



# Healthy Mothers, Healthy Babies

*South Carolina's Plan*  
To Reduce Infant Mortality & Premature Births



*The “Healthy Mothers, Healthy Babies” is a trademark of  
the National Healthy Mothers Healthy Babies Coalition,  
which is not associated with preparation or distribution of this report.*

## Acknowledgments

South Carolina is fortunate to have many highly-skilled professionals with expertise in maternal and child health and strong commitments to the reduction of infant mortality. The chief authors of this report are Lisa F. Waddell, MD, MPH, Brenda Y. Martin, RN, NE.A, MN, Michael G. Smith, MSPH, and Lucy H. Gibson, MSW, LMSW, from S.C. Department of Health and Environmental Control (DHEC) and Breana N. Lipscomb, MPH, from S.C. March of Dimes. Daniela Nitcheva, PhD, from DHEC made significant contributions in data retrieval and analysis. Special thanks also go to the following professionals who shared their time and content expertise: Dr. Richard Foster from the South Carolina Hospital Association, Dr. Amy Picklesimer from Greenville Health System, Megan Branham and Amy Nienhuis from S.C. Children's Trust, and Melanie Giese from S.C. Department of Health and Human Services. We also credit federal partners who convened the Region IV and Region VI Infant Mortality Summit. This event launched a collaborative multi-state initiative to improve infant health outcomes and reduce infant mortality and prematurity across the United States. These partners include the Health Resources and Services Administration, Association of Maternal and Child Health Programs, US Department of Health and Human Services, Association of State and Territorial Health Officials, and the March of Dimes. Finally, we dedicate this report to the families who have experienced the heartbreak of infant deaths. Through collaboration and implementation of evidence based practices, South Carolina will strive to have more of our smallest citizens reach their first birthdays and go on to live happy, healthy, and productive lives.

# Table of Contents

Executive Summary .....	iii
Key Definitions .....	iv
What is Infant Mortality? .....	1
Why Does Infant Mortality Matter? .....	1
Infant Mortality in South Carolina .....	2
Is Everyone Impacted Equally? .....	2
Recommendations and Strategies for South Carolina	
Recommendation A: Improve Access to Systems of Care for Women Before, During and After Pregnancy .....	5
Recommendation B: Promote Use of Evidence-Based Patient Practices by Health Care Providers and Families.....	6
Recommendation C: Promote Health across the Lifespan .....	6
Recommendation D: Develop Data Systems to Understand and Inform Efforts.....	7
Recommendation E: Eliminate Disparities and Promote Health Equity .....	7
South Carolina’s Conceptual Model for Reducing Infant Mortality .....	8
South Carolina’s Priorities to Address Infant Mortality.....	9
Health Equity and the Life Course Perspective .....	12
Causes of Infant Mortality .....	14
Maternal and Infant Risk Factors for Infant Mortality .....	14
Maternal Risk Factors and Lifestyle Choices Contributing to Infant Mortality .....	15
What is South Carolina Doing? .....	19
South Carolina’s Healthy Mothers, Healthy Babies Infant Mortality Prevention Team .....	21
S.C. Collaboratives .....	22
Evaluation .....	24
Closing Summary .....	24
References.....	25
Appendices	
Appendix A: Summary of Analysis to Suggest a Geographic Area of Focus and Intervention Strategy for Infant Mortality Reduction in South Carolina.....	26
Appendix B: S.C. Infant Mortality Team SWOT Analysis .....	36

## Executive Summary

Infant mortality, a proxy measure for population health, is a cause of great concern for states, the nation, and the world. Its impact on families and society is profound. In South Carolina (S.C.), the infant mortality rate (IMR) has decreased by 22.1% since 2005. The 2010 rate of 7.4 deaths per 1000 live births remains higher than the U.S. rate of 6.14 deaths per 1000 live births and the Healthy People 2020 target of 6.0 infant deaths per 1,000 live births. The infant mortality rate (IMR) among black and other infants is still nearly twice the rate observed among white infants.

The leading causes of infant deaths in S.C. are birth defects, disorders related to low birth weight and preterm birth, Sudden Infant Death Syndrome, and accidents. Access to systems of care, evidence-based patient practices, and health across the lifespan are three priority areas that can directly impact these causes. Health equity underpins all of the priority areas. Concerns in population health can be traced to economic and social conditions that are unequal dependent on race. The state must work toward achieving health equity at the risk factor and outcome levels to reduce the IMR. Additionally, there are geographic inequities across the state. A data analysis identified nine counties that had greater than the median number and rate of infant deaths. These counties, plus three of the most populous areas, will be a focus of targeted intervention.

Maternal health is a significant contributing factor to infant mortality as well. Women with chronic conditions such as diabetes, hypertension, and obesity are at greater risk for poor pregnancy outcomes. A life course perspective, including preconception and interconception care, is essential to prevent or decrease these risks.

Two state-level efforts addressing infant mortality are S.C. Department of Health and Environmental Control's (DHEC) Healthy Mothers, Healthy Babies (HMHB) Plan for Reducing Infant Mortality in South Carolina and the Birth Outcomes Initiative (BOI) led by S.C. Department of Health and Human Services (S.C.DHHS). DHEC and S.C.DHHS have long-standing positive relationships with major maternal and child stakeholders, including the S.C. Hospital Association, March of Dimes, physicians, and numerous community agencies, who are participating in both efforts. Some early successes of the BOI include: implementing a policy to discourage elective deliveries before 39 weeks of gestation; facilitating access to 17-alpha hydroxyprogesterone (17P), a medicine that can help prevent preterm births in some pregnant women who have already had a preterm birth; and streamlining access to Medicaid for pregnant women through assumptive eligibility. S.C. is also participating in Collaborative Improvement and Innovation Networks (CoIIN) convened by the federal government to address interconception care, perinatal regionalization, smoking cessation, early elective deliveries, and Sudden Unexplained Infant Death (SUID) // Sudden Infant Death Syndrome (SIDS) / Safe Sleep.

DHEC, with legislative support, has built and maintained a system of perinatal regionalization (PR) that is widely regarded as one of the strongest in the country. PR ensures that high-risk deliveries take place at one of the state's five regional perinatal centers to improve maternal and infant outcomes, and that staff across the state receives best practice education. Regional Systems Developers (RSDs) work closely with a network of Maternal-Fetal Medicine (MFM) specialists and neonatologists to improve outcomes for both mothers and babies.

Other practices and programs that are being utilized in the fight against infant mortality include: hospital and physician emphasis on patient quality and safety; evidence-based maternal and infant home visitation programs; postpartum newborn home visits; March of Dimes funding, research, and education; and the S.C. Birth Defects Program. All who are engaged in this work are determined to give every child in South Carolina the best chance for a happy and productive life.

HMHB is a comprehensive plan with five recommended focus areas: 1) improve access to systems of care; 2) promote use of evidence-based patient practices; 3) promote health across the lifespan; 4) use data to inform practice and drive decision-making; and 5) achieve health equity. These recommendations include a total of thirty-four strategies that will lead to meaningful and measurable reductions in infant deaths in the state.

## Key Definitions

**Extremely Low Birth Weight (ELBW):** Birth weights less than 1000 grams

**Fetal Death:** Death that occurs in utero at greater than or equal to 20 weeks of gestation

**Infant Death:** Death of an infant before the first birthday

**Infant Mortality Rate (IMR):** Number of infant deaths per 1000 live births

**Low Birth Weight (LBW):** Birth weights less than 2500 grams

**Neonatal Mortality Rate (NMR):** Number of infant deaths per 1000 live births that occurs at less than 28 days of life

**Postneonatal Mortality Rate (PNMR):** Number of infant deaths per 100 live births that occur between 28 days to 364 days

**Very Low Birth Weight (VLBW):** Birth weights less than 1500 grams

## What is Infant Mortality?

Infant mortality is defined as a death occurring during the first year of life. The infant mortality rate (IMR) is an important health outcome measure that is often used as a measure of the overall health status of a given population. It reflects the health status of mothers and children, and is also indicative of underlying socioeconomic and racial disparities.

Infant mortality is often subdivided into neonatal mortality (death in the first 27 days of life) and post-neonatal mortality (death from 28-365 days). These subdivisions are useful because the leading causes of neonatal deaths are often different than the leading causes of post-neonatal deaths. The leading causes of neonatal mortality include: disorders related to short gestation and low birth weight, birth defects, and maternal complications of pregnancy. The leading causes of post-neonatal mortality include: Sudden Infant Death Syndrome (SIDS), birth defects, and accidents. In developing and assessing infant mortality reduction strategies, it is important to consider whether the strategy is likely to impact neonatal mortality, post-neonatal mortality, or both.

## Why Does Infant Mortality Matter?

Infant mortality is a sentinel event and major public health issue that reflects the health of societies at local, state, national, and international levels. The United States Department of Health and Human Services (DHHS) Secretary, Kathleen Sibelius, has announced a national call to action to address infant mortality.

Costs associated with services, medical and support, are high for low birthweight infants. The National Healthy Start Association reports that low birth weight babies that survive the first year average medical bills of \$93,800. For the smallest survivors, the costs may reach \$273,900. Significant savings to society can be obtained by implementing interventions that improve the chances of a positive outcome. Prenatal interventions that result in a normal birth weight save \$59,700 in medical expenses during the first year of life.

In South Carolina, maternal health (particularly preconception obesity, hypertension, and diabetes), socioeconomic factors, poverty, reductions in public programs for women and children, and lack of access to preventive and primary care all contribute to poor pregnancy outcomes, including infant mortality. This plan outlines efforts toward improving prenatal outcomes in order to impact the tragedy of infant death, its emotional toll upon families, and society's loss of the potential contributions of these citizens.

**T**he leading causes of infant deaths in S.C. are birth defects, disorders related to low birth weight and preterm birth, Sudden Infant Death Syndrome, and accidents. Access to systems of care, evidence-based patient practices, and health across the lifespan are three priority areas that can directly impact these causes.

## Infant Mortality in South Carolina

South Carolina's IMR, similar to the majority of southeastern states, has been among the highest in the country for many years. However, South Carolina's IMR has been consistently improving in recent years, dropping from 8.9 in 2001 to 7.4 in 2011 (a nearly 17% decrease). Though South Carolina has made improvements in recent years, the most recent national infant mortality data released by the National Center for Health Statistics show that South Carolina continues to lag behind other southern states<sup>1</sup>.

**Table 1.** Infant Mortality Rates by State, 2009

Rank	State	2009 IMR*
1	Texas	6.0
2	Kentucky	6.8
3	Florida	6.9
4	South Carolina	7.1
4	Virginia	7.1
6	Georgia	7.3
7	Arkansas	7.6
8	Oklahoma	7.9
8	North Carolina	7.9
10	Tennessee	8.0
11	Alabama	8.3
12	Louisiana	8.8
13	Mississippi	10.1
	<b>United States</b>	<b>6.4</b>

*\*IMR: Infant Mortality Rate per 1,000 live births*

South Carolina has high rates of underinsured and uninsured women, and the rising costs of health care adversely affect the poor, as well as the middle class. These high costs result in limited access to preventive and prenatal care, thus, increasing the risk of poor health for mothers and infants.

## Is Everyone Impacted Equally?

South Carolina's IMR has decreased by 22.1% since 2005; however, the 2011 rate of 7.4 deaths per 1000 live births remains higher than the U.S. 2011 rate of 6.14 deaths per 1000 live births. South Carolina's rate is 21% higher than the Healthy People 2020 Goal of reducing the rate of deaths to an average of 6.0 per 1000 live births. The four leading causes of infant death in S.C., birth defects, preterm birth/low birth weight, sudden infant death syndrome (SIDS), and accidents, accounted for 50.6% of all infant deaths in 2011.

Although the overall IMR in S.C. has declined, the rate for black and other infants is still greater than twice the rate for white infants (white: 5.0 infant deaths per 1,000 live births in 2011; black and other: 11.8 infant deaths per 1,000 live births in 2011). Disorders related to preterm birth and low birth weight is the leading cause of death for infants born to African-American women. It is important that efforts aimed at reducing the racial disparity in infant mortality be pursued along with, and as part of, efforts to reduce the overall IMR in South Carolina.

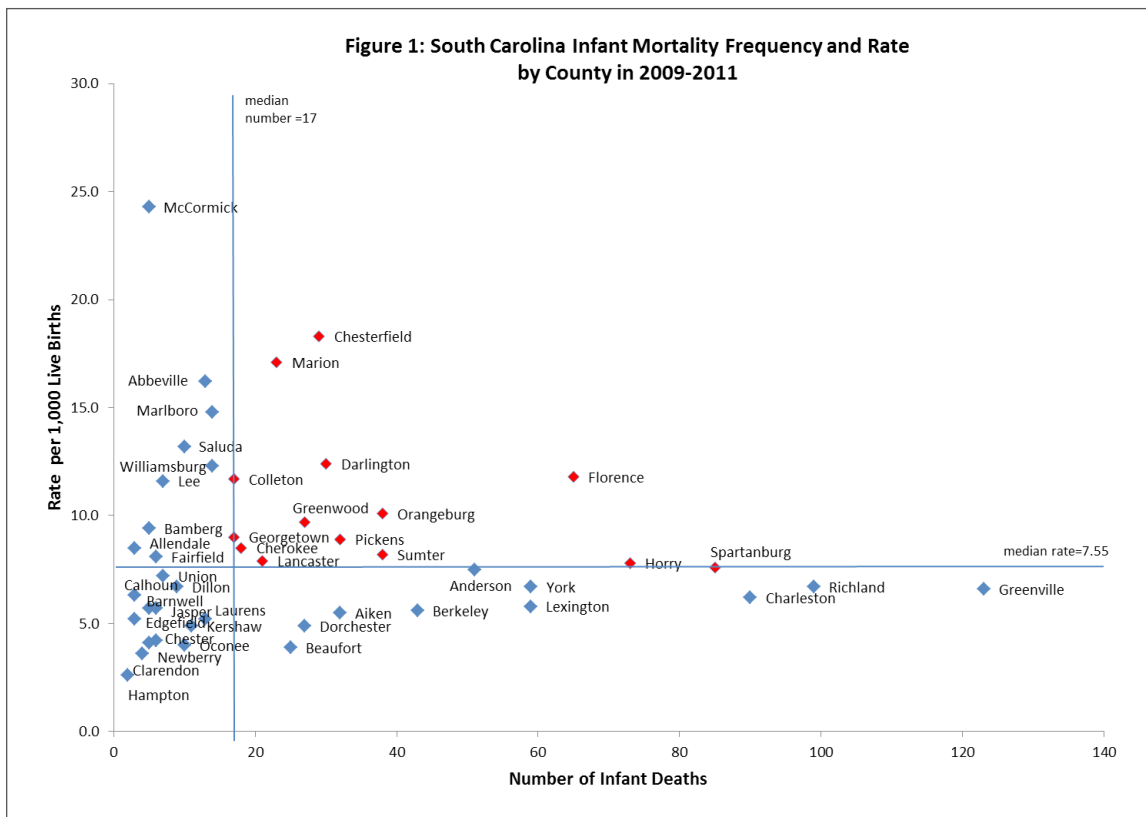
Another way to examine the differential impact of infant mortality on South Carolina's citizens is by examining geographic disparities. Rates of infant deaths and numbers of infant deaths were examined for each county in the state for 2009-2011 (Figure 1) and for 2006-2008 (Figure 2), and counties that had greater than the median number and rate



of infant deaths for both time periods were identified. This resulted in the identification of nine counties: Cherokee, Chesterfield, Darlington, Florence, Georgetown, Greenwood, Horry, Marion, and Orangeburg.

These nine counties accounted for 17.4% of all live births, but for 24.9% of all infant deaths in South Carolina from 2009-2011. The infant mortality rate for these nine counties from 2009-2011 was 10.4 deaths per 1,000 live births, while the infant mortality rate for the state from 2009-2011 was 7.3 deaths per 1,000 live births. This equates to about 96 excess infant deaths in these counties from 2009-2011. Due to this, these counties, or a selection of these counties, can be targeted as primary geographic areas of focus for infant mortality prevention efforts. It may be cost-effective to target efforts to a subset of these counties, as many of them are located in the Pee Dee region of South Carolina (Figure 3). Because there are significant racial and ethnic disparities in infant mortality rates, it is critical to utilize interventions proven to work with disparate populations, to seek and employ input from consumers, and to involve key community-based organizations such as Healthy Start and PASOs in this effort.

Furthermore, three of South Carolina’s most populous counties, Greenville, Richland, and Charleston, have high numbers of infant deaths and are consistently near the median rate of infant deaths. Targeting efforts to pockets within these counties with the highest infant mortality rates also has the potential to substantially reduce infant mortality. A full report titled “Summary of Analyses to Suggest a Geographic Area of Focus and Intervention Strategy for Infant Mortality Reduction in South Carolina” is included in the appendices (Appendix A).



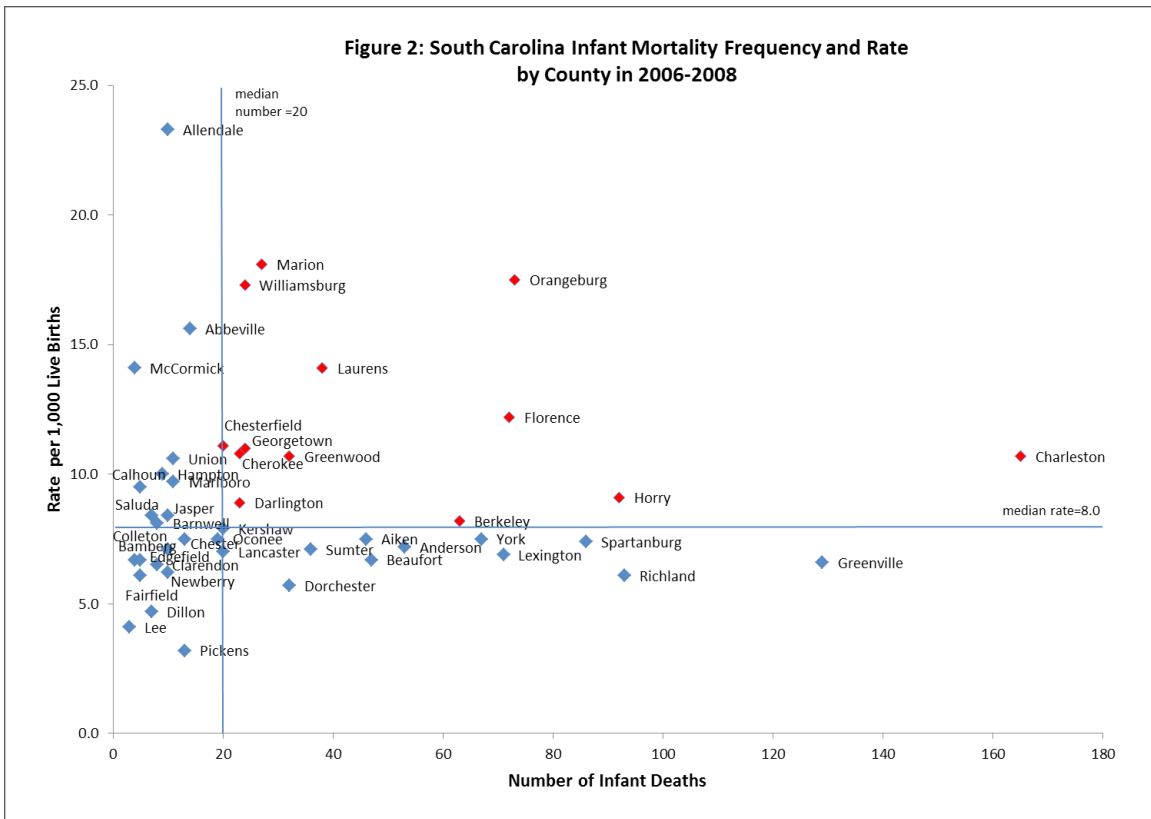
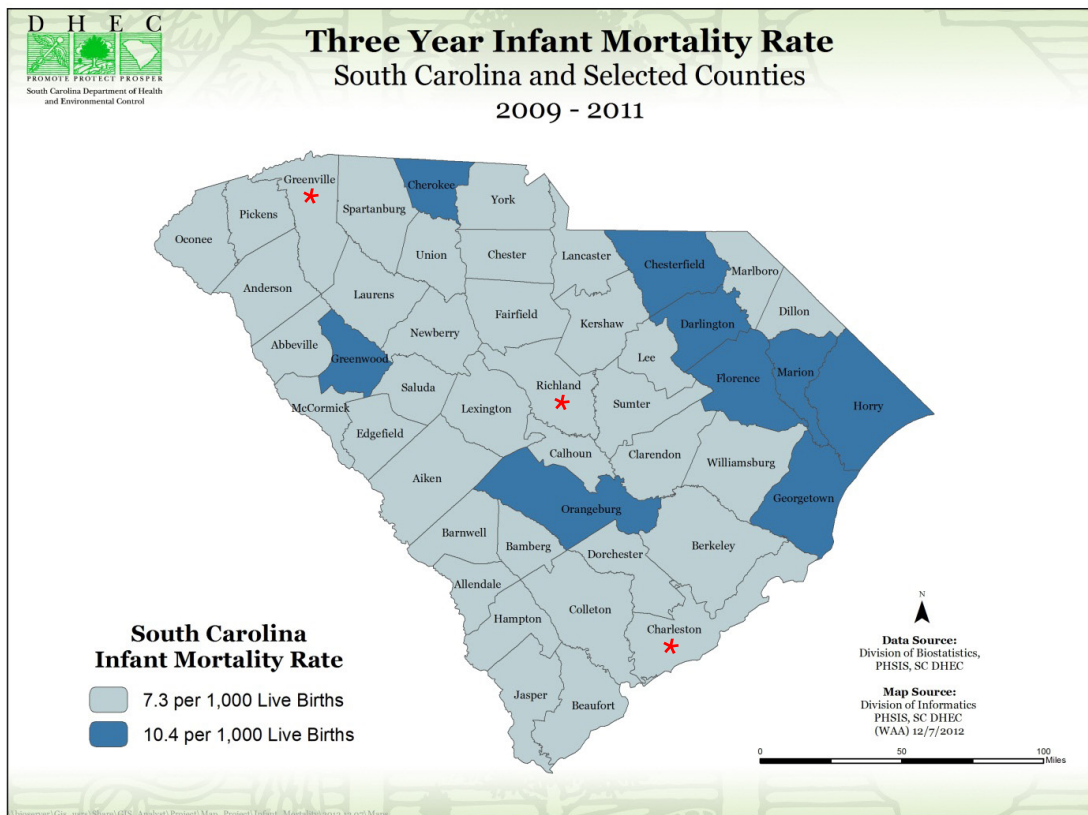


Figure 3. Map of counties that consistently have greater than the statewide median number and rate of infant deaths, 2009-2011.



\*These counties have large number of infant deaths, though their infant mortality rates might not be high. Targeting infant mortality reduction strategies to communities within these counties is also important. See Appendix A for details.

## Recommendations and Strategies for South Carolina

The following recommendations and strategies have been developed or adopted by the South Carolina Healthy Mothers, Healthy Babies Team that includes representatives from S.C. Department of Health and Environmental Control, South Carolina Department of Health and Human Services, South Carolina Hospital Association, and S.C. March of Dimes. Other key partners include the Children’s Trust of South Carolina; Low Country, Palmetto, and Pee Dee Healthy Starts; Perinatal Awareness for Successful Outcomes (PASOs); Nurse-Family Partnership (NFP); S.C. Department of Alcohol and Other Drug Abuse Services (DAODAS); and many others involved with the S.C. Birth Outcomes Initiative.

“Forging a Comprehensive Initiative to Improve Birth Outcomes and Reduce Infant Mortality: Policy and Program Options for State Planning, Association of Maternal and Child Health Programs” published in June 2012, has been an invaluable resource and its content is cited many times throughout this report. This plan outlines five overarching recommendations and 34 strategies. Key themes of the recommendations and strategies are:

- Improve access to systems of care.
- Promote use of evidence-based patient practices.
- Promote health across the lifespan.
- Use data to inform practice and drive decision-making.
- Eliminate disparities and promote health equity

### **Recommendation A: Improve Access to Systems of Care for Women Before, During and After Pregnancy**

Access to health care and related services is a crucial component of ensuring healthy birth outcomes for women and infants. According to the American Congress of Obstetricians and Gynecologists (ACOG), in 2010, 18% of reproductive-age women in the US were uninsured. In South Carolina in 2010, 24.2% of adult women of reproductive age were uninsured. Lack of health care coverage is a major impediment to health care access and often means late or no entry into prenatal care for women. This can result in pregnancy complications and delayed diagnosis of treatable conditions. Furthermore, science indicates that prenatal care may be too late to intervene to fully assure the health of mothers and babies (Alexander GR, Kotelchuck M. Assessing the role and effectiveness of prenatal care: history, challenges, and directions for future research. *Public Health Reports*. 2001; 116:306-316). Comprehensive medical services for women before, during, and between pregnancies are a proven intervention for improving birth outcomes. Access to effective contraceptives is crucial in preventing unplanned or mistimed pregnancies.

#### **Strategies**

- A-1 Ensure that all pregnant women and high-risk infants have access to the appropriate level of care through a well-established regional perinatal system.
- A-2 Streamline the Medicaid applications process.
- A-3 Provide interconception care coordination to women with previous low birth weight and premature deliveries.
- A-4 Improve pregnancy spacing through increased access to long acting reversible contraceptives (LARCS) such as intrauterine devices (IUD) and the contraceptive implant.
- A-5 Reduce barriers to access to prenatal care through the use of telemedicine in perinatal consultations and the use of community health workers to enhance medical workforce capacity.
- A-6 Utilize social media, such as text4baby, Facebook, and Twitter, to deliver health care messages and promote access to resources.

## **Recommendation B: Promote Use of Evidence-Based Patient Practices by Health Care Providers and Families**

Quality patient care is dependent upon implementation of evidence-based practices proven to result in positive outcomes for the intended population. For the perinatal community, evidence-based practices include eliminating non-medically indicated inductions and cesarean deliveries prior to 39 weeks and promoting intended vaginal deliveries; ensuring access to 17- alpha hydroxyprogesterone (17P) when indicated; promoting breastfeeding; implementing the Centering Pregnancy model of group prenatal care for low-risk pregnancies; immunizing pregnant women and infants in accordance with Advisory Committee on Immunization Practices (ACIP) recommendations; encouraging use of folic acid to prevent certain birth defects; preventing Central Line Associated Blood Stream Infections (CLABSI); offering home visitation programs to high-risk populations; decreasing risky behaviors and accidents; and emphasizing the importance of good oral health care to prevent periodontal disease.

Incorporating these evidence-based strategies into the system of care for pregnant women and infants can reduce the risk of birth defects, low birth weight and prematurity, and risky behaviors and accidents, which ultimately affect infant morbidity and mortality. Families who are provided information based on a strong evidence base and rendered from a strengths perspective have the best opportunities to improve their own health, as well as the health of their children.

### **Strategies**

- B-1 Work with all birthing hospitals to sign pledge to stop non-medically indicated inductions and cesarean deliveries prior to 39 weeks.
- B-2 Promote smoking cessation among pregnant women through use of evidence-based interventions and the Tobacco Quit Line.
- B-3 Eliminate preventable harm to mothers and babies through quality care and consistent delivery of evidence-based practices within the healthcare system.
- B-4 1) Working with non-primary infant caregivers such as child care providers, churches, and baby sitters to assure they practice and promote safe sleep recommendations. 2) Standardizing provision of Safe Sleep education and training for providers, including OB, Pediatrics, nursing staff, discharge planners, home visitors, clinic staff. 3) Developing strategic alliances and cooperative partnerships to endorse AAP safe sleep recommendations, promote safe sleep and prenatal smoking cessation. (AARP, sororities, civic groups, students, volunteers, Girl Scouts, and others.)
- B-5 Increase access to and utilization of immunizations recommended by the Advisory Committee on Immunization Practices (ACIP) for pregnant women.
- B-6 Expand Centering Pregnancy Programs; this model's outcomes include empowerment and community building, increased patient satisfaction, reduction in preterm birth, and increased breastfeeding rates.
- B-7 Increase utilization of folic acid and/or multivitamins to impact birth defects.
- B-8 Strengthen, support and promote breastfeeding efforts in the state by: 1) Increasing access to lactation consultants and peer counselors; 2) Increasing the number of hospitals working toward Baby Friendly certification; 3) Implementing a S.C. Breastfeeding Strategic Plan to improve breastfeeding rates; and 4) Increasing the number of employers designated as Mother-Friendly Workplaces.
- B-9 Conduct pulse oximetry screening for critical congenital heart defects (CCHDs) in all S.C. birthing hospitals.
- B-10 Provide culturally-appropriate consumer educational materials about 17P, a medication that can prevent premature births in women who have previously had a preterm birth, to this target population.
- B-11 Expand access to evidence-based home visitation programs for pregnant women and infants that focus on risk factors for maternal, infant, and child morbidity and mortality.
- B-12 Promote use of S.C. Oral Health Coalition's "Oral Health Care for Pregnant Women" guidelines.
- B-13 Develop formal education programs for OB providers to become pregnancy medical homes.

## Recommendation C: Promote Health across the Lifespan

In order to impact infant mortality, promotion and assurance of health and healthy behaviors across the lifespan is critical. Behaviors throughout life, such as physical activity, diet, inter/preconception care, family planning, mental health, and use of tobacco, drugs and alcohol, all affect birth outcomes and underscore the importance of having an effective medical home. Although there have been significant declines over the past four years, South Carolina has the 11th highest teen birth rate in the country. It is critical to delay childbearing in this population since teens have higher rates of low birth weight babies and infant mortality than mothers in their 20s.

In South Carolina in 2010, 24.2% of adult women of reproductive age were uninsured.

Postpartum behaviors such as safe sleeping practices and breastfeeding impact the infant's ability to thrive. Medical interventions have provided many advances in regards to preventing infant mortality and preterm birth; however, if women's health prior to pregnancy could be improved, many more strides in infant mortality reduction could be made. Preconception and interconception health promotion are essential to achieve optimal health status for women and, ultimately, infants (Lu M, Halfon N. Racial and ethnic disparities in birth outcomes; a life course perspective. MCHJ. 2003; 7:13-30).

### Strategies

- C-1 Improve access to interconception health care, with a particular focus on women with chronic diseases and adverse pregnancy outcomes.
- C-2 Reduce teen birth rates through increased implementation of evidence-based teen pregnancy prevention programs and increased access to long-acting reversible contraceptives.
- C-3 Increase the number of providers screening pregnant women for smoking, alcohol and drug use, domestic violence and depression and making appropriate referrals.
- C-4 Increase the number of women who keep the postpartum visit appointments to ensure follow-up for any post-pregnancy health concerns and the opportunity to access a birth control method of their choice.

## Recommendation D: Develop Data Systems to Understand and Inform Efforts

Collecting and analyzing a wide range of data to understand reproductive and infant health, as well as contextual information about health care systems, neighborhoods, personal risk factors and protective factors, and the environment, will help to define the extent, causes and contributors to infant mortality.

### Strategies

- D-1 Use data to identify counties and neighborhoods at highest risk of poor birth outcomes and implement priority interventions in those areas.
- D-2 Conduct a thorough assessment of existing data systems to determine strengths that currently exist and which data systems may need to be developed and/or improved.
- D-3 Create formal data-sharing partnerships to facilitate timely and ongoing data analysis and linkages.
- D-4 Partner with Vital Statistics to devise and implement strategies to improve data quality from birth and death certificates, as well as surveys such as the Pregnancy Risk Assessment Monitoring System and the Behavioral Risk Factor Surveillance System.
- D-5 Work with Community Health and Chronic Disease Prevention partners to collaborate closely on projects around topics in the intersection of chronic disease and maternal and child health.
- D-6 Explore opportunities to expand data analysis capacity through partnerships and collaborations with other researchers such as graduate students, university faculty and staff, and fellows.

## Recommendation E: Eliminate Disparities and Promote Health Equity

Different populations across the United States and South Carolina experience varying burdens of infant mortality. Factors such as race or ethnic group, income level, and educational attainment contribute to the disparities in outcomes. Health disparities should be addressed with strategies designed to improve access to health care and other services. Systems changes are indicated to ensure families and communities are included as equal partners in health interventions.

The Reduction in Health Disparities Workgroup of the South Carolina Birth Outcomes Initiative (BOI), chaired by Amy Picklesimer, MD and co-chaired by Lisa Waddell, MD, completed a report on April 11, 2012 that defines the scope of the problem in the state and identifies promising practices to reduce racial disparities in the rates of low birth weight. This document is an excellent resource for planning and implementing evidence-based interventions.

### Strategies

- E-1 Ensure health care services are provided in a manner compatible with the cultural beliefs, practices, and preferred language of the consumer.
- E-2 Collaborate with community based organizations such as Healthy Start and PASOs to implement culturally appropriate best and promising practices in targeted counties with greatest numbers and rates.
- E-3 Implement programs with an evidence base for the population served.
- E-4 Prepare and maintain current demographic, cultural, and epidemiologic profiles to accurately plan and implement services that respond to the cultural and linguistic characteristics of the population.
- E-5 Offer technical assistance and training to providers at all levels to improve the quality of care for high-risk pregnant women and the level of cultural competence in health care delivery.

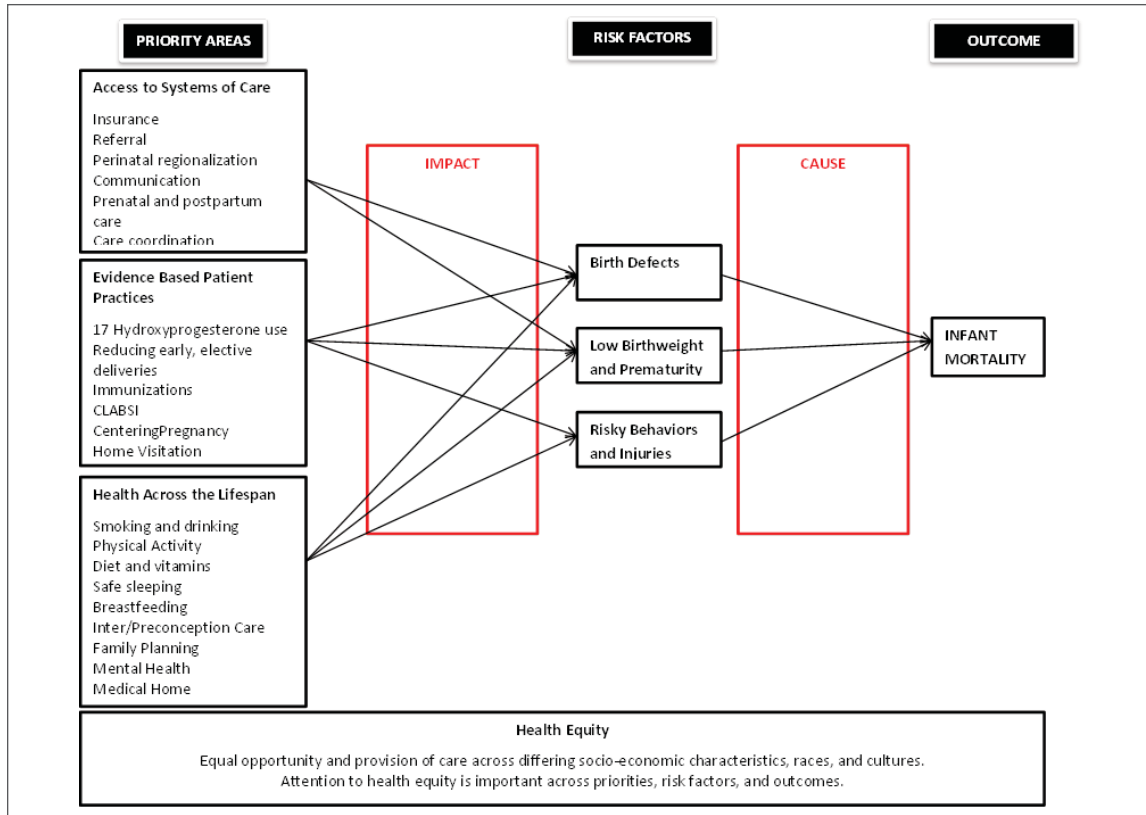
**S**outh Carolina's IMR has been consistently improving in recent years, dropping from 8.9 in 2001 to 7.4 in 2011 (a nearly 17% decrease).

**A**lthough the overall AIMR in SC has declined, the rate for black and other infants is still greater than twice the rate for white infants



# South Carolina's Conceptual Model for Reducing Infant Mortality

Figure 4. Conceptual model for the South Carolina HMHB Plan to Reduce Infant Mortality.

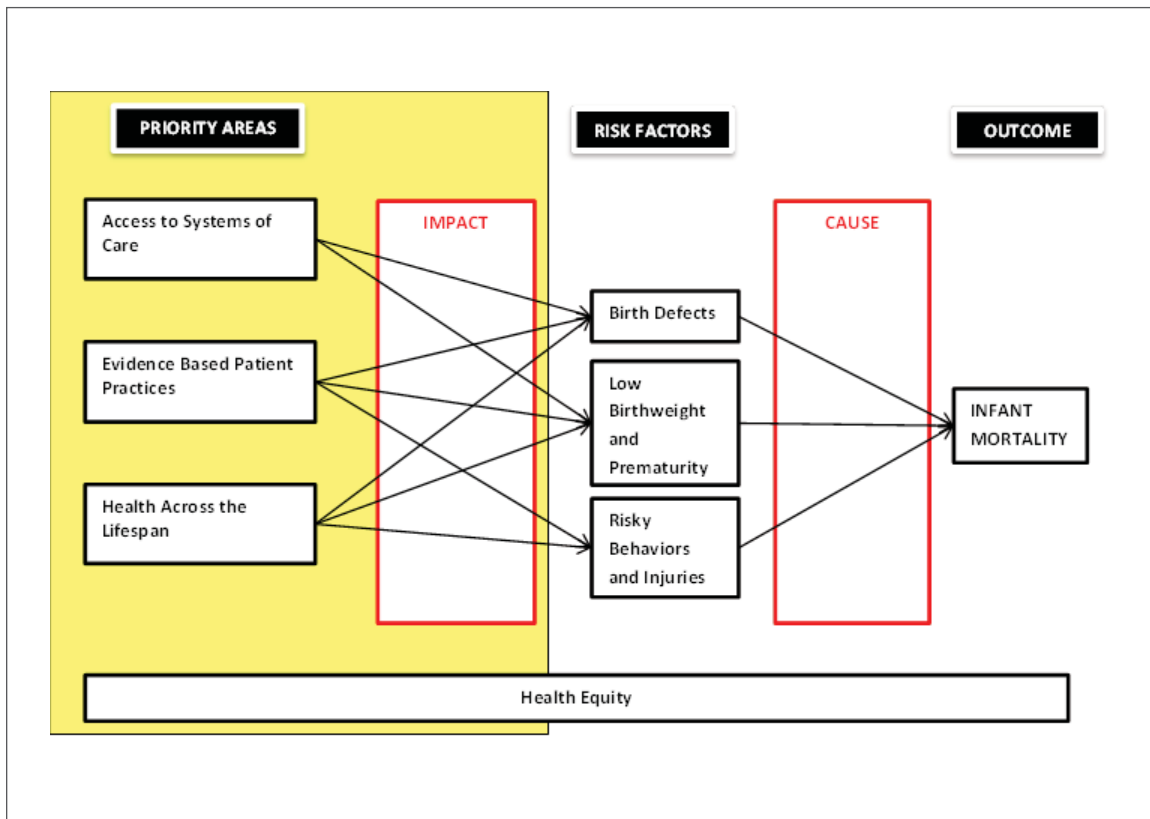


This conceptual model (Figure 4) provides a visual representation of the priority recommendations of the Healthy Mothers, Healthy Babies Plan that lead to strategies that can be utilized to impact the key risk factors that cause infant mortality in S.C.. The selected outcome for improvement is infant mortality. Three key risk factors that cause infant mortality have been identified using the leading causes of infant deaths in South Carolina. These leading causes are birth defects, disorders related to low birth weight and preterm birth, SIDS, and accidents. SIDS deaths are, by definition, of unknown cause; however, risky behaviors (such as smoking and non-back infant sleep positioning) that are associated with SIDS have been clearly identified. Accidental infant deaths are primarily due to accidental suffocation and strangulation in bed as a direct result of co-sleeping with adults and/or other children. Priority areas that impact these risk factors, such as access to systems of care, evidence-based patient practices, and health across the lifespan are identified as the primary areas where interventions can be made. A comprehensive review of risk factors follows the discussion of intervention priorities.

Improving access to systems of care can impact the effects of birth defects and low birth weight and prematurity on infant mortality. Similarly, evidence-based patient practices and health across the lifespan can impact the effects of birth defects, low birth weight and prematurity, risky behaviors and accidents on infant mortality. Each priority area includes a set of strategic points that can be used to form strategies to impact appropriate risk factors. For example, strategies to improve access to systems of care can be formed around insurance, appropriate maternal and infant referral to risk appropriate care, appropriate transport of referred mothers and infants, provider-to-provider and provider-to-patient communication, and access to prenatal and postpartum care. Again, appropriate strategies within these priority areas can impact the risk factors that cause infant mortality in South Carolina. The recommendations included in this report are

designed to produce improvement in at least one of these priority areas and allow for the measurement of success. Health equity is a primary focus of all the strategies and priorities so that appropriate improvements in equity can be achieved at the risk factor and outcome levels.

## South Carolina's Priorities to Address Infant Mortality



HMHB is a roadmap to reduce infant mortality by improving access to systems of care, utilizing evidence-based patient practices, and addressing health across the lifespan. These three priority areas will be described in detail in the following section.

### Access to Systems of Care

Optimal systems of care for pregnant women and infants include insurance with access to prenatal, postpartum, and pediatric care and hospital care; well-informed, interconnected information and referral networks; and mechanisms for coordination of care. Communication must take place in the primary language of the clients, be designed at appropriate literacy levels, and reach the target populations. Perinatal Regionalization brings all of these elements together for the benefit of mothers and infants.

The best-designed system of care has little value unless clients are informed about available services and know how to access them. The DHEC Care Line (1-800-868-0404) links callers to information about prenatal, postpartum, and infant healthcare; Medicaid; transportation to medical appointments; family planning services; immunizations; services for children with special healthcare needs; the WIC program; and other services offered by local public health departments and community agencies. Several Care Line operators are bilingual (English and Spanish) and translation services are available for callers speaking other languages. The 2-1-1 system also facilitates access to various types of services, but is not currently operational in every county in the state. The Benefit Bank of South Carolina assists families with online access to applications for a variety of programs and services, including Medicaid.



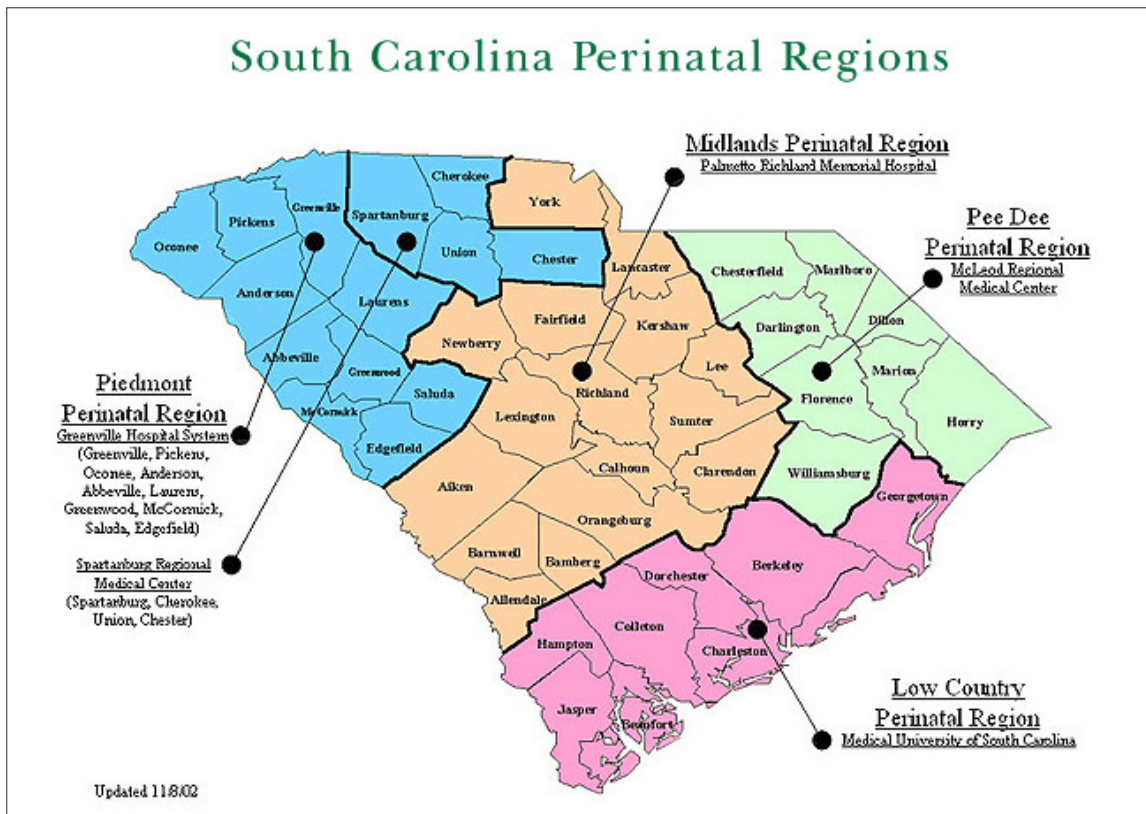
Well-trained care coordinators contribute to the success of a comprehensive system of care. Partnerships with maternal and early childhood home evidence-based visitation programs help with access to care and improve outcomes. Also, S.C.DHHS is launching a Community Health Workers Program in which workers are placed in physician offices to remove barriers to care and to improve adherence to physician instructions.

Efforts are underway through the Birth Outcomes Initiative to craft specific messaging utilizing the media most likely to reach pregnant women and families. Social media, such as Facebook and Twitter, as well as smartphones, web pages and peer-to-peer communication, are all avenues for messaging. Text4baby is also promoted as an avenue for pregnant women and new mothers to receive vital health information.

Perinatal regionalization is a vital component of the system of care that protects pregnant women and infants with a high risk for a poor birth outcome such as premature delivery, low birth weight, and neonatal death. South Carolina is divided into four perinatal regions, each with at least one designated Regional Perinatal Center that is a Level III hospital (Figure 5). The Perinatal Regionalization System ensures communication between the hospitals that deliver babies in S.C. and monitors births in S.C. to make sure that very low birth weight (VLBW) babies are born and cared for at hospitals with the highest level of care (Level III hospitals). Other key features of this system are maternal and infant transport and outreach education provided to staff of Level I and Level II hospitals.

Peer-reviewed research demonstrates that Level III hospitals with a high volume of VLBW deliveries had lower mortality rates among VLBW infants than Level III hospitals with lower volumes of VLBW deliveries (Phibbs CS, Baker LC, Caughey AB, et. al. Level and volume of neonatal intensive care and mortality in very-low-birth-weight infants. N Engl J Med. 2007; 356:2165-75). This implies that the improved technology and physician specialty required to have a Level III hospital only provide a portion of the possible risk reduction for VLBW infants. Hospital staff having frequent experience delivering and caring for VLBW infants also contributes to significant risk reduction.

Figure 5. South Carolina Perinatal Regions Map



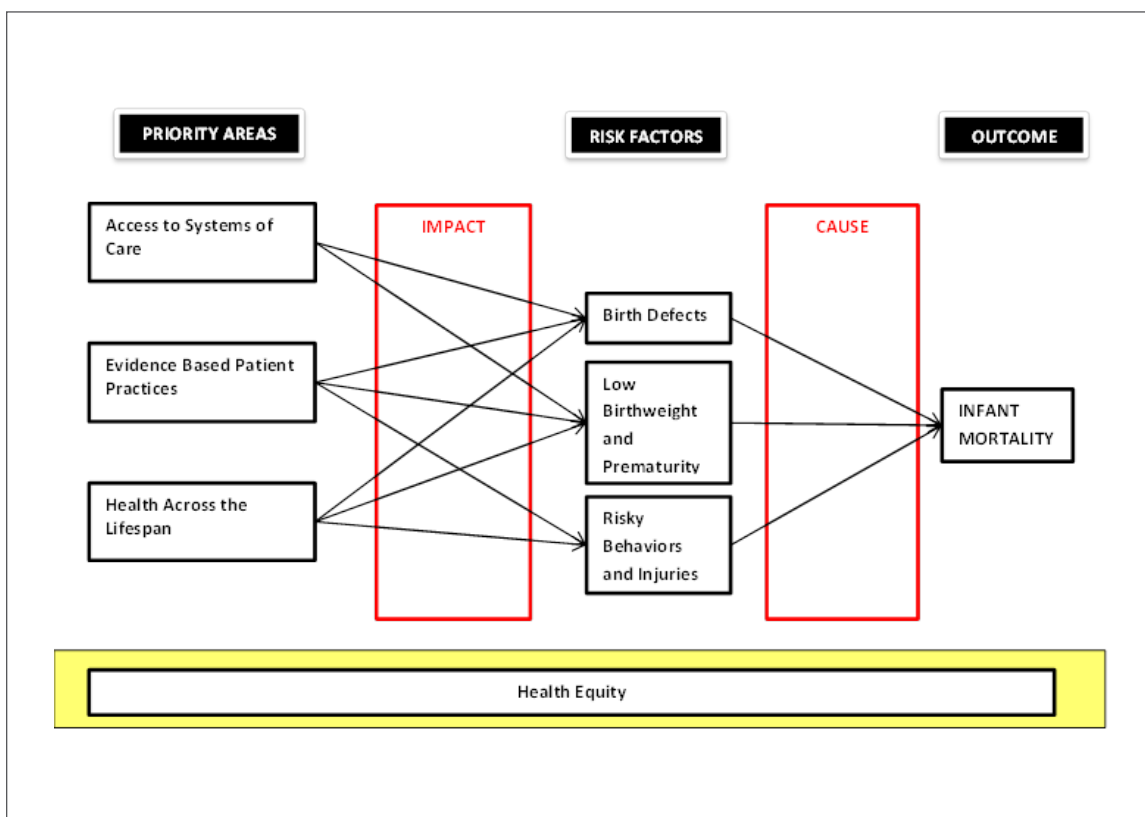
## Evidence-Based Patient Practices

Quality patient care is dependent upon implementation of evidence-based practices, which are proven to result in positive outcomes for the intended population. For the perinatal community, evidence-based practices include eliminating non-medically indicated deliveries prior to 39 weeks, ensuring access to 17P, promoting breastfeeding, implementing the Centering Pregnancy model, providing immunizations, preventing Central Line Associated Blood Stream Infections (CLABSI), and utilizing home visitation models. Incorporating these evidence-based strategies into the system of care provided to pregnant women and infants can reduce birth defects, low birth weight, prematurity, risky behaviors and accidents, which ultimately affect infant morbidity and mortality.

## Health across the Lifespan

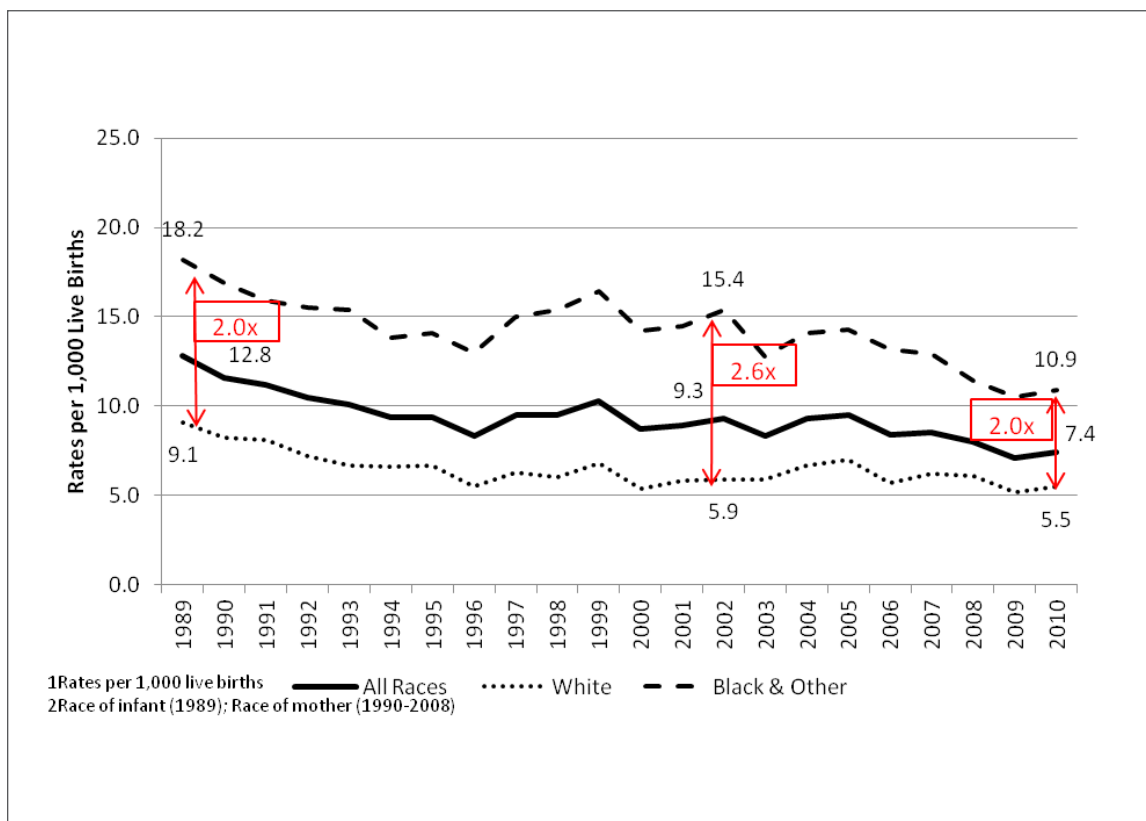
In order to impact birth outcomes, promotion and assurance of health and healthy behaviors across the lifespan is critical. Behaviors throughout life, such as physical activity, diet, inter/preconception care, family planning, mental health, and substance use (i.e. tobacco, drugs and alcohol), all affect birth outcomes and underscore the importance of having an effective medical home. Additionally, postpartum behaviors such as safe sleeping practices and breastfeeding impact the infant's ability to thrive. Medical interventions have certainly provided many advances in regards to preventing infant mortality and preterm birth; however, if women's health prior to pregnancy could be improved, many more strides in infant mortality reduction could be made. Preconception and interconception health services are essential to achieve optimal health status for women and ultimately infants.

## Health Equity and the Life Course Perspective



Health disparities remain a key area of concern. The risk for delivering low birth weight infants for non-Hispanic Black women is double the risk for non-Hispanic White women (Figure 6).

**Figure 6.** South Carolina infant mortality rates<sup>1</sup> by race<sup>2</sup>, residence data 1989-2010.



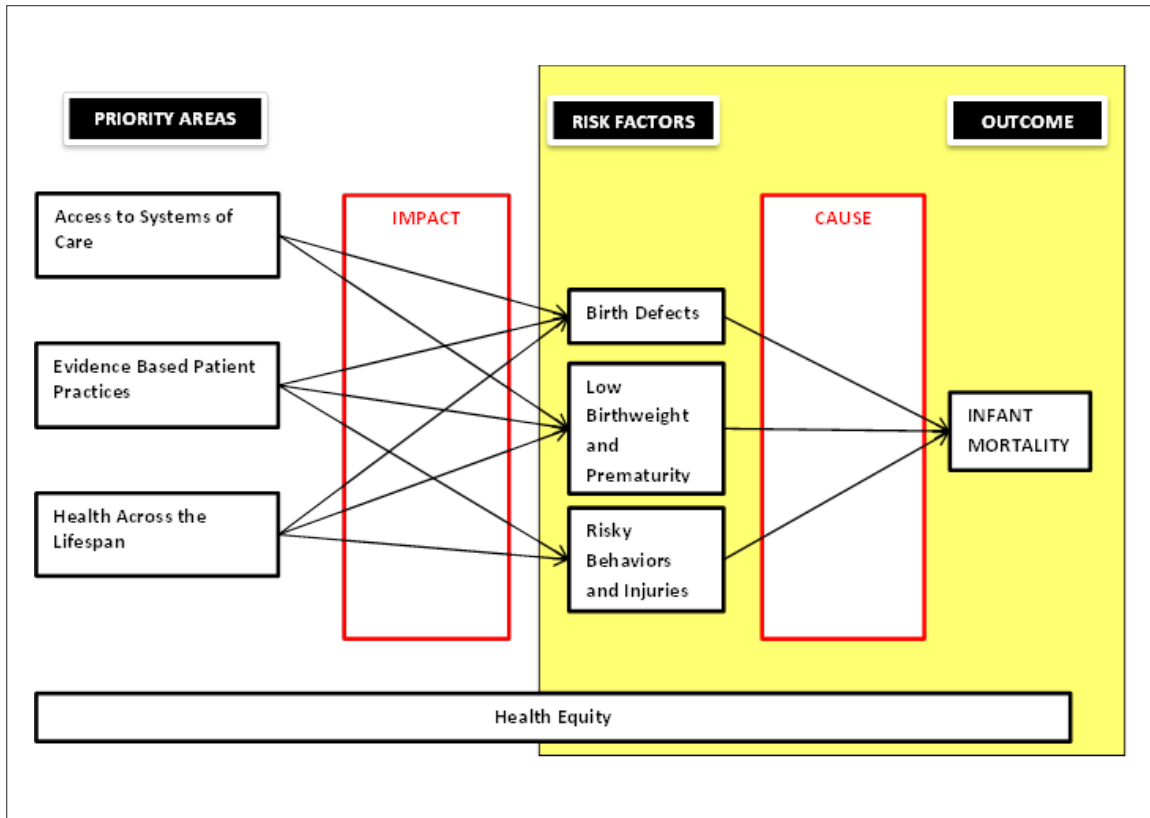
A growing body of research demonstrates that concerns in population health can be traced to economic and social conditions that disproportionately impact minority populations. Health inequities are, at least in part, consequences of public policy and unequal distribution of societal resources. These inequities can be explained with the Life Course Perspective (Health across the Lifespan). This is a theoretical framework that includes disease entities, plus underlying social, environmental, and economic factors that contribute to persistent inequities over the course of the lifespan. According to the World Health Organization, these social determinants of health include the circumstances into which people are born, grow up, live, work, and age, and the systems that are put into place to deal with illness. Early childhood development, social support networks, chronic stress, and income are powerful determinants.

The Life Course Perspective is especially useful in understanding health disparities that persist in health service utilization, such as prenatal care (Table 2), as well as disparities in health outcomes such as infant mortality (Figure 6). This highlights the fact that it is critical to improve the overall health of South Carolinians, which will ultimately improve birth outcomes.

**Table 2.** Adequacy of prenatal care utilization by mother’s race/ethnicity, 2010 S.C. residents

Prenatal Care Utilization	Mother’s Race/Ethnicity			χ <sup>2</sup> p-value
	White, Non-Hispanic	Black, Non-Hispanic	Hispanic	
Adequate Plus	47.8	46.2	29.0	<0.001
Adequate	33.0	23.5	25.8	
Intermediate	6.6	6.1	7.6	
Inadequate	12.6	24.2	37.6	
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	

# Causes of Infant Mortality



In order to impact the burden of infant mortality on South Carolina it is essential to understand its causes and assure strategies are employed to reduce the risk of these causes. Underlying causes include maternal and infant risk factors and lifestyle choices. The following description of poor pregnancy outcomes and associated risk factors demonstrates the need for critical evaluation and implementation of the described strategies to impact the causes of infant mortality and improve outcomes.

## Maternal and Infant Risk Factors for Infant Mortality

### Poor Pregnancy Outcomes and Infant Risk Factors Contributing to Infant Mortality

**Prematurity and Low Birth Weight:** The earlier a baby is born, the more severe his or her health problems are likely to be. Preterm infants are a small percentage of all births, but account for a large number of infant deaths. More infants die from preterm-related problems than from any other single cause. Some premature babies require special care and spend weeks or months hospitalized in a neonatal intensive care unit (NICU). They may experience many health challenges, including intellectual disabilities, cerebral palsy, breathing and respiratory problems, vision problems, hearing loss, and feeding and digestive difficulties. In South Carolina in 2010, 11.7% of all births were preterm. Among all infants born in South Carolina in 2010 that died before their first birthday, 67.0% were preterm births.

**Birth Defects:** Birth defects were the leading cause of infant deaths in 2010, as in many previous years. Cardiovascular defects are the most common birth defects in South Carolina, followed by defects of the kidneys and urinary tract, defects of the central nervous system such as spina bifida and anencephaly. In about 70% of birth defect cases the causes are unknown. However, behaviors such as taking folic acid vitamins or prenatal vitamins can prevent some types of

central nervous system defects. Furthermore, pulse oximetry screenings can help identify certain types of critical congenital heart defects in time for life-saving operations or other interventions.

**Sudden Infant Death Syndrome (SIDS) and Sudden Unexpected Infant Death (SUID):** SIDS, the sudden death of an infant under age one that cannot be explained after a thorough investigation has been conducted, is the third leading cause of death of S.C. infants. SUID is the sudden and unexpected death of an infant in which the manner and cause of death are not immediately obvious prior to investigation. It can be caused by metabolic disorders, exposure to extreme heat or cold, neglect or homicide, poisoning, accidental suffocation, or SIDS. Although SIDS has been declining, there has been an associated increase in SUID rates, primarily deaths attributed to overlaying, suffocation, and wedging.

**Respiratory Distress Syndrome (RDS):** RDS is a common lung disorder that occurs in nearly all infants born before 28 weeks of gestation. Some babies have complications from RDS or its treatments, including chronic breathing problems such as asthma, blindness, and brain damage.

**Multiple Births:** According to the March of Dimes, more than 3% of babies in the U.S. are born in sets of two, three or more; about 95% of these multiple births are twins. Women who are expecting more than one baby are at increased risk of pregnancy complications, including premature birth and low birth weight. Factors associated with multiple births include fertility treatments, maternal age over 30 years, and a family history of fraternal twins. In South Carolina in 2010, 3.3% of all live births were multiple births. Of the 430 infants born in South Carolina in 2010 that died before their first birthday, 48 or 11.2%, were delivered in a multiple birth.

**S**moking during pregnancy is said to be the most modifiable risk factor for poor birth outcomes. Smoking during and after pregnancy is associated with fetal and infant risks including LBW, SIDS, preterm delivery, placental abruption and an increase in childhood respiratory illness.

## Maternal Risk Factors and Lifestyle Choices Contributing to Infant Mortality

**Smoking and Exposure to Secondhand Smoke:** Smoking during pregnancy is said to be the most modifiable risk factor for poor birth outcomes. Smoking during and after pregnancy is associated with fetal and infant risks including LBW, SIDS, preterm delivery, placental abruption and an increase in childhood respiratory illness. Maternal smoking increases risk of ectopic pregnancy and miscarriage. Quitting smoking reduces the risk of health problems for the baby and complications during delivery, and also benefits the mother's long-term health (Fiore MD, Jaen CR, Baker TB Et. Al. Treating tobacco use and Dependence Clinical Practice Guideline. Rockville, MD: US Department of Health and Human Services, Public Health Service, May 2008). In S.C. in 2010, 13.4% of mothers reported smoking during their pregnancy and 19.9% reported smoking after pregnancy (Figure 7). In S.C. from 2005-2010, women that smoked before or during pregnancy had 1.8 times the odds of having a low birth weight baby than women that did not smoke.

According to the Centers for Disease Control and Prevention, infants who are exposed to secondhand smoke after birth are also at greater risk for SIDS. Chemicals in secondhand smoke appear to affect the brain in ways that interfere with its regulation of infants' breathing. Infants who die from SIDS have been shown to have higher concentrations of nicotine in their lungs and higher levels of cotinine, a biological marker for secondhand smoke exposure, than infants who die from other causes.

**Hypertension:** High blood pressure can be dangerous for both the mother and the fetus. It can harm the mother's kidneys and other organs, and it can cause low birth weight and early delivery. In the most serious cases, the mother develops preeclampsia, a condition that can threaten the lives of both the mother and the fetus. In S.C. in 2010, 2.7%

of women had hypertension before they got pregnant and 5.4% developed pregnancy-induced hypertension or preeclampsia during pregnancy (Figure 7). In S.C. from 2005-2010, women with prepregnancy hypertension had 1.7 times the odds of having a low birth weight baby than women that were not hypertensive before pregnancy. Similarly, women with gestational hypertension had two times the odds of having a low birth weight baby than women that did not have gestational hypertension.

**Diabetes:** High blood sugar levels before and during pregnancy can worsen complications for the mother such as vision problems, heart disease and kidney disease. These high levels can also increase the chance of complications for the baby such as premature birth, low birth weight, birth defects, or loss of the baby by miscarriage or stillbirth. For diabetic women who keep blood sugar under control, the risk of birth defects is about the same as with babies born to women without diabetes. In S.C. in 2010, 0.9% of women had diabetes before pregnancy and 5.4% developed gestational diabetes during pregnancy (Figure 7).

**Overweight and Obesity:** According to the March of Dimes, being overweight or obese can cause complications of pregnancy such as preeclampsia, diabetes, or hypertension. For infants, the risk for birth defects, preterm births, and infant mortality is increased if the mother is overweight or obese. Reaching and maintaining a healthy weight before pregnancy gives both the mother and the infant the best chance of a positive outcome. In 2010, 23.7% of S.C. mothers were overweight and 28.3% of S.C. mothers were obese before becoming pregnant (Figure 7).

**R**ecent studies suggest that women who experience high levels of stress are significantly more likely to deliver preterm

**Unintended Pregnancy:** Pregnancies that are either mistimed, occurring sooner than the mother desired, or when the mother did not wish to become pregnant, are classified as unintended. In 2010, South Carolina's rate of unintended pregnancy was 41.2% (Figure 7), higher than the national rate of 37%. "Nationally large differences exist between groups in the percentage of births that are unintended. Unmarried women, black women, and women with less education or income are still much more likely to experience unintended births compared with married, white, college-educated, and high-income women" (Intended and Unintended Births in the United States: 1982-2010, National Health Statistics Reports, Number 55, July 24, 2012, William D. Mosher, PhD; Jo Jones, PhD; and Joyce C. Alma, PhD,

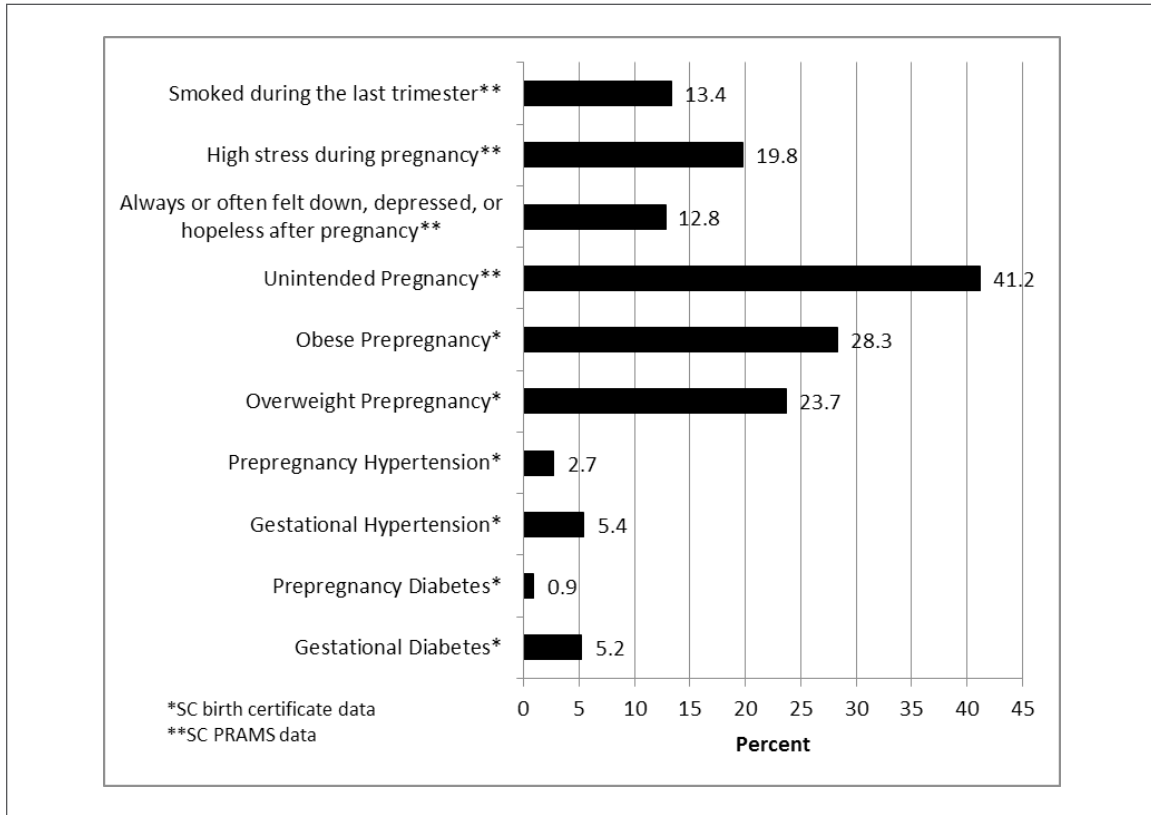
Division of Vital Statistics). This places great importance on the mother's preconception health status. Correct and consistent use of contraception by those not wishing to become pregnant will help to lower this rate. The use of long-acting reversible contraceptives such as intrauterine devices and implants show the greatest promise in this area.

**Stress:** Pregnancy outcomes may be impacted by stress associated with poverty, racial discrimination, and domestic violence. Preterm births and low birth weight are among the most recognized effects of maternal stress during pregnancy. Recent studies suggest that women who experience high levels of stress are significantly more likely to deliver preterm. In 2010, 19.8% of S.C. mothers experienced four or more major stressful life events (such as the death of a loved one, a divorce or separation, or having bills that they could not pay) during pregnancy (Figure 7).

**Asthma:** Poorly controlled asthma can lead to serious medical problems for pregnant women and their fetuses, including increased risk of infant death, preeclampsia, and premature delivery.

**Perinatal depression:** One in five pregnant women experience depression and 10-20% of women experience postpartum depression. Prenatal depression and anxiety have been linked to premature birth, low birth weight, developmental delay, and increased risk of postpartum depression. Depression screening is recommended by the American Congress of Obstetrics and Gynecology both during and after pregnancy. In S.C. in 2010, 12.8% of mothers reported always or often feeling down, depressed, or hopeless in the months immediately following their pregnancy (Figure 7).

**Figure 7.** Prevalence of maternal characteristics associated with poor pregnancy outcomes, 2010.



### Population Focus for Infant Mortality Prevention

In years past, most infant mortality prevention efforts were focused upon working directly with individuals. However, there has been a paradigm shift in public health that highlights the importance of population-based services and their impact upon the nation’s health. This concept is further explained by the “Health Impact Pyramid” endorsed by Dr. Thomas Frieden, Director of the Centers for Disease Control and Prevention (Figure 8). (Frieden TR. A framework for public health action: the health impact pyramid. *Am J Public Health*. 2010; 100(4):590-595).

**R**eaching and maintaining a healthy weight before pregnancy gives both the mother and the infant the best chance of a positive outcome.

**Figure 8.** The Health Impact Pyramid developed by CDC Director, Dr. Thomas Frieden.

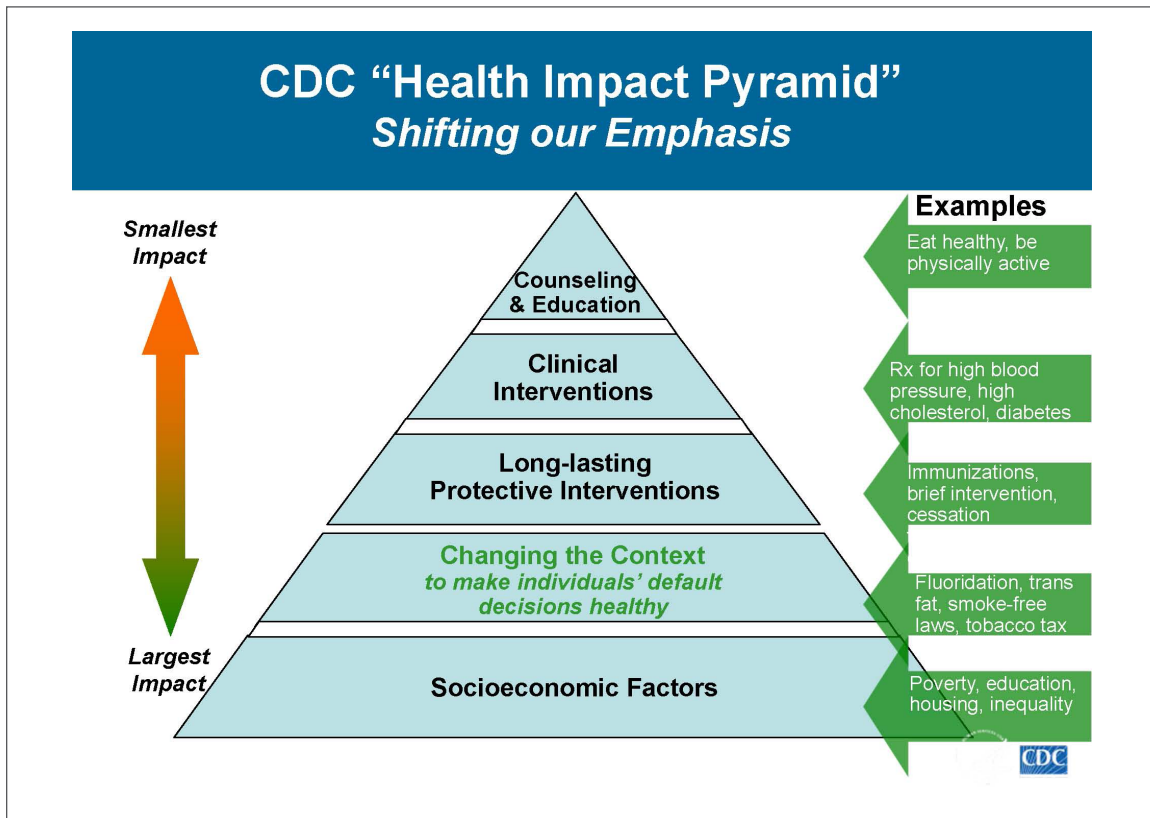


Figure 8 shows that changing factors closer to the base of the pyramid, such as socioeconomic factors and the context in which health decisions are made, have the greatest impact on the health of the population and require less effort from individual members of the population. However, the factors at the base of the pyramid are much more difficult for a public health practitioner or a public health entity to change, often requiring major shifts in policy and paradigms.

This model demonstrates that greater impact on public health occurs by utilizing more population-based interventions that make healthy decisions more socially desirable. These interventions at the base of the pyramid have a broader reach than those nearer the top, such as counseling and education, that impact one individual at a time. This model requires close collaboration with key partners and utilization of evidence-based practices with an evaluation component to ensure that desired outcomes are achieved. In addition to improvements in the use of individual-level evidence-based interventions, DHEC, as most of its public health counterparts, focuses upon all levels of this model to achieve desired results.



## What is South Carolina Doing?

For the past twenty years, DHEC has implemented various initiatives to address infant mortality. These include home visitation models such as the High Risk Channeling Project (1986-2001), health promotion campaigns, smoking cessation initiatives, and surveillance. DHEC's current efforts to reduce infant mortality include:

- **South Carolina Birth Defects Program:** The S.C. Birth Defects Program (SCBDP) was established in July 2006 under the South Carolina Birth Defects Act. The program provides statewide active surveillance of all nine categories of major structural birth defects recommended for monitoring by the CDC and the National Birth Defects Prevention Network. The SCBDP monitors birth defects identified prenatally through age two for the purposes of:
  1. Determining rates and trends of birth defects;
  2. Promoting effective referral of infants and families for appropriate services and care;
  3. Developing public health strategies for the prevention of birth defects; and
  4. Conducting research on the causes, distribution, and prevention of birth defects.
- **Tobacco Cessation:** The 2 A's and R (Ask, Advise, and Refer) evidence-based smoking cessation curriculum was initiated statewide within DHEC in 2010. DHEC staff implements a brief clinical protocol with clients of the Family Planning, STD/HIV/ TB, Postpartum Newborn Home Visit, Home Health, and WIC programs who smoke or use any tobacco product and are ready to quit. These clients are then referred to the South Carolina Tobacco Quitline (<http://www.scdhec.gov/health/chcdp/tobacco/quit-for-keeps/index.htm>). DHEC's Division of Tobacco Prevention and Control also plans to provide training about the impact of secondhand smoke for home visitors, WIC, and Title X FP providers.
- **Breastfeeding:** Breastfeeding reduces the risk of both SIDS and childhood obesity. The WIC Program works to increase the number of mothers who breastfeed through education, the use of trained lactation consultants, breastfeeding peer counselors (mothers who have successfully breastfed and have a strong interest in helping other women with breastfeeding support and education), a breast pump loan program, and exclusive breastfeeding food packages. DHEC is a member of the South Carolina Breastfeeding Coalition that sponsors a Mother-Friendly Employer Recognition Program for workplaces supporting employee breastfeeding (<http://scbreastfeedingcoalition.org/employers/mother-friendly-employer-recognition-program/>).
- **Nurse-Family Partnership:** The Nurse-Family Partnership Program (NFP) was implemented in South Carolina in 2009. NFP is an evidence-based home visitation program for first time, low-income mothers. A nurse home visitor works with clients during pregnancy and through the child's second birthday. The program goals of NFP are to improve pregnancy outcomes, to improve the child's growth and development, and to improve the mother's economic self-sufficiency. Currently, there are four NFP sites in South Carolina implemented through DHEC in all four public health regions plus sites at Greenville Health System, Spartanburg Regional Healthcare System, and Carolina Health Centers, Inc.
- **Safe Sleep:** The ABCs of Safe Sleep campaign was implemented in 2008 and continues to encourage caregivers to place infants to sleep Alone, on their Backs, and in a Crib. The campaign consisted of posters, brochures, an educational DVD, and training guides for nurses and other professionals that work directly with pregnant women. DHEC has partnered with other state agencies, Healthy Start programs, and various community organizations, such as Cribs for Kids and the Zeta Phi Beta Stork's Nest, to disseminate the ABCs of Safe Sleep message. DHEC uses the evidence-based guidelines from the federal Safe to Sleep Campaign, an expansion of the original Back to Sleep Initiative.

- Postpartum Newborn Home Visits:** The Postpartum Newborn Home Visit (PPNBHV) program began in the early 1980s and is still in operation. It was an outgrowth of home visitation projects that were primarily geared towards high-risk mothers, infants, and young children that started in the 1960s and evolved through the years. While the infant mortality rate in South Carolina has been generally decreasing over the past decade, SC continues to rank poorly in comparison to other states. The PPNBHV program's mission is to improve infant and postpartum outcomes by providing at risk families with a visit from a Public Health Nurse (PHN). During the visit, the PHN assesses the environmental, social, and medical needs of newborns and mothers and assures mothers have access to the health care services and education needed to appropriately care for their infants and themselves. Although decreases in staffing capacity have led to less visits completed, DHEC staff visited over 8,000 mothers in 2012.
- Hypertension Initiative:** DHEC's Office of Minority Health (OMH) and the DHEC Title X Family Planning Program (FP) are designing an initiative to help decrease hypertension in areas of the state in which minority women have higher blood pressure readings than the rest of the state and, thus, are at greater risk for delivering a low birth weight baby. OMH and FP will identify, educate and refer minority women who have an elevated blood pressure reading during their family planning visit to a hypertension education and prevention class that OMH will conduct, and will link them to follow-up services in the community.
- Newborn Screening:** South Carolina infants are tested shortly after birth for specific metabolic, hormone/enzyme, and genetic disorders that could lead to death or severe disability if left untreated. The screening program maintains a 100% rate of providing timely follow-up to definitive diagnosis and clinical management for these conditions, thus improving chances for infant survival. DHEC convened a group of stakeholders in January 2012 to discuss how the state should address the recommendation by the Secretary's Advisory Committee on Heritable Disorders in Newborns and Children that all infants should be screened for certain critical congenital heart defects (CCHD). The group recommended that: no legislative action be pursued at that time; hospitals should be encouraged to voluntarily begin screening infants for CCHD; and DHEC should monitor implementation and encourage quick adoption of the recommended screening protocol. DHEC and the SCHA, with significant technical assistance from the Regional Systems Developers, educated hospital staff and developed a quarterly monitoring process, resulting in voluntary compliance with screening recommendations by all birthing hospitals. The Emerson Rose Act, passed in June 2013, now requires each birthing facility licensed by DHEC to perform a pulse oximetry screening on every newborn in its care. The Emerson Rose Foundation continues to purchase pediatric pulse oximeters for birthing facilities upon request. DHEC will convene a stakeholder group in September 2013 to discuss the possibility of adding Severe Combined Immunodeficiency Disorder to the state's screening panel.
- Oral Health:** Oral Health is an essential component of the overall health status for pregnant women and women of reproductive age. Poor oral health of the mother, including dental decay and periodontal disease before and during pregnancy, has been linked to poor birth and pregnancy outcomes such as preterm birth and low birth-weight. Improving the oral health of pregnant women has the potential to improve women's overall health and may also reduce premature and low birth weight deliveries. S.C.'s Oral Health Advisory Council and Coalition has issued "Oral Health Care for Pregnant Women" guidelines (<http://www.scdhec.gov/administration/library/CR-009437.pdf>), which present key oral health messages for pregnant women, resources, and strategies for health professionals to improve access to dental care during pregnancy.

## South Carolina's Healthy Mothers, Healthy Babies Infant Mortality Prevention Team

The 2012 Region IV and Region VI Infant Mortality Summit, held January 12-13, 2012, in New Orleans, Louisiana, was the launching point for a collaborative and multi-state initiative that aims to improve infant health outcomes and reduce infant mortality and prematurity across the United States, particularly among disparate populations. These regions were chosen because they contain the thirteen states that currently and historically have the highest rates of infant mortality in the country. The Maternal and Child Health Bureau of the Health Resources and Services Administration convened the summit with the assistance of numerous national partners.

The summit's goal was to improve birth outcomes and reduce infant mortality and prematurity in the United States. In developing and implementing plans and strategies in those states most at risk, the aim is to develop the nexus of a national initiative to prevent infant mortality.

A team of seven professionals served as South Carolina's Infant Mortality Reduction Team at the Summit.

Members included:

- Megan Branham, Director of Program Services, S.C. March of Dimes
- Dr. Richard Foster, Senior Vice President for Quality and Patient Safety, South Carolina Hospital Association
- Lucy Gibson, Director, Division of Children's Health, S.C. Department of Health and Environmental Control
- Mark Jordan, Director, Office of Primary Care, S.C. Department of Health and Environmental Control
- Michael Smith, MCH Epidemiologist, Director, Division of Research and Planning, MCH Bureau, S.C. Department of Health and Environmental Control
- Dr. Lisa Waddell, Deputy Director, Preventive Services, S.C. Department of Health and Environmental Control
- Valeria Williams, Program Director, S.C. Department of Health and Human Services

Brenda Martin, MCH Bureau Director, joined the team in February 2012.

The summit was designed to give optimum time for teams to meet and work on state-specific strategies. In addition, much valuable information was shared. Highlights included a presentation by Dr. David Lakey, Commissioner of the Texas Department of State Health Services and then-president of the Association of State and Territorial Health Officials (ASTHO). Dr. Lakey encouraged states to sign on to the 2011 ASTHO President's Challenge, a partnership to improve birth outcomes by reducing infant mortality and prematurity in the United States. This encompassed the March of Dimes' Prematurity Campaign and other public health initiatives with similar goals. The Challenge's stated goal is to reduce prematurity by 8% by 2014. South Carolina and 46 other states have formally agreed to this goal. Objectives include:

- Focus on improving birth outcomes as state health officers and state leadership teams work with state partners on health and community system changes;
- Create a unified message that builds on the best practices from around the nation; and
- Develop clear measurements to evaluate targeted outreach, progress, and return on investment.

Each state team participated in a SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis led by an independent facilitator. Lauren Ramos, Director of Programs at the Association for Maternal and Child Health Programs (AMCHP), led this process for South Carolina (Appendix B). The priorities generated from this analysis and the work of the S.C. Birth Outcomes Initiative serve as the bases for the state recommendations and an accompanying plan.

## S.C. Collaboratives

Three key collaboratives addressing infant mortality in South Carolina are:

1. **Birth Outcomes Initiative:** The South Carolina Birth Outcomes Initiative (BOI) is a state-level effort led by S.C.DHHS that began in March 2011. Its goals are to improve perinatal outcomes for mothers and babies, reduce disparities in birth outcomes, and create measureable cost savings in perinatal and neonatal care. Many of the BOI priorities are reflected in the HMHB Plan. Achievements of the BOI to date include:

- Receiving pledges from all of the state's birthing hospitals to stop the practice of inducing labor or delivering infants via cesarean section prior to 39 weeks gestation without a medical indication. Effective January 1, 2013, the South Carolina Department of Health and Human Services (S.C.DHHS) and Blue Cross Blue Shield stopped reimbursement to hospitals and physicians for non-medically indicated deliveries prior to 39 weeks, making South Carolina the first state in the nation for public and private entities to implement the same non-payment policy for early deliveries. The 39 Weeks Initiative is estimated to have saved the state and federal government a total of \$6 million dollars in large part due to the decreased admissions and Average Length of Stay (ALOS) to the NICU.
- Developing a screening, Brief Intervention, Referral, and Treatment (SBIRT) program to screen pregnant women for substance use, depression and domestic violence and refer them to appropriate care
- Analyzing the risk factors for low birth weight births and ongoing programs that can reduce the prevalence of these births, as well as the racial disparities in the rate of low birth weight births.
- Reimbursing in-hospital insertion of LARCS.
- Incentivizing the process of hospitals gaining Baby-Friendly status.
- Facilitating access to 17 P.
- Streamlining the Medicaid application process for pregnant women through assumptive eligibility.



2. **Healthy Mothers, Healthy Babies (HMHB):** South Carolina's Plan to Reduce Infant Mortality and Premature Birth: DHEC serves as the leader for this plan. HMHB includes goals and evidence-based strategies as referenced earlier in this report to improve the health of women and infants, ultimately reducing infant mortality. The plan will serve as an accountability tool for state implementation.

3. **Collaborative Improvement and Innovation Networks (CoIIN):** In a follow-up to the January 2012 Infant Mortality Summit, the concept of CoIIN was introduced in July 2012 as a mechanism to support the adoption of collaborative learning and quality improvement principles and practices. The 5 CoIINs – Interconception Care, Tobacco Cessation, Early Elective Deliveries, SIDS/SUID/Safe Sleep, and Perinatal Regionalization – were developed in partnership with the Health Resources and Services Administration, Association of State and Territorial Health Officials, Centers for Medicare and Medicaid, Association of Maternal and Child Health Programs, March of Dimes, CityMatCH, and the Centers for Disease Control and Prevention. These CoIINs will influence the national strategy to prevent infant mortality and collectively should help to decrease infant mortality rates by leveraging partnerships to make systems changes. DHEC is serving in a convening role for the state CoIIN teams and has representation on all teams. Following are the key activities for each S.C. CoIIN:

- **Interconception Care's** focus is upon increasing the number of women who keep the postpartum visit appointment, thus, ensuring follow up for any post-pregnancy health concerns and the opportunity to access a birth control method of their choice. In 2010, 53.8% of women with Medicaid-financed deliveries received a postpartum checkup. The CoIIN is working on patient educational materials, researching best practices, and recommending consideration of provider incentives.
- **Perinatal Regionalization:** Working to increase the percentage of VLBW births that occur in Level III or higher facilities to 90%. S.C. is currently at 84%.
- **Reduction in Elective Preterm Deliveries:** SCDHHS and SC Blue Cross, Blue Shield implemented policies denying payment for early elective deliveries. SC hospitals reduced documented elective inductions between 37-39 weeks by 48% from the first quarter in 2010 to the third quarter in 2010, and reduced early elective deliveries overall by 26.4% during that same time period.
- **Safe Sleep:** At the request of the Joint Citizens and Legislative Committee on Children, Children's Trust formed a statewide Safe Sleep Coalition in January 2012. The coalition represents more than 20 organizations convening to address rising rates of unsafe sleep practices that result in injury and death for children younger than one year old. Members include hospital systems, public social service agencies, nonprofit organizations and state agencies. In part, the coalition and its members are serving to support the CoIIN state team in achieving its targeted outcomes. It continues to serve as a network for sharing resources and best practices related to safe sleep education and awareness. With the support of the coalition, Children's Trust Fund is planning a statewide Safe Sleep Summit for March 2014.
- **Tobacco Cessation:** This CoIIN's national goal is to reduce smoking during pregnancy by 3% within each state and across Regions IV and VI by December 2013. S.C. is working to close the gap between SBIRT provider referrals of pregnant smokers to the Quitline and those participants who actually enroll for Quitline services.

**B**irth Outcomes Initiative: The South Carolina Birth Outcomes Initiative (BOI) is a state-level effort led by SCDHHS that began in March 2011. Its goals are to improve perinatal outcomes for mothers and babies, reduce disparities in birth outcomes, and create measureable cost savings in perinatal and neonatal care.

## Evaluation

**Implementation and promotion of evidence-based practices such as breastfeeding, elimination of non-medically indicated deliveries prior to 39 weeks, and use of 17 P have a proven impact on maternal and infant health. Use of these evidence-based practices is critical to providing the best care for South Carolinians.**

The South Carolina Healthy Mothers, Healthy Babies plan recommends that all strategies developed or employed to reduce infant mortality have objectives that are specific, measurable, attainable, relevant, and time bound (SMART). Having SMART objectives ensures that each objective is based on readily available data and has a deadline for completion. Each objective should be associated with one or more measures, which can be either an outcome or process measure.

Outcome measures are quantitative in nature and measure progress toward improving a health condition in a population. Outcome measures are often based on public health surveillance, administrative, or billing data that are routinely collected. An example of an outcome measure is the rate of low birth weight deliveries to South Carolina residents. Process measures may be quantitative or qualitative in nature and usually indicate the completion of action steps that are necessary for achieving an objective. Process measures are usually not based on data from large datasets, but instead are indicators of whether or not something has been done. An example of a process measure is whether a script has been finalized for a public service announcement recommending that pregnant women receive a flu vaccine.

Both outcome and process measures can be important in determining whether an objective has been met by its deadline. However, most objectives are written such that either an outcome measure or a process measure will be the primary measure to indicate whether the objective has been met. Outcome measures should be updated as the required data becomes available (often annually) and process measures should be updated as they are or completed or as the deadlines for completion pass (whichever comes first). In this way evaluation of every objective in an infant mortality reduction strategy is built in.

The overall goal of the South Carolina Healthy Mothers, Healthy Babies Plan is for the accumulated effects of the strategies implemented based on the recommendations in this report to reduce infant mortality among South Carolina residents. Therefore, the annual infant mortality rate published by DHEC will be used to evaluate the success of the plan over time.

## Closing Summary

Infant mortality is an indicator of a community's health. Over the past 20 years, South Carolina has made significant strides in reducing infant mortality and improving the health of mothers and babies; however, South Carolina's infant mortality rate remains above the national rate of infant deaths. There is opportunity to implement programs, activities, and initiatives that have potential to further reduce the infant mortality rate. The South Carolina Healthy Mothers, Healthy Babies Plan has classified these initiatives in three priority areas: (1) access to systems of care; (2) evidence-based patient practices; and (3) health across the lifespan. It is critical that state efforts include these three areas in order to have the greatest impact on infant mortality. Health equity must be addressed to ensure progress is made in all of these areas.

Access to systems of care will ensure that women and infants are receiving the services they need to permit the best possible birth outcome. Innovations such as S.C.DHHS' Assumptive Eligibility policy, which provides temporary Medicaid eligibility for pregnant women while they obtain necessary documentation to submit a complete application, diminish barriers to care.

Implementation and promotion of evidence-based practices such as breastfeeding, elimination of non-medically indicated deliveries prior to 39 weeks, and use of 17 P have a proven impact on maternal and infant health. Use of these evidence-based practices is critical to providing the best care for South Carolinians.

Health across the lifespan is especially important to maternal and infant outcomes. It is vital that women are healthy prior to pregnancy since various maternal risk factors have a direct impact on birth outcomes. Also, in 2010 over 40% of the state's pregnancies were unplanned. Women must live a healthy lifestyle, balancing physical activity and good nutrition with avoidance of drugs, alcohol and tobacco. Additionally, use of reproductive health methods is essential for women that do not currently desire to become pregnant. These key concepts are further emphasized by medical providers, a fact that underscores the value of women of reproductive age having a medical home.

DHEC continues to strengthen efforts to address these three priority areas and recognizes the benefits of fostering collaboration among other state agencies, community organizations and stakeholders. Reduction of infant mortality requires a collaborative effort. The strategies outlined in this document represent a sampling of the activities and initiatives that can be launched to improve birth outcomes.

## References

1. Mathews TJ and MacDorman MF. Infant mortality statistics from the 2009 period linked birth/infant death data set. *National Vital Statistics Reports*. 2013;61(8)
2. Alexander GR, Kotelchuck M. Assessing the role and effectiveness of prenatal care: history, challenges, and directions for future research. *Public Health Reports*. 2001;116:306-316
3. Lu M, Halfon N. Racial and ethnic disparities in birth outcomes; a life course perspective. *MCHJ*. 2003;7:13-30
4. Reduction in Health Disparities Report, S.C. Birth Outcomes Initiative, Picklesimer, Amy, MD et al
5. Intended and Unintended Births in the United States: 1982-2010, *National Health Statistics Reports*, Number 55, July 24, 2012, William D. Mosher, PhD; Jo Jones, PhD; and Joyce C. Alma, PhD, Division of Vital Statistics
6. Frieden TR. A framework for public health action: the health impact pyramid. *Am J Public Health*. 2010; 100(4):590-595
7. Phibbs CS, Baker LC, Caughey AB, et al. Level and volume of neonatal intensive care and mortality in very-low-birth-weight infants. *N Engl J Med*. 2007; 356:2165-75
8. Forging a Comprehensive Initiative to Improve Birth Outcomes and Reduce Infant Mortality: Policy and Program Options for State Planning, Association of Maternal and Child Health Programs, June 2012
9. Lakey, D. L. *The ASTHO Presidential Challenge (PowerPoint Slides), Presentation at the ASTHO Annual Meeting; October 2011*
10. Michael G. Smith, MSPH, Brenda Martin, RN, MN, Shae Sutton, PhD, Daniela Nitcheva, PhD, South Carolina Department of Health and Environmental Control. Summary of Analyses to Suggest a Geographic Area of Focus and Intervention Strategy for Infant Mortality Reduction in South Carolina



# Appendix A: Summary of Analysis to Suggest a Geographic Area of Focus and Intervention Strategy for Infant Mortality Reduction in South Carolina

## Purpose

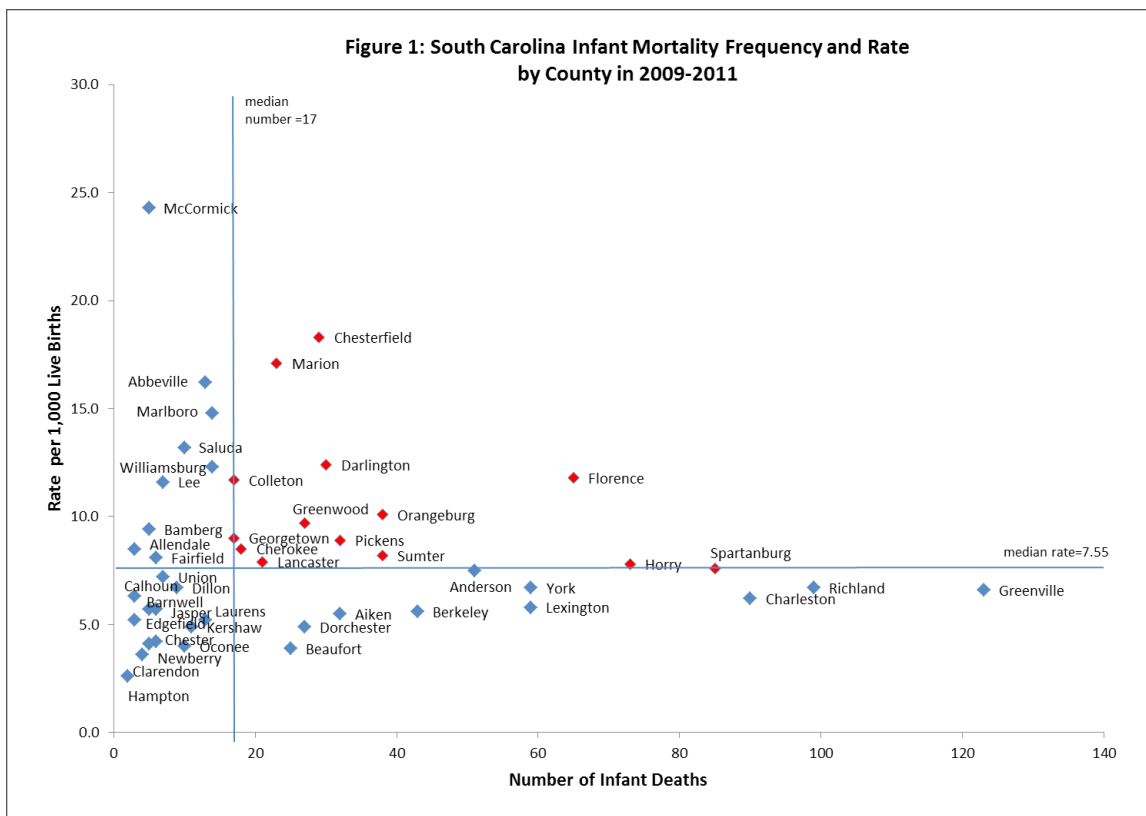
The purpose of these analyses was to develop a recommendation to efficiently target our efforts around infant mortality reduction in South Carolina. Targeting efforts along two fronts were explored: targeting interventions geographically to areas with high infant mortality burdens, and targeting efforts strategically around topics to address the causes of excess infant mortality.

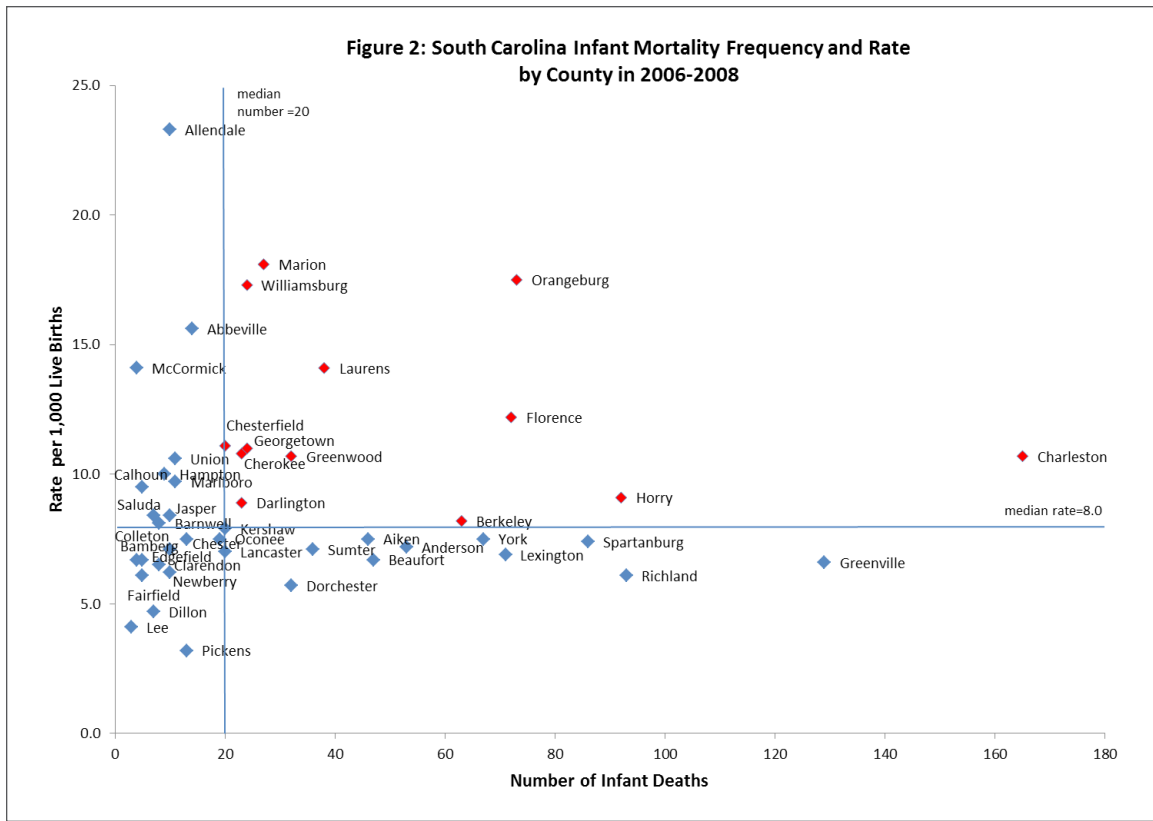
## Methods and Results

In order to identify geographic areas to target for infant mortality reduction, it was important to consider the overall burden of infant mortality on communities and ensure that a reduction in infant mortality in the identified geographic areas would have an impact on infant mortality overall at the state level. Therefore, it will be necessary to target areas with both high numbers of infant deaths and high rates of infant mortality.

Infant mortality was examined at the county level since interventions may be more easily implemented in a single county than in areas that may span county borders. Furthermore, infant mortality is a statistically rare event and analyses at a smaller geographic level would require substantial aggregation of multiple years of data. However, it was important to identify counties that have had a consistently large infant mortality burden. Therefore, counties would have to have had a large infant mortality burden for the three years from 2009-2011, and also for the three years from 2006-2008.

Rates of infant deaths and numbers of infant deaths were examined for each county for 2009-2011 (Figure 1) and for 2006-2008 (Figure 2), and counties that had greater than the median number and rate of infant deaths for both time

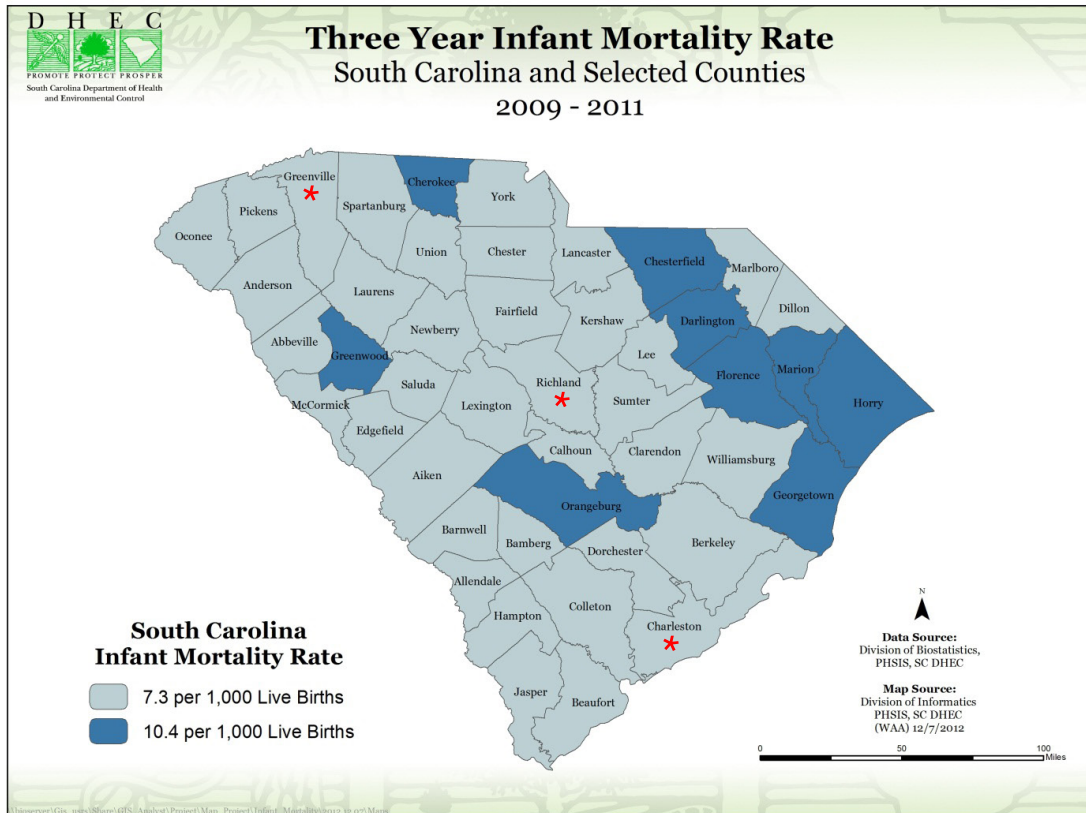




periods were identified. This resulted in the identification of nine counties: Cherokee, Chesterfield, Darlington, Florence, Georgetown, Greenwood, Horry, Marion, and Orangeburg.

These nine counties account for 17.4% of all live births, but for 24.9% of all infant deaths in South Carolina from 2009-2011. The infant mortality rate for these nine counties from 2009-2011 was 10.4 deaths per 1,000 live births, while the infant mortality rate for the state from 2009-2011 was 7.3 deaths per 1,000 live births. This equates to about 96 excess infant deaths in these counties from 2009-2011 (see Figure 3).

**Figure 3.** Three year infant mortality rates for selected counties and the rest of the state.



*\*These counties have large number of infant deaths, though their infant mortality rates might not be high. Targeting infant mortality reduction strategies to communities within these counties is also important. See Appendix A for details.*

Figure 3: Three year infant mortality rates for selected counties and the rest of the state. The burden of infant mortality by race was also examined for each county and many of these same counties were identified among both the white and minority populations (Chesterfield, Darlington, Florence, Greenwood, and Horry). This, paired with the fact that many of these counties are located in the Pee Dee, led to the recommendation to the focus on the nine counties identified above (Cherokee, Chesterfield, Darlington, Florence, Georgetown, Greenwood, Horry, Marion, and Orangeburg).

In addition to the counties discussed above (which consistently have infant mortality numbers and rates above the median), Charleston, Greenville, and Richland counties consistently have the highest number of infant deaths, though their infant mortality rates are generally slightly below the median. However, because of the large number of infant deaths that occur in these populous counties, targeting infant mortality reduction interventions to communities within these counties that have the highest numbers and rates of infant mortality may be an efficient approach to reducing infant deaths in these areas. Figures 4a - 4f display areas within each of these counties that have the highest number and rate of infant deaths.

To determine topics for intervention, the top four causes of infant deaths in each selected county were assessed. Table 1 displays the four leading causes of infant deaths in each county, along with the number of infants that died from the specific cause. After reviewing the four leading causes of death across the nine counties, five causes of death were listed multiple times. These five causes of death were: birth defects, preterm birth and low birthweight, Sudden Infant Death Syndrome (SIDS), accidents, and maternal complications of pregnancy.

To determine which of these causes of death to focus interventions toward, the cause-specific infant mortality rate for the nine counties was compared to that of the state rates for each of the identified causes of death. Table 2 demonstrates that the largest difference in the cause-specific mortality rates between the nine counties and the state are in SIDS and preterm birth/low birthweight. These were also the top two causes of excess infant mortality among white women and among black and other women (Tables 3 and 4).

Figure 4a - 4f: Areas with the greatest number of infant deaths and highest rates of infant mortality within Charleston (a and b), Greenville (c and d), and Richland (e and f) counties.

**Figure 4a.** Numbers of infant deaths in Charleston County communities.

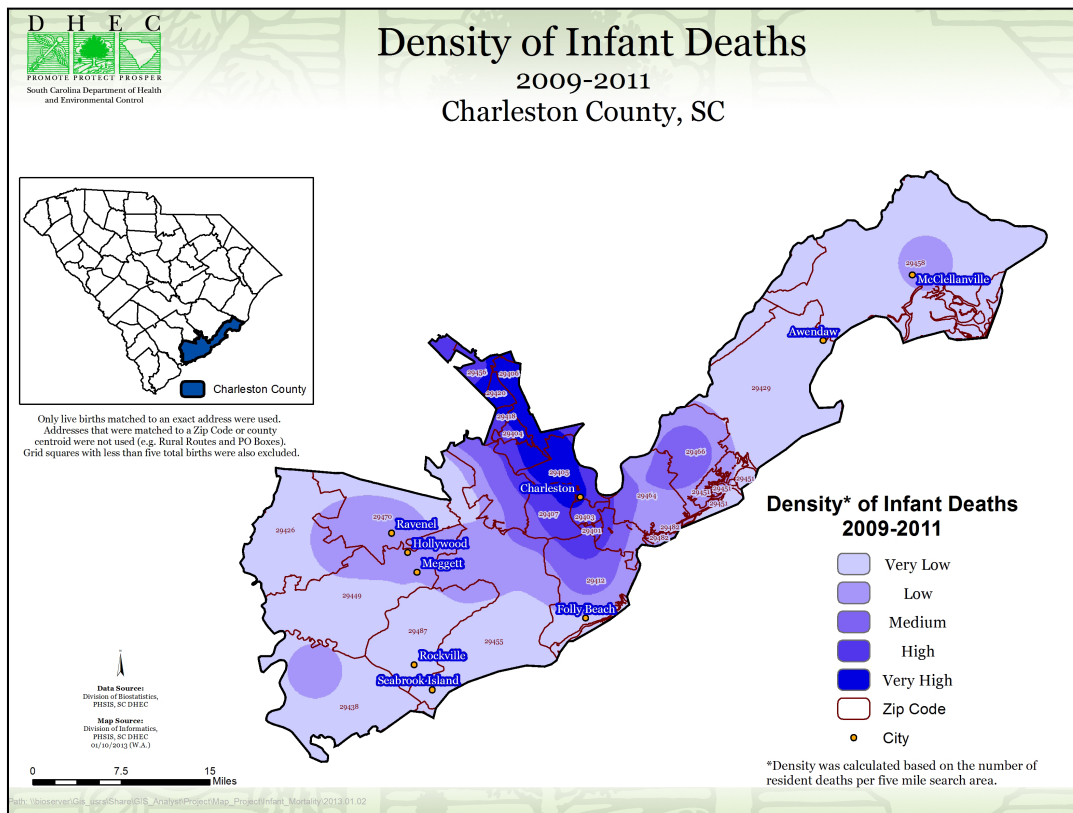


Figure 4b. Rates of infant deaths in Charleston County communities.

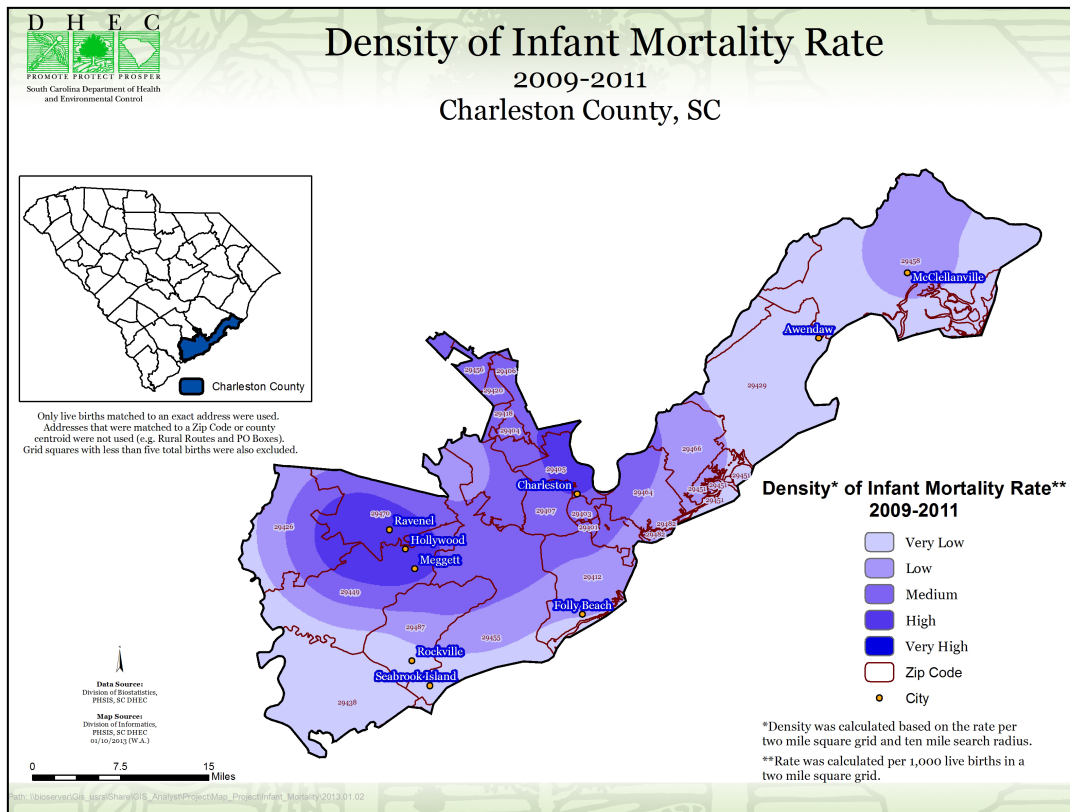


Figure 4c. Number of infant deaths in Greenville County communities.

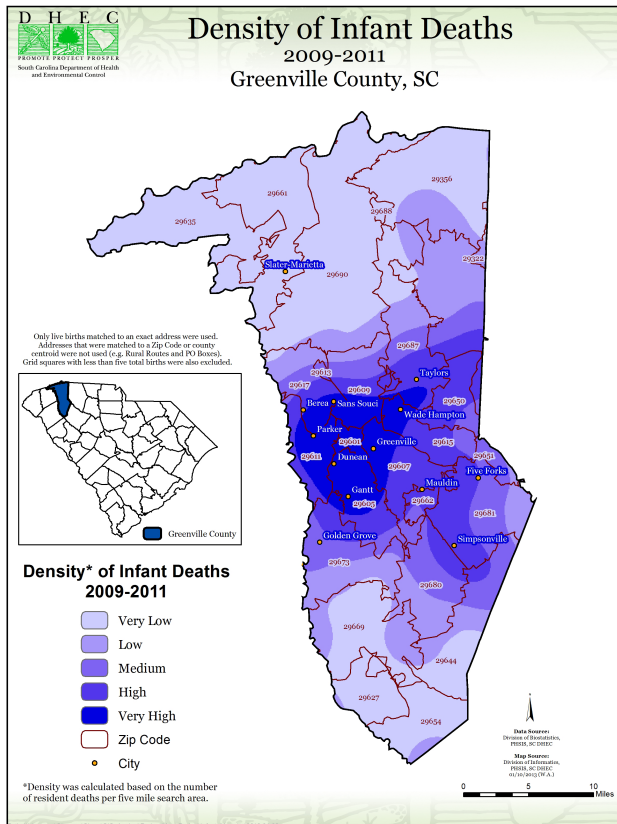


Figure 4d. Rate of infant deaths in Greenville County communities.

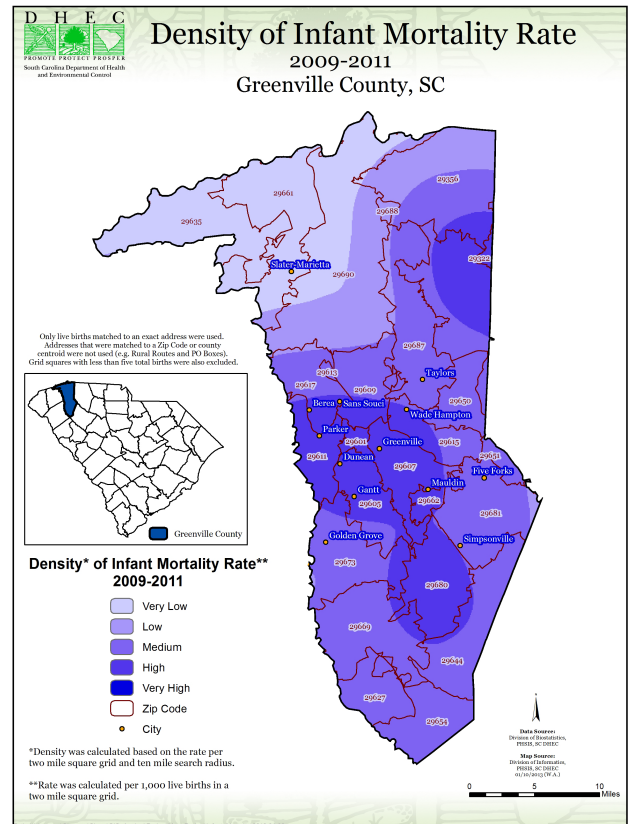


Figure 4e. Number of infant deaths in Richland County communities.

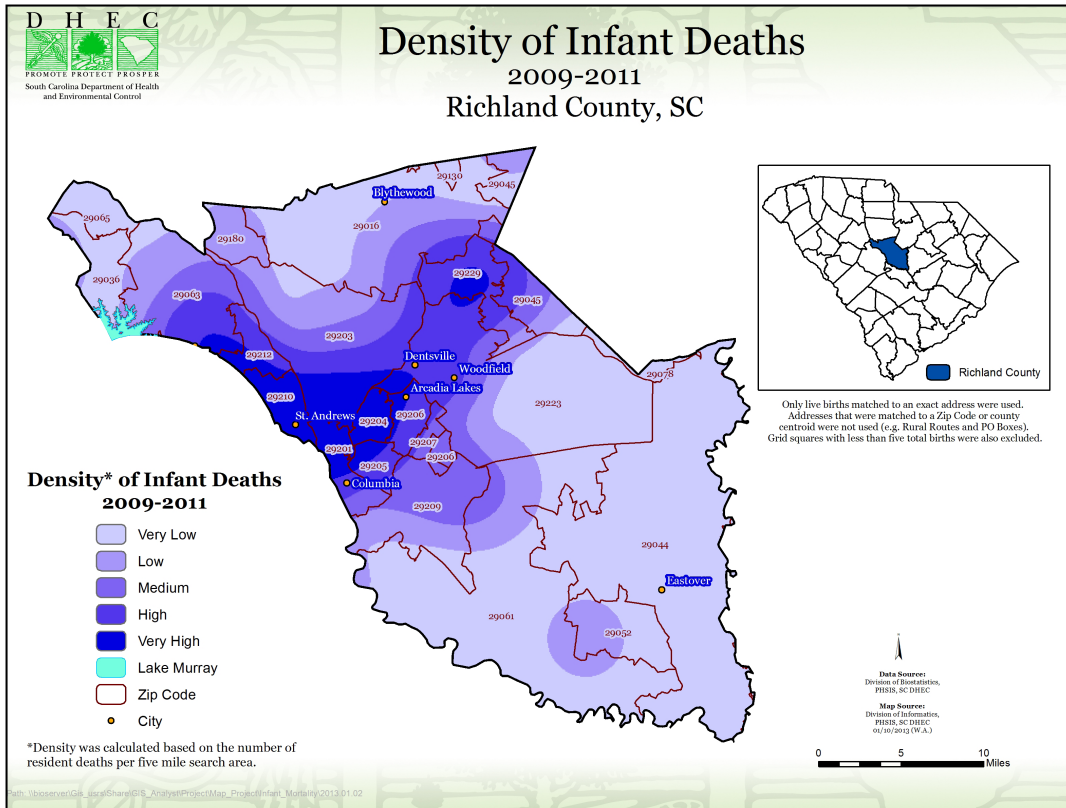
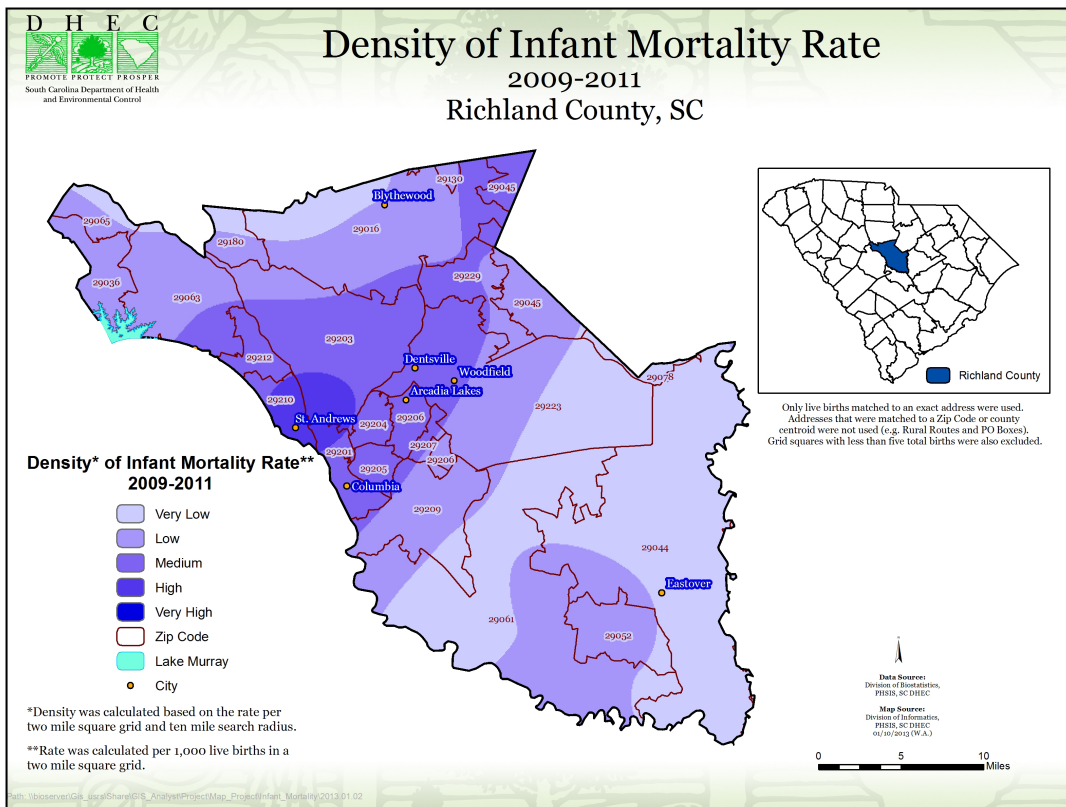


Figure 4f. Rate of infant deaths in Richland County communities.



## Recommendation

Our recommendation, based on the data presented in this report, is to focus efforts on SIDS and preterm birth/low birthweight reduction in the nine counties (Cherokee, Chesterfield, Darlington, Florence, Georgetown, Greenwood, Horry, Marion, and Orangeburg) as well as in communities with large numbers of infant deaths within Richland, Charleston, and Greenville counties.

Safe infant sleep practices, such as having infants sleep alone, on their backs, and in a crib, have been shown to effectively decrease the risk of SIDS deaths. DHEC is currently developing new materials to communicate these messages to align with the National Institutes of Health Safe to Sleep Campaign. These materials and related educational efforts can be targeted to the identified counties. Furthermore, smoking cessation has been shown to reduce the risk of SIDS, preterm births, and low birthweight births. Evidence-based campaigns to refer pregnant smokers to the S.C. Tobacco Quitline can also be implemented. Finally, preconception health reduces the risk of preterm and low birthweight births. Preconception health messages are similar to obesity reduction and prevention messages which are being disseminated by DHEC. In addition to educating the public about these issues, it is important to also disseminate this information to maternal and child health providers. The Birth Outcomes Initiative, DHEC OB Task Force, and DHEC Pediatrics Advisory Council would be efficient ways to reach key providers.

*Report prepared by:*

*Bureau of Maternal and Child Health*

Michael G. Smith, MSPH, and Brenda Martin, RN, MN

*PHSIS, Division of Biostatistics*

Shae Sutton, PhD, and Daniela Nitcheva, PhD

**Table 1.** Leading causes of infant mortality in counties that consistently\* have above the median number and rate of infant deaths, 2009-2011.

County	Cause 1**		Cause 2**		Cause 3**		Cause 4**	
	Cause	Number	Cause	Number	Cause	Number	Cause	Number
Cherokee	SIDS	4	Birth Defects	2	Preterm/LBW	2		
Chesterfield	SIDS	7	Birth Defects	4	Preterm/LBW	3	Maternal Complications of Pregnancy	2
Darlington	SIDS	7	Preterm/LBW	5	Maternal Complications of Pregnancy	4	Birth Defects	2
Florence	Preterm/LBW	11	Maternal Complications of Pregnancy	9	Birth Defects	7	SIDS	6
Georgetown	Birth Defects	6	Preterm/LBW	4	SIDS	2	Accidents	2
Greenwood	Birth Defects	6	Accidents	3	Preterm/LBW	2	Maternal Complications of Pregnancy	2
Horry	Preterm/LBW	14	Birth Defects	12	SIDS	12	Maternal Complications of Pregnancy	5
Marion	Maternal Complications of Placenta	5	Preterm/LBW	4	Birth Defects	3	Maternal Complications of Pregnancy	3
Orangeburg	Preterm/LBW	8	SIDS	8	Birth Defects	6	Maternal Complications of Pregnancy	2
South Carolina	Birth Defects	222	Preterm/LBW	193	SIDS	138	Accidents	95

\*Counties selected had higher than median number and rate of infant deaths from 2006-2008 and from 2009-2011.

\*\*Causes only included if 2 or more deaths due to that cause occurred in the county from 2009-2011.



**Table 2.** Impact of each cause of death for selected counties and South Carolina overall, 2009-2011

Cause of Death	Nine Selected Counties		South Carolina Overall	
	Number	Rate for Counties	Number	Rate for State
Birth Defects	48	1.6	222	1.3
Preterm/LBW	53	1.7	193	1.1
SIDS	48	1.6	138	0.8
Accidents	19	0.6	95	0.5
Maternal Complications of Pregnancy	27	0.9	76	0.4
<b>Total Infant Deaths*</b>	<b>320</b>	<b>10.4</b>	<b>1283</b>	<b>7.3</b>

\*Total infant deaths include deaths due to all causes, not restricted to the causes of death included in this table.

**Table 3.** Impact of each cause of death for selected counties and South Carolina overall, WHITE 2009-2011

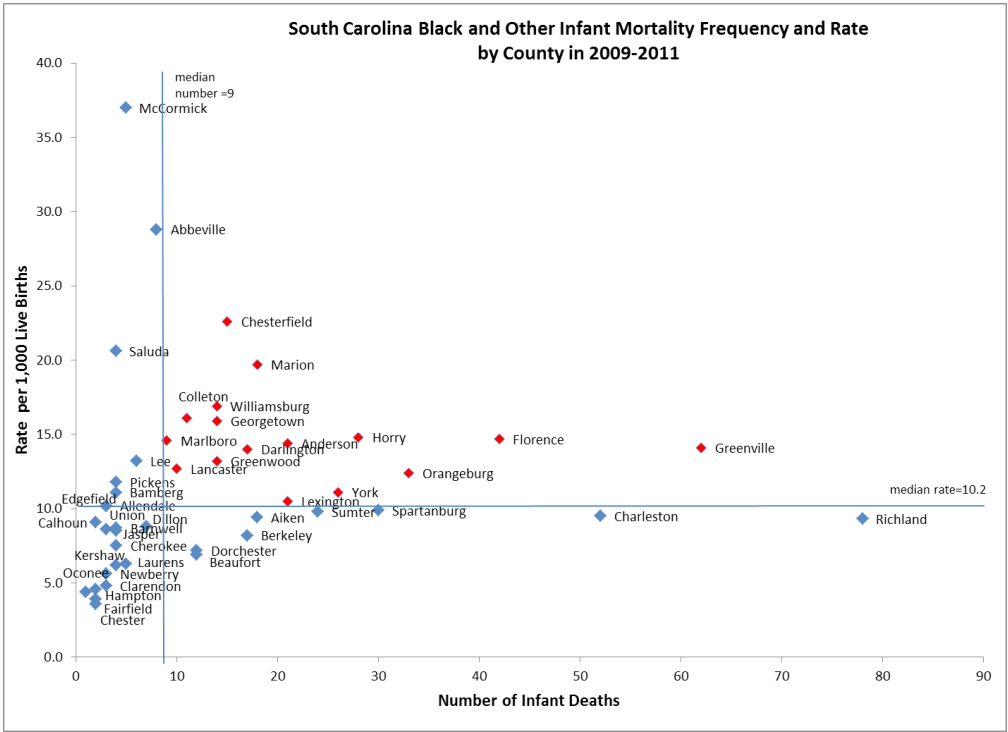
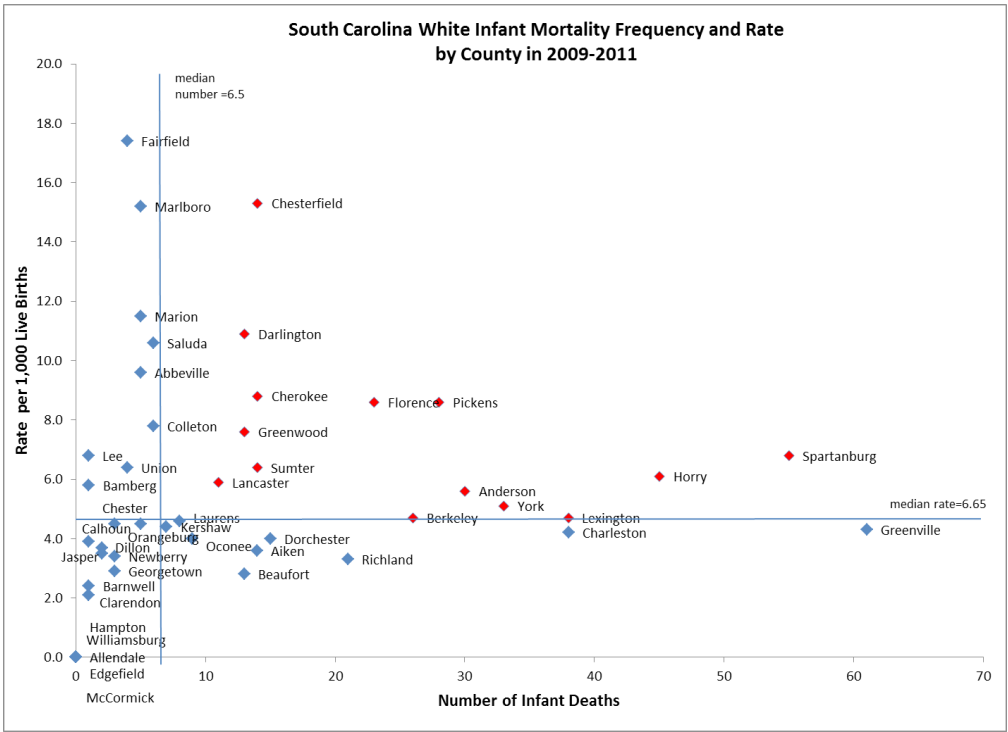
Cause of Death	Nine Selected Counties		South Carolina Overall	
	Number	Rate of Counties	Number	Rate for State
Birth Defects	19	1.1	109	1.0
Preterm/LBW	14	0.8	70	0.6
SIDS	23	1.3	68	0.6
Accidents	10	0.6	53	0.5
Maternal Complications of Pregnancy	8	0.4	26	0.2
<b>Total Infant Deaths*</b>	<b>130</b>	<b>7.2</b>	<b>577</b>	<b>5.0</b>

\*Total infant deaths include deaths due to all causes, not restricted to the causes of death included in this table.

**Table 4:** Impact of each cause of death for selected counties and South Carolina overall, BLACK AND OTHER 2009-2011

Cause of Death	Nine Selected Counties		South Carolina Overall	
	Number	Rate for Counties	Number	Rate for State
Birth Defects	29	2.3	113	1.8
Preterm/LBW	39	3.1	123	2.0
SIDS	25	2.0	70	1.1
Accidents	9	0.7	42	0.7
Maternal Complications of Pregnancy	19	1.5	50	0.8
<b>Total Infant Deaths*</b>	<b>190</b>	<b>15.0</b>	<b>706</b>	<b>11.5</b>

\*Total infant deaths include deaths due to all causes, not restricted to the causes of death included in this table.



## **Appendix B:**

# **S.C. Infant Mortality Team SWOT Analysis from January 2012 Infant Mortality Summit**

### **Strengths**

South Carolina has long enjoyed strong, positive relationships with major maternal and child health stakeholders whose leadership possesses strong collaborative spirits. Our ability to share and integrate data through the Office of Research and Statistics' (ORS) Data Warehouse is the envy of many states. The Birth Outcomes Initiative led by S.C.DHHS in 2011 brought together many of the stakeholders needed to address issues related to infant mortality. The BOI has implemented several key strategies designed to improve the infant mortality rate, such as a policy discouraging elective deliveries before 39 weeks of gestation. This group has also facilitated awareness of and access to 17 P, a medicine that can help prevent preterm births in some pregnant women who have already had a preterm birth. In addition, Medicaid eligibility for pregnant women will now be streamlined through assumptive eligibility.

DHEC has an integrated state and local public health system. This assists in development and implementation of statewide policies. Within this framework, there is a very strong system of perinatal regionalization that works to ensure that high-risk deliveries take place at one of the state's five regional perinatal centers to improve maternal and infant outcomes. Perinatal regionalization also assures best practice education is received by staff across the state. Regional Systems Developers, located in four perinatal centers across the state, are co-funded by DHEC and the centers. They work closely with a strong network of Maternal-Fetal Medicine (MFM) specialists and neonatologists to improve outcomes for both mothers and babies.

DHEC also has public health nurses experienced in home visitation through the Postpartum Newborn Home Visit Program (PPNBHV) and the Nurse-Family Partnership (NFP).

Birth defects are consistently a leading cause of infant mortality and morbidity. DHEC collaborates with the nationally recognized Greenwood Genetics Center to publicize the benefits of folic acid consumption to decrease incidence of neural tube defects. The S.C. Birth Defects Program has been collecting data on all categories of birth defects recommended by CDC since 2008. In 2012, the Birth Defects Program expanded functionality to be able to systematically collect data on whether cases of critical congenital heart defects were identified, in part, by pulse oximetry screening.

DHEC is also fortunate to have strong collaborations with the University of South Carolina Schools of Medicine and Public Health and the Medical University of South Carolina. In addition, there are three Healthy Start sites in South Carolina that are located in areas with high rates of infant mortality and preterm deliveries. Collaboration with Healthy Start will be a key to the state's success.

The Maternal Infant and Early Childhood Home Visiting Program funded by the federal DHHS Administration for Children and Families (ACF) provides significant funding for evidence-based home visitation programs in the state. The funds are administered through S.C. Children's Trust and DHEC and its partners serve on the program's advisory committee. These programs will be vital tools in working at the individual and community level to impact infant mortality, as well as working at the systems or community level to demonstrate collective impact.

In terms of smoking cessation, there is a statewide Tobacco Quitline administered by DHEC, hospitals and many state agencies are now smoke-free, and there are numerous local smoke-free ordinances. In 2010, the state's cigarette tax was increased from 50 cents a pack to 57 cents per pack, the first such increase in 33 years. Priority areas selected for further development during this process include:

- Develop a unified birth outcomes improvement plan(life course framework);
- Create a mechanism to identify, disseminate and leverage best practices;
- Create a data-driven model for policy/program decisions and development; and
- Develop a collaborative birth outcomes epidemiological and evaluation program/team.

## Weaknesses

Despite its many assets, South Carolina still has some key barriers that impede progress in reducing infant mortality and improving overall health outcomes. Although S.C.DHHS has removed barriers to receiving 17P, some physicians and many consumers do not have adequate information about the benefits of this treatment. S.C. will work to improve and disseminate educational materials designed separately for providers and consumers.

Transportation reimbursement limits transfer of newborns and mothers. This has long been a key concern of the perinatal regionalization system. In addition, the ability to link and contract with Medicaid providers can be difficult due to variations in policies and services of the Medicaid managed care plans.

South Carolina, as many states, is not making significant progress addressing the social determinants of health. The recently awarded Community Transformation Grant will give us the best opportunity in years to make progress in this area. South Carolina has negative health indicators in many areas such as obesity, cardiovascular health, and diabetes. The rural areas of the state have poor access to services, including to specialists who are concentrated in the three largest urban counties: Charleston, Greenville, and Richland. There is currently no comprehensive plan that outlines goals for birth outcomes and infant mortality. This impedes collaboration and ability to leverage funding.

Funding tends to remain within silos. Although there have been many efforts to blend funding of state and private agencies for common purposes, this is still the exception rather than the rule. In terms of workforce capacity, the public health workforce is aging and economic shortfalls have limited hiring of the new young talent that is crucial to sustaining the system. Many well-trained graduates of USC. Public Health have gone to other states due to the lack of opportunity currently in S.C.. This is also an issue with other trained professions.

It can be difficult for Medicaid clients to access behavioral health and dental health services. Also, termination of postpartum Medicaid coverage at 60 days limits screening and treatment for postpartum depression and other conditions. There is limited access to preconception and interconception health counseling, which are key strategies to improve population health prior to pregnancy and between pregnancies. Historically there has not been much focus on this type of life course approach and payment options have been limited. Because it is a best practice, South Carolina will find ways to extend availability for these services.

Health disparities remain a key area of concern. The risk for delivering low birth weight infants for non-Hispanic Black women is more than double the risk for non-Hispanic White women. S.C. is implementing evidence-based models such as Centering Pregnancy and the Nurse-Family Partnership in an effort to decrease these disparities, but more population-based work is indicated. The BOI Reduction in Health Disparities Workgroup has issued a comprehensive report identifying key issues and recommending strategies that should be adopted.

Suggested priority areas include:

- State culture: frame issues accurately and creatively to inform citizens and politicians about importance of key issues; use data as well as anecdotal examples; include associated human costs.
- Employ technological advances (telemedicine and social media) to educate.
- Develop a comprehensive state plan with public and private support.
- Increase access to medical homes.
- Develop policies to expand and retain the medical provider workforce in rural areas.

## Threats

Cuts in reimbursement for Medicaid for OB care could lead to provider disenrollment and difficulty locating a Medicaid provider even if Medicaid eligible. There are some efforts for financial incentives that are not well aligned. There has been a “perfect storm” of economic pressure, federal focus on less government, and the uncertainty of funds available to support MCH priorities at the federal and state level.

Suggested priorities:

- State loan forgiveness program in areas of workforce shortages.
- Collaborate with CDC on existing programs to expand workforce capacity.
- DHHS and Blue Cross Blue Shield leadership of a program to align incentives and test new reimbursement models.

## Opportunities

The Maternal and Child Health Title V Reporting System contains some performance measures that can serve as the baseline for some of our efforts. The next needs assessment may determine the need for specific state measures focused upon our collaborative work to reduce infant mortality and improve birth outcomes. The opportunity to develop a state plan to formalize the priorities developed during the summit, implement the plan, and evaluate outcomes, will be key tools in the fight against infant mortality. We have good opportunities to optimize clinical interventions such as tobacco cessation and appropriate use of 17P.

Suggested priorities:

- Promote best practice across service delivery (using incentives).
- Develop pilot to increase interconception care.
- Expand practice acts to improve access.
- Utilize students in internships and practica.
- Develop multidisciplinary use of telemedicine in multiple locations.

The summit’s meeting outcomes included increased understanding of strategies and resources, increased synergy among state partners, and completed action plans for each state.







South Carolina Department of Health  
and Environmental Control

[www.scdhec.gov](http://www.scdhec.gov)

*We promote and protect the health of the public and the environment.*