rate of a community into four periods aimed at prevention (Figure 25):

- **Maternal Health/Prematurity** (infant and fetal deaths weighing less than 1,500 g)
- **Maternal Care** (fetal deaths weighing 1,500 g or more)
- **Newborn Care** (neonatal deaths weighing 1,500 g or more)
- **Infant Health** (postneonatal deaths weighing 1,500 g or more)

Figure 25. Perinatal Periods of Risk (PPOR) Map (adapted from CityMatCH)

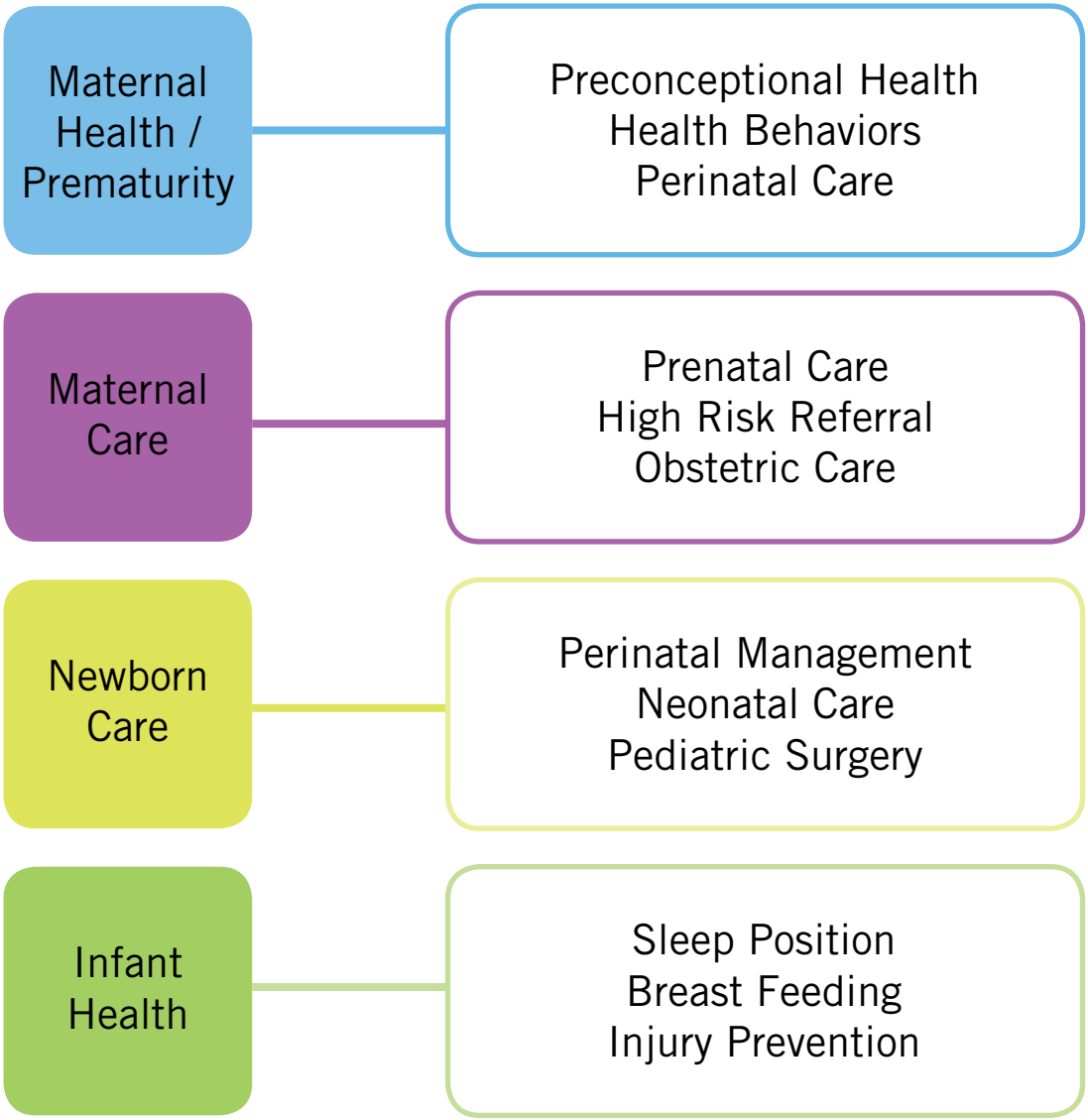


The PPOR analysis compares feto-infant mortality rates of a community to a reference group that has the "best" birth outcomes. In this report, the reference group is a group of births in Alabama in 2009 to non-Hispanic White women who were 20 or more years of age with 13 or more years of education. The PPOR analysis then calculates excess deaths from the target and comparison groups to determine the target community's "opportunity gap".

The PPOR mapping of feto-infant mortality into these four periods of risk enables communities to identify and further investigate periods where there are the greatest opportunities for local impact.

The PPOR is about action. Each component period of risk can then be associated with suggested potential areas of focus for prevention strategies, as shown Figure 26.

Figure 26. The PPOR Periods of Risk Labeled by Primary Prevention Areas and Potential Prevention Strategies (adapted from CityMatCH)



There are six comprehensive steps to the PPOR approach:

1. **Assure Analytic and Community Readiness**
2. **Conduct Analytic Phases of PPOR**
3. **Develop Strategic Actions for Targeted Prevention**
4. **Strengthen Existing and/or Launch New Prevention Initiatives**
5. **Monitor and Evaluate Approach**
6. **Sustain Stakeholder Investment and Political Will**

Each of these steps is an essential building block with each building upon the previous. The approach divides feto-infant mortality into four strategic prevention areas: maternal health/prematurity, maternal care, newborn care, and infant health. PPOR mapping of feto-infant mortality enables communities to identify and further investigate areas in which there are the greatest opportunities for local impact. Follow-up investigations provide in-depth information and strategic direction for targeted prevention of fetal and infant mortality.

The data analysis in PPOR is actually just one part of a large process of community partnership, understanding, consensus, and mobilization to address feto-infant mortality. In this report, we only present the phase 1 analysis of PPOR approach from 2009 data.

Fetal deaths less than 24 weeks of gestation, live births and fetal deaths weighing less than 500 grams (g), as well as spontaneous and induced abortions and births with unknown birthweight, are excluded from the analysis to ensure comparability across regions and time periods through the use of uniform reporting criteria.

PPOR Phase 1 Analysis by Perinatal Region

After excluding 1) <500 g infants and fetal deaths, 2) fetal death <24 weeks and 3) implausible birthweight, the feto-infant deaths in each region and total resident births are shown in Table 12.

Table 12. Live Births and Feto-Infant Deaths by Perinatal Region in 2009*

Region	Maternal Health/ Prematurity	Maternal Care	Newborn Care	Infant Health	Fetal-Infant Death	Live Births
Region I	59	28	22	27	136	12,309
Region II	23	14	8	7	52	4,641
Region III	113	52	25	50	240	21,422
Region IV	27	20	10	26	83	9,513
Region V	72	33	11	35	151	14,446
Reference	50	18	17	27	112	19,843

The feto-infant mortality rates in each region are mapped into the four periods of risk. The overall feto-infant mortality rates are also presented in Table 13.

Table 13. Feto-Infant Mortality Rates by Perinatal Region in 2009*

Region	Maternal Health/ Prematurity	Maternal Care	Newborn Care	Infant Health	Feto-Infant Mortality Rate
Region I	4.7	2.2	1.8	2.2	10.9
Region II	4.9	3.0	1.7	1.5	11.1
Region III	5.2	2.4	1.2	2.3	11.1
Region IV	2.8	2.1	1.0	2.7	8.6
Region V	4.9	2.3	0.8	2.4	10.3
Reference	2.5	0.9	0.9	1.4	5.6

*In this report, feto-mortality rate is number of fetal (birthweight between 500 g and 6,999 g and age of gestation ≥24 weeks) and infant deaths (birthweight between 500 g and 6,999 g) per 1,000 live births (birthweight between 500 g and 6,999 g) plus fetal and infant deaths.

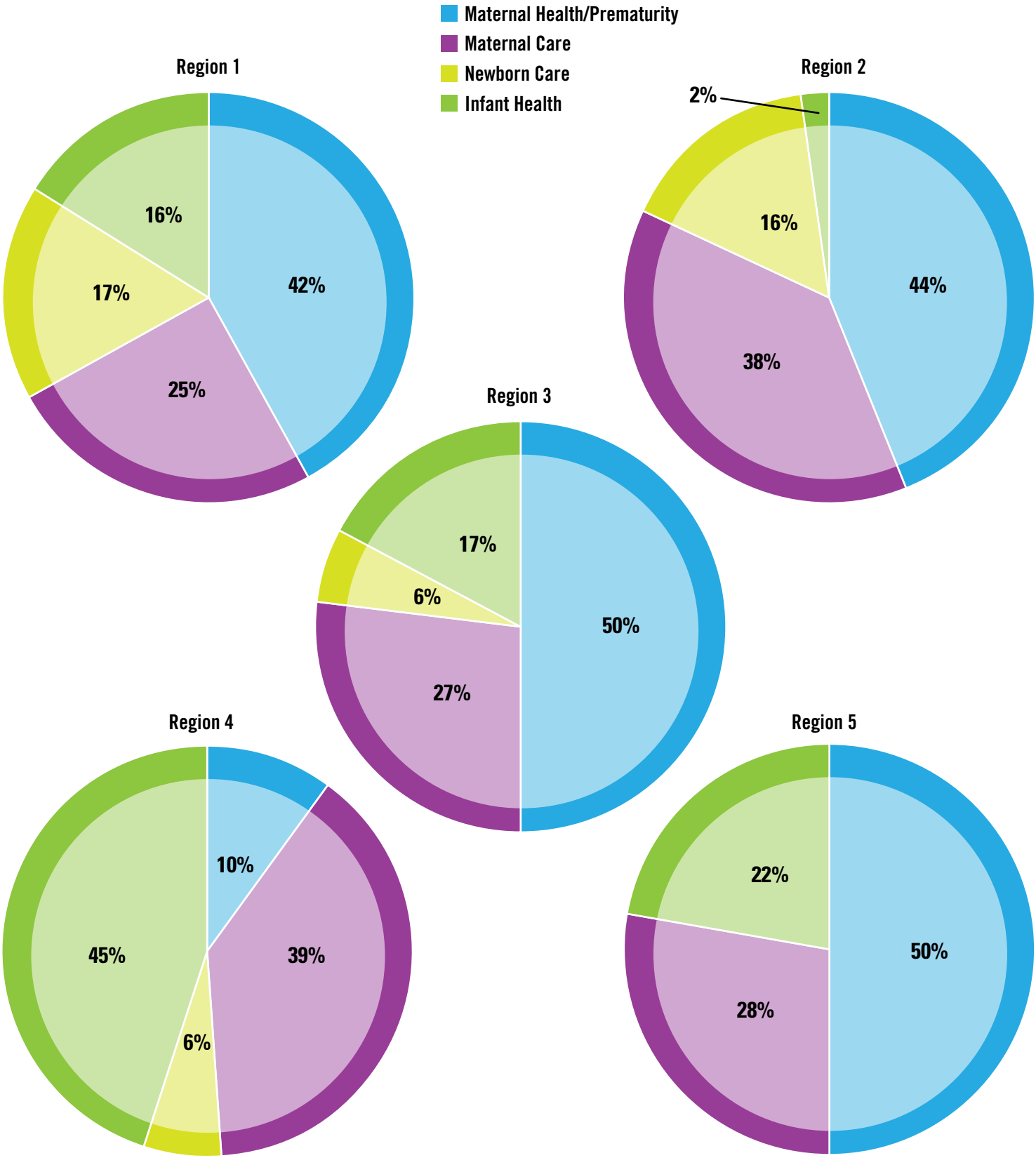
Excess feto-infant mortality rates are calculated by subtracting Alabama reference population from the target population for each of the periods of risk. The excess feto-infant mortality rates for Region 1 to 5 compared to Alabama reference group are 5.3, 5.5, 5.5, 3.0, and 4.7 per 1,000 live births and fetal deaths (Table 14).

Table 14. Excess Feto-Infant Mortality Rates by Perinatal Region in 2009

Region	Maternal Health/ Prematurity	Maternal Care	Newborn Care	Infant Health	Feto-Infant Mortality Rate
Region I	2.2	1.3	0.9	0.8	5.3
Region II	2.4	2.1	0.9	0.1	5.5
Region III	2.7	1.5	0.3	1.0	5.5
Region IV	0.3	1.2	0.2	1.4	3.0
Region V	2.4	1.4	-0.1	1.0	4.7

Comparing each region to Alabama reference group with optimal birth outcomes helps target deaths that could be prevented. Except for Region IV, the highest percentage of the excess feto-infant deaths was in the Maternal Health/Prematurity group. Approximately 42%, 44%, 50%, and 50% of the excess feto-infant mortality were in the Maternal Health/Prematurity group in Region I, II, III, and V, respectively. In Region IV, approximately 45% of the excess feto-infant deaths were in Infant Health group (Figure 27).

Figure 27. Distribution of Excess Feto-infant Mortality by Period of Risk in 2009



Estimated excess feto-infant deaths in each region in 2009 are shown in Table 15. A total of 66, 26, 118, 29, and 69 excess, or preventable, feto-infant deaths in Region I, II, III, IV, and V, respectively.

Table 15. Estimated Excess Feto-Infant Deaths by Perinatal Region in 2009

Region	Maternal Health/ Prematurity	Maternal Care	Newborn Care	Infant Health	Feto-Infant Mortality
Region I	28	17	11	10	66
Region II	11	10	4	1	26
Region III	59	32	7	21	119
Region IV	3	11	2	13	29
Region V	35	20	-1	15	69
Total	136	90	23	60	309

PPOR Phase 1 Analysis by Race/Ethnicity

The feto-infant deaths and live births by race/ethnicity are shown in Table 16.

Table 16. Live Births and Feto-Infant Deaths by Race/Ethnicity in 2009

Race/Ethnicity	Maternal Health/ Prematurity	Maternal Care	Newborn Care	Infant Health	Feto-infant Death	Live Births
Non-Hispanic White	115	59	50	80	304	35997
Non-Hispanic Black	152	76	20	54	302	18773
Hispanic & Other	27	12	6	11	56	7561
Reference	50	18	17	27	112	19843

The feto-infant mortality rates by race/ethnicity are mapped into the four periods of risk. The overall feto-infant mortality rates are also presented in Table 17.

Table 17. Feto-Infant Mortality Rates by Race/Ethnicity in 2009

Race/Ethnicity	Maternal Health/ Prematurity	Maternal Care	Newborn Care	Infant Health	Feto-Infant Mortality Rate
Non-Hispanic White	3.2	1.6	1.4	2.2	8.4
Non-Hispanic Black	8.0	4.0	1.0	2.8	15.8
Hispanic & Other	3.5	1.6	0.8	1.4	7.4
Reference	2.5	0.9	0.9	1.4	5.6

The excess feto-infant mortality rates for non-Hispanic White, non-Hispanic Black, and Hispanic compared to Alabama reference group are 2.8, 10.2, and 1.7 per 1,000 live births and fetal deaths (Table 18).

Table 18. Excess Feto-Infant Mortality Rates by Race/Ethnicity in 2009

Race/Ethnicity	Maternal Health/ Prematurity	Maternal Care	Newborn Care	Infant Health	Feto-Infant Mortality Rate
Non-Hispanic White	0.7	0.7	0.5	0.9	2.8
Non-Hispanic Black	5.5	3.1	0.2	1.5	10.2
Hispanic & Other	1.0	0.7	-0.1	0.1	1.7

The distribution of excess feto-infant mortality by race/ethnicity is shown in Figure 28. Estimated excess feto-infant deaths by race/ethnicity in 2009 are shown in Table 19. A total of 100, 195, and 13 excess, or preventable, feto-infant deaths among non-Hispanic White, non-Hispanic Black and Hispanic, respectively.

Figure 28. Distribution of Excess Feto-infant Mortality by Period of Risk and Race/ Ethnicity in 2009

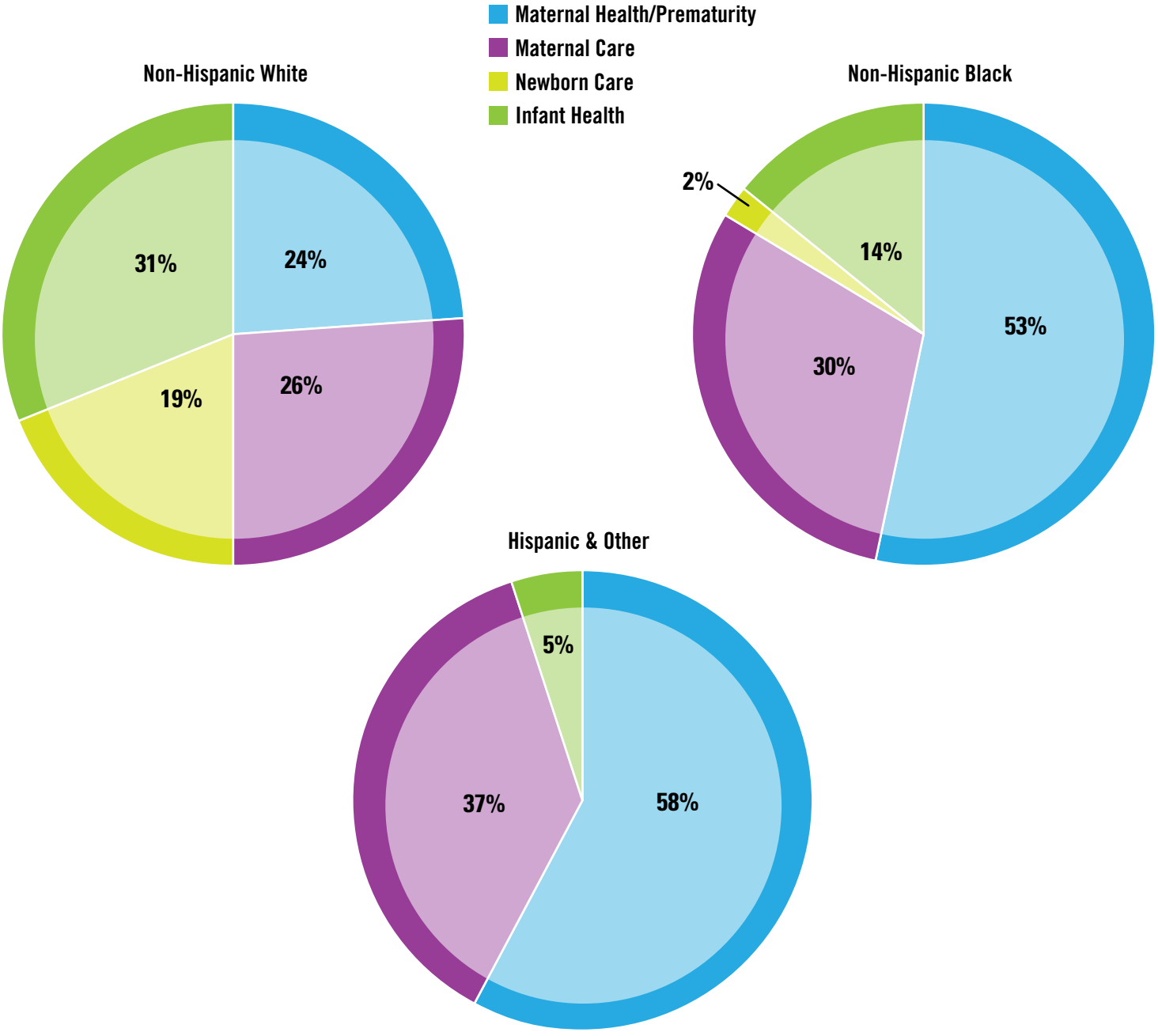


Table 19. Estimated Excess Feto-Infant Deaths by Race/Ethnicity in 2009

Race/Ethnicity	Maternal Health/ Prematurity	Maternal Care	Newborn Care	Infant Health	Feto-Infant Mortality
Non-Hispanic White	24	26	19	31	100
Non-Hispanic Black	104	59	4	28	195
Hispanic & Other	8	5	0	1	14
Total	136	90	23	60	309

In summary, there were 309 excess feto-infant deaths in 2009. Of 309 excess feto-infant deaths, 66 were in Region I, 26 in Region II, 119 in Region III, 29 in Region IV, and 69 in Region V. Of 309 excess feto-infant deaths, 100 were non-Hispanic White, 195 were non-Hispanic Black, and 14 were Hispanic and others. Non-Hispanic Black accounted for 63% of excess feto-infant deaths in 2009.

According to PPOR analysis for 2009, excess feto-infant deaths in Regions I, II, III, and V mainly occurred in the perinatal periods of Maternal Health/Prematurity and Maternal Care, which suggests that primary prevention areas and prevention strategies need to focus on preconception health, healthy behaviors, perinatal care, high risk referral, and obstetric care. In Region IV, excess feto-infant deaths mainly occurred in the perinatal periods of Infant Health and Maternal Care, which suggests that primary prevention areas and prevention strategies need to focus on prenatal care, high risk referral, obstetric care, sleep position, breast feeding, and injury prevention.

Technical Notes

ADEQUACY OF PRENATAL CARE UTILIZATION INDEX (APNCU) This index, also known as the Kotelchuck Index of Prenatal Care, was designed as an improvement on the Kessner Index. It has 5 values: 1 = adequate plus, 2 = adequate, 3 = intermediate, 4 = inadequate and 5 = unknown. Its major advantage is that it divides the adequate into two categories. Those with adequate plus had other risk factors, which increased the number of visits. The index can serve as an indicator that some medical condition required additional prenatal care. [Kotelchuck M., "An Evaluation of the Kessner Adequacy of Prenatal Care Index and a Proposed Adequacy of Prenatal Care Utilization Index", American Journal of Public Health, 1994, 84(9):1414-20.]

BIRTHWEIGHT The first weight of the fetus or newborn obtained after birth. This weight preferably is measured within the 1st hour of life, before a significant postneonatal weight loss has occurred.

CONGENITAL ANOMALIES The abnormality of the structure of a body part. 'Birth defect' is a widely-used term for a congenital malformation or anomaly which is recognizable at birth.

CAUSE OF DEATH The cause of death presented in this publication is the "underlying cause" which is defined as the cause deemed responsible for the sequence of morbid events leading directly to death or the circumstances of the accident or violence that produced the fatal injury. Deaths, by cause, are classified according to the International Classification of Diseases (ICD), Tenth Revision, following instructions established by the National Center for Health Statistics.

DEATH Death is defined in Black's Law Dictionary, Sixth Edition as "The cessation of life; permanent cessations of all vital functions and signs." For definitions of the determination of death under other than general circumstances, the Code of Alabama should be consulted.

FETAL DEATH "Death prior to the complete expulsion or extraction from the mother of a product of human conception, irrespective of the duration of pregnancy and which is not an induced termination of pregnancy. The death is indicated by the fact that after the expulsion or extraction the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles. Heartbeats are to be distinguished from transient cardiac contractions; respirations are to be distinguished from fleeting respiratory efforts or gasps." Code of Alabama, 1975, Section 22-9A-1. While the definition of fetal death includes all gestations, only fetal deaths that have advanced to or are beyond the twentieth week of uterogestation are required to be reported under Alabama law and they are the only ones counted as fetal deaths in this publication.

$$\text{Fetal Death Rate} = \frac{\text{Number of Fetal Deaths 20 or More Weeks in Gestation}}{\text{Number of Live Births+Fetal Deaths}} \times 1{,}000$$

GESTATION The period of development from the time of fertilization of the ovum to birth. In these publications, the terms gestation and uterogestation are used synonymously.

INFANT DEATH Death of a liveborn infant under one year of age. The term excludes fetal death.

$$\text{Infant Mortality Rate} = \frac{\text{Number of Deaths Under 1 Year of Age}}{\text{Number of Live Births}} \times 1{,}000$$

INTERNATIONAL CLASSIFICATION OF DISEASES (ICD) A publication of the World Health Organization (WHO) that provides the essential ground rules for the coding and classification of cause-of-death data. The purpose of the ICD and of WHO sponsorship is to promote international comparability in the collection, classification, processing and presentation of health statistics. In addition to being a classification system, the rules provide for identification of a single condition on the death certificate that is considered most informative from a public health point of view, called the underlying cause of death.

LATE PRENATAL CARE Medical care during pregnancy that is initiated after the first trimester (after the 3 month).

LIVE BIRTH "The complete expulsion or extraction from the mother of a product of human conception, irrespective of the duration of the pregnancy, which, after such expulsion or extraction, breathes or shows any other evidence of life such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached. Heartbeats are to be distinguished from transient cardiac contractions; respirations are to be distinguished from fleeting respiratory efforts or gasps." Code of Alabama, 1975, Section 22-9A-1. In these publications, the terms live birth and birth are used synonymously.

LOW BIRTH WEIGHT A weight at birth of under 2,500 g or under 5 pounds and 8 ounces.

NEONATAL DEATH Death of a liveborn infant occurring within the first 27 days of life.

$$\text{Neonatal Mortality Rate} = \frac{\text{Number of Deaths Under 28 Days of Age}}{\text{Number of Live Births}} \times 1{,}000$$

OCCURRENCE DATA Data compiled as to the geographical place where the event occurred.

POSTNEONATAL DEATH Death of a liveborn infant after the first 27 days of age, but before one year of age.

$$\text{Postneonatal Mortality Rate} = \frac{\text{Number of Deaths 28 or More Days, But Less Than 1 Year of Age}}{\text{Number of Live Births}} \times 1{,}000$$

RESIDENCE DATA Data compiled as to the place of residence without regard to the geographical place where the event occurred. For births and deaths, place of residence of mother is used.

TRIMESTER A 3-month period of time. First trimester care, for example, refers to care initiated in the first three months of pregnancy.

VERY LOW BIRTH WEIGHT A weight at birth of less than 1,500 g or under 3 pounds and 5 ounces.

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