

Florida Black Infant Health Practice Initiative (2008)

A Review of the Literature on Black-White Disparities in Birth Outcomes

Executive Summary:

The aims of this review of the literature were to identify: 1) the extent of the research on the black-white disparities in birth outcomes; 2) the known causes of black-white disparities in birth outcomes; 3) models explaining the disparities; and 4) effective strategies for addressing racial disparities in birth outcomes. Birth outcomes include infant mortality (death of an infant within the first year of life), fetal mortality (death of the baby in the womb), perinatal (death of a baby anytime between 5 months before birth to 1 month after birth) and neonatal mortality (death of an infant within the first month of life). We selected 106 peer-reviewed articles for inclusion in this report.

According to the available literature, there is a breadth of research on the persisting racial disparities in birth outcomes as well as the possible contributors to these disparities. It is not known which factor or combination of factors, explication models, or intervention strategies can be used to reduce the black-white disparity in birth outcomes. The literature clearly recognizes that it is possible that other risk factors or combinations of factors exist which have yet to be explored. Based on the literature in peer reviewed journals, little evidence has been provided in regards to best practices for reducing racial disparities in birth outcomes.

- Much of the literature on fetal and infant mortality in the United States has focused on the medical causes of infant mortality such as low birth weight, preterm birth, sudden infant death syndrome, and congenital anomalies.
- There are disparate findings when it comes to factors such as income, education, and access to care. These have been shown to impact birth outcomes among both races; however they do not explain the disparities between blacks and whites.
- Social factors such as neighborhood characteristics (residential segregation), racism (institutional and chronic stressor), and stress (social environment and family) have been often found to be stronger determinants of these disparities.
- Existing models that attempt to explain health disparities include life-course perspectives, ecological models, preconception and interconception models of care, and PPOR techniques.
- Suggested prevention strategies include continuing to support community health centers/community outreach programs and improving access to health care/prenatal care.
- The persistent disparities in black-white fetal and infant death warrant a serious effort to understand, reduce, and eliminate these disparities.

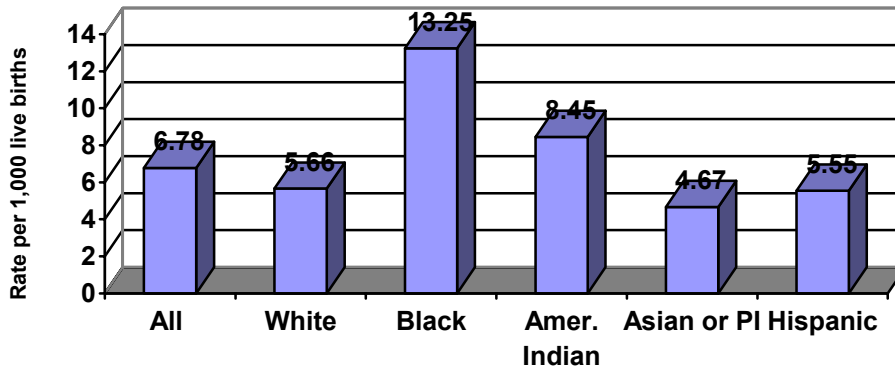
I. Introduction

Today, in the United States, a black infant is more than twice more likely to die before his/her first birthday than a white infant. This disparity in infant mortality is reflected in fetal and neonatal mortality: the black fetal mortality rate is more than double than that of whites'. In the past 2 decades, these disparities have either remained unchanged or have increased. The determinants of these persistent disparities in fetal and infant mortality have been heavily researched and multiple possible causes have been identified. However, no single cause or set of causes has been found to explain these racial disparities. The literature suggests that the interplay between social, historical, behavioral, institutional issues all contribute to the differences in black-white infant, fetal and neonatal mortality rates.

U.S. Infant Mortality Rates:

In 2004, the infant mortality rate of blacks was 13.25 per 1,000 live births, higher than any other race in America. In fact, it is nearly two times the national average for all races (6.78 per 1,000 live births), more than two times the infant mortality rate for white and Hispanic infants (5.66 per 1,000 live births and 5.55 per 1,000 live births respectively), close to three times that of Asian or Pacific Islanders (4.67 per 1,000 live births), and is one and a half times as high as American Indians (8.45 per 1,000 live births) (NVSR, 2007) (Figure 1).

Figure 1. Infant Mortality Rates by Race/ethnicity, 2004

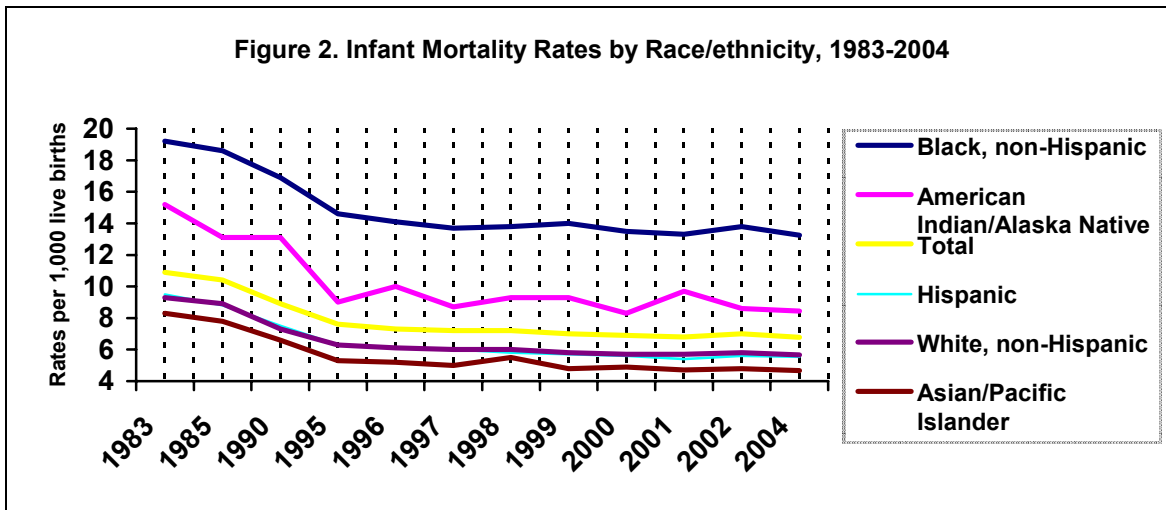


Source:

NVSR, 2007, note: Amer. Indian=American Indian & PI=Pacific Islander

Figure 2 displays the trends in infant mortality rates by race/ethnicity overtime from 1983 to 2004. It is clear from this figure that although infant mortality rates are generally decreasing over time, still, major racial disparities persist.

Figure 2. Infant Mortality Rates by Race/ethnicity, 1983-2004



Source:

NVSR, 2007 (Vol. 55, Number 14); Health, United States, 2006 with Chartbook on Trends in the Health of Americans with Special Feature on Pain

Florida Infant Mortality Rates:

When comparing Florida to the U.S., Florida's overall infant mortality rate in 2004 (7.33 per 1,000 live births) was higher than the U.S. as a whole (6.86 per 1,000 live births).

When comparing Florida to the other 49 states in the U.S., it ranks as the 20th worst state in the nation. For decades the infant mortality rate in Florida had been declining until about 1995 when the rates began leveling off (NVSR, vol. 55, #14). For the black population in Florida, the infant mortality rate is the 26th worst in the nation. (Table 1)

Table 1. Infant Mortality Rates by Race and Place, 2002-2004 linked files

	Florida	United States
Total	7.33	6.86
White	5.67	5.73
Black	12.79	13.51
American Indian	8.27	8.6
Asian or Pacific Islander	5.99	4.76
Hispanic	5.11	5.6

Source: NVSR, 2007 (vol. 55, no 14).

Perinatal Mortality Rates:

Although infant mortality is typically the public health problem that is quantified and discussed the most, fetal mortality is a major public health concern and actually occurs more frequently than infant mortality. Overall U.S. fetal and perinatal mortality rates have decreased over time, however, similar to infant mortality, these rates are higher than other developed countries (7-9 from NVSR, Vol. 56, 2007). Racial disparities also exist in fetal and perinatal mortality. The fetal mortality rate for white women was

4.98 and 4.77 for Asian or Pacific Islander, whereas the rate for black women was 11.25 an astounding 2.3 times higher than that of white women.

Florida Perinatal Mortality Rates:

When comparing Florida to the U.S. as a whole, Florida's fetal mortality rate (7.51) and perinatal mortality rate (6.97) is higher than the U.S. fetal and perinatal mortality rates, 6.2 and 6.69 respectively. When comparing Florida to the other 49 states in the U.S., it ranks as the 8th worst state in the nation in fetal mortality. In terms of perinatal mortality, Florida ranks as the 19th worst state in the nation (NVSR, vol 56, 2007).

II. Methods

We undertook an analysis of the literature to examine racial and ethnic disparities in fetal and infant mortality. The types of studies considered for inclusion in the analysis included peer reviewed articles for the period of 1966 to 2007 using Web of Science, MEDLINE and CINAHL, and subsequently, the reference sections of these articles were scouted for additional relevant articles. The literature search was initiated in October 2007 by an experienced medical reference librarian. For the peer reviewed article search, search terms included "health status disparities", "African Americans", "perinatal care", "risk factors", "etiology", "underlying mechanism", "infant mortality", "prenatal care", "fetal mortality", "perinatal mortality", "pregnancy complications", and "blacks". Articles were required to have full manuscripts and to be written in the English language. Qualifying articles were reviewed and evaluated for content related to racial and ethnic

disparities in fetο-infant mortality. The articles were then examined and partitioned into four main categories: 1) birth outcomes and infant characteristics, 2) parent and family characteristics, 3) community and societal characteristics, and 4) models explaining health disparities, as well as strategies for the prevention and reduction of black-white disparities in birth outcomes.

III. Results

A total of 109 articles have been retrieved and reviewed to date and are presented in the summary table (Appendix A) by the four identified categories:

1. Birth outcomes and infant characteristics: 42 articles
2. Parent and family characteristics: 21 articles
3. Community and societal characteristics: 28 articles
4. Models and existing preventative strategies: 18 articles

Factors Impacting Racial Disparities in Birth Outcomes:

i. Birth Outcomes and Infant Characteristics

- Preterm Birth, low birthweight (LBW), very low birthweight (VLBW)
 - Black women are more at risk for preterm birth, LBW, and VLBW as compared to white women. Black women have 1.6 times the rate of preterm birth than white women.
 - About 2/3 of the disparity in infant mortality is due to these higher rates.
(Armstrong A & Maddox YT, 2007; Byrd DR. et al., 2007; Mathews TJ & MacDorman, MF, 2007; Schempf AH et al., 2007; Headley AJ, 2004; Anachebe NF, 2006; Hamilton BE et al., 2007; Shi L et al., 2004; Shiao SPK et al., 2005; Ashton, D, 2006; Kitsantas P et al., 2006; Kramer MS et al., 2006; Alexander GR et al., 2007; Schempf AH et al., 2007)
- Prenatal Care

- Minorities (including Blacks) are more likely to receive late or no prenatal care. (Armstrong A & Maddox YT, 2007)
- Sudden Infant Death Syndrome (SIDS)
- Blacks have a higher incidence of SIDS as compared to whites with estimates 2.1 times higher.
(Armstrong A & Maddox YT, 2007; Mathews TJ & MacDorman, MF, 2007; Hessol NA & Fuentes-Afflick E, 2005; Anachebe NF, 2006; Headley AJ, 2004)
- Preventable Injury
- Black infants have 3.5 times increased risk of death from preventable injuries as compared to white infants.
 - Disparities found comparing blacks to whites: mortality 9.6% vs. 2.8%; abuse 15% vs. 4%; suffocation 100% vs. 55%
(Falcone RA et al., 2007)
- Stillbirth
- There is an increased risk of stillbirth for black couples and for interracial couples.
 - Mother white-father black RR=1.17
 - Mother black-father white RR=1.37
 - Mother black-father black RR=1.67
 (Getahun D et al., 2005)
- Respiratory Distress Syndrome (RDS)
- There is a nationwide reversal from a survival advantage to a survival disadvantage for blacks with RDS from 1989-1998
(Frisbie, WP et al., 2004; Headley AJ, 2004)
- Congenital Anomalies
- Black infants with gastroschisis have worse survival outcomes while those with omphalocele have better chances of survival than their white counterparts.
(Salihu, H et al., 2004)

- Infant mortality related to congenital malformation has declined more slowly in no-whites than in whites.
- In 1970-71, infant mortality related to congenital malformations in nonwhites was lower (2.6/1000) than whites (3.1/1000); in 1996-07, it was higher in nonwhites (1.7/1000) than whites (1.6/1000).
(Lee K et al., 2001; Headley AJ, 2004)
- Postneonatal mortality attributable to birth defects (PMBD) is higher for blacks as compared to whites. The disparity in PMBD between infants of black and infants of white mothers increased significantly from 1989-1991 to 2000-2002.
(Yang Q et al., 2006)

➤ Other Contributing Factors

- Blacks experienced higher rates of intra-uterine growth restriction, pre-eclampsia, preterm premature rupture of membranes, gestational diabetes, placenta previa, preterm birth, very-preterm birth, cesarean delivery, light vaginal bleeding, and heavy vaginal bleeding compared to the white population
(Healy AJ et al., 2006)

ii. Parent and Family Characteristics

➤ Marital Status

- Neonatal mortality is significantly elevated for single mothers across race; however black single mothers have higher rates.
- Neonatal mortality was 34.9/1000 for married black women & 20.6/1000 for married white women. Neonatal mortality for single women was 43.4/1000 for black women & 28.9/1000 for white women.
(Salihu, HM et al., 2004)

➤ Maternal Stress

- Black women experiencing high levels of prenatal stress (including stress caused by racism) are more likely to deliver preterm and have a LBW infant.
- Psychosocial stress can lead to acute and chronic changes in the functioning of body systems & can also lead directly to illness.

(Headley AJ, 2004; Hogue CJ & Bremner JD, 2005; Gee GC & Payne-Sturges DC, 2004; O'Campo P & Schempf A, 2005; Rich-Edwards J et al., 2001; Rich-Edwards JW & Grizzard TA, 2005; Patrick TE & Bryan Y, 2005; Jackson FM, 2007)

➤ Maternal Age

- Health problems among older black women of reproductive age may contribute to racial disparities in birth outcomes.
- *Weathering Hypothesis* — “the health of black women may begin to deteriorate in early adulthood as a physical consequence of cumulative socioeconomic disadvantage.”

(Buescher PA & Mittal MM, 200; Hogue CJ & Bremner JD, 2005)

- Women who are of advanced maternal age are at higher risk of stillbirth throughout gestation.
- Among women 40 years old and older, black women had a 1.26-fold increase in stillbirth risk at 37 weeks or longer when compared with white women.

(Reddy UM et al., 2006)

- Older maternal age is associated with reduced birth weight among infants born to black women, & the age effect is exacerbated by individual poverty.

(Rauh VA, et al., 2001)

➤ Prenatal Care

- Women receiving no prenatal care are more likely to be black.
- There is a 2 to 4-fold increased risk for negative birth outcomes for women receiving no prenatal care.
- Interventions aimed at increasing maternal education and access to prenatal care that are not aimed at high risk populations may actually increase the disparities in infant mortality.

(Byrd DR. et al., 2007; Taylor CR et al., 2005)

➤ Sexually Transmitted Infections (STIs)

- Bacterial vaginosis (BV) is associated with adverse pregnancy outcomes such as prematurity, LBW, premature rupture of membranes and late miscarriage.
- Women with BV were more likely to be non-white (OR 2.75; 1.08,7.07).

(Cottrell BH & Shannahan M, 2004; Leitich H & Kiss H, 2007)

iii. Community and Societal Characteristics

- Socio-economic Status (SES), Poverty
 - Traditional SES indicators (e. g. education, income)
 - There is conflicting evidence when it comes to SES and infant mortality:
 - Some studies state that SES is a fundamental cause of racial differences in health and show that as maternal levels of SES grow, infant mortality rates decline. (Singh GK & Kogan MD, 2007; Headley AJ, 2004; Rich-Edwards JW & Grizzard TA, 2005; Goza FW et al., 2006; Hamilton P & Restrepo E, 2006; Gennaro S, 2005; Williams DR & Collins C, 2001)
 - Other studies demonstrate that higher level of SES is not protective for blacks in particular. (Sims M et al., 2007; Headley AJ, 2004)
 - For both blacks and whites, the increase in VLBW occurred to higher SES suggesting that conventional strategies of increasing access to prenatal care for disadvantaged women may be insufficient to reverse infant mortality rate increases, irrespective of race. (Schempf A et al., 2007)
 - One study found that the role of race/ethnicity varied based on how SES was measured and urges researchers to understand the problems with measuring SES and to interpret findings accordingly. (Braveman P et al., 2001)
- Neighborhood Characteristics (e. g. Residential Segregation, Geographic Region of Residence, Environmental Exposures)
 - Residential segregation leads to differential experiences of community stress, exposure to pollutants, & access to community resources that may be deleterious to health. (Gee GC & Payne-Sturges DC, 2004; Rich-Edwards JW & Grizzard TA, 2005; Whitman S et al., 2004; Culhane JF & Elo IT, 2005; Patrick TE & Bryan Y, 2005; Bell JF et al., 2006; Williams DR & Collins C, 2001; Farley TA et al., 2006)

- A significant association was found between neighborhood deprivation & risk of preterm birth. (O'Campo P et al., 2007)
- 79% of black infants compared to 9% of whites infants resided in impoverished neighborhoods ($p < 0.01$).
- Urban black infants who reside in both impoverished and non-impoverished neighborhoods are at high risk for postneonatal mortality. (Papacek EM et al., 2002)
- Living in the Deep-South region is a strong predictor of poor child health. (Goldhagen J et al., 2005)
- Environmental risk factors are suggested as indicators of economic and social disparities and may impact reproductive health outcomes. (Silbergeld EK & Patrick TE 2005)

➤ Racism

- Racism may impact health outcomes.
- Racism is a system that assigns value and opportunity based on the way people look and unfairly disadvantages some people and groups.
- Jones CP presents a framework for understanding racism. This framework is useful for raising new hypotheses about the basis of race-associated difference in health outcomes and for designing effective interventions to eliminate differences.
- It is proposed that racism impacts health on 3 levels: 1) Institutionalized racism (structures resulting in differential access to goods, services, and opportunities), 2) Personally-mediated racism (prejudice and discrimination which results in lack of respect, suspicion, devaluation, scapegoating, and dehumanization), and 3) Internalized racism (acceptance of stigma and negative messages about our intrinsic worth which translates to embracing "whiteness", self-devaluation, and helplessness). Jones CP also discusses ways to confront these 3 types of racism in practice. (Jones CP, 2000; Jones CP, 2000; Jones CP, 2001)
- Racism can cause chronic cumulative stress which can impact pregnancy outcomes.
- Black women are 4 times more likely than other minority groups to report daily or weekly racism incidents.
- Low income black women who delivered infants weighing $< 1500\text{g}$ were twice as likely to report incidents of racism as compared to

women who delivered normal-weight infants with no complications.

(Rich-Edwards JW & Grizzard TA, 2005)

➤ Access to Health Care

- Enrollment in SCHIP was associated with improvement in access, continuity, & quality of care for all racial/ethnic groups & reduction in preexisting racial/ethnic disparities in access, unmet need, & continuity of care.
- Racial disparities in quality of care remained, despite improvements for all racial groups.

(Shone LP et al., 2005)

IV. Addressing Health Disparities:

Racial disparities in health outcomes is an harsh reality in our society and although it has been well documented that these disparities exist, the greater challenge has been to develop models that address these health disparities. A few researchers have taken a stab at the challenge, providing possible explication models.

The *Life-course Development Model* addresses the relationship between the health of a mother prior to a pregnancy and the subsequent effect on her infant's health. It suggests that the sum of all the events and behaviors over the course of the mother's life prior to her becoming pregnant determine the outcome of her pregnancy, including stress, racism, family circumstances and personal choices. This perspective integrates two broad mechanisms explaining this relationship: early programming mechanism & cumulative pathway mechanism. This model offers a longitudinal perspective of the relationship between biological, behavioral, psychological, and social risk factors as well as protective factors that may impact birth outcomes (Lu & Halfon, 2003).

The *Ecological Model* or framework posits that a public health problem such as fetal infant mortality is the result of a confluence of factors spanning all levels of the problem. Specifically, the ecological framework proposes two key concepts: 1) that individual behavior affects and is affected by the social environment and 2) that behavior both shapes and is shaped by multiple levels of influence (Glanz, 1995). McLeroy et al. (1988) developed and defined five levels of influence that can affect health behavior including, individual factors, interpersonal factors, institutional or organizational factors, community factors, and public policy factors. Ecological models recognize that examining the ecological niche—the family, the community, the political and social environments—in which the person lives is essential in helping to understand and to prevent health problems (Reifsnider et al., 2005).

The *Perinatal Periods of Risk (PPOR) Technique* identifies areas of intervention within the community for public health problems and has been used to assess disparities in infant mortality. The PPOR typically includes two analytic phases where the first phase partitions fetal and infant mortality into four prevention categories depending on birth weight at delivery and death (maternal health/prematurity (MHP), maternal care (MC), newborn care (NC), and infant health (IH)), and the second phase estimates excess death in total and also within the each category. This technique has been applied to infant mortality from both a perspective of disparity as well as by geography (Cai, J et al.,

2007; Cai et al., 2005). The results of this technique highlight specific areas and opportunities for prevention.

V. Strategies for the Prevention and Reduction of Black-White Disparities in Birth Outcomes

Although many risk factors for negative birth outcomes have been identified and some models have been suggested to explain the racial disparities, researchers have much less of an understanding about how to eliminate these disparities. Overall, successful strategies employed in the prevention and reduction of black-white disparities in health outcomes have focused on community-based interventions and improving quality of care.

Community Initiatives

- *Case Management:* Community-based case management strategies have been shown to reduce infant mortality and LBW. Mackey and Alexander (2003) found that mothers who did not receive case management paid an average of \$277 more in medical costs for their infant within the first 60 days of birth than mothers who received case management. Cramer et al., 2007 evaluated a prenatal care program that focused on coordinated case management. They found that participants in the program had lower infant mortality rates, lower LBW rates, and lower hospital expenditure costs as compared to non-participants. These findings were especially true for black participants. In addition, Donovan et al. (2007) examined a community-based home visitation program and found that the infant mortality

rate was 2.5 higher for families that did not receive home visiting. However, black infants were less likely to benefit from the program as compared to non-black infants.

- *Community Health Centers:* Community health centers (CHCs) provide comprehensive and integrated health care and services such as case management, health education, transportation, and child care to typically vulnerable populations living in a given area. Shi et al. (2004) analyzed data from approximately 700 U.S. based CHCs per year over a six year period (1996-2001) and found that the disparity between black-white LBW rates was lower in CHCs as compared to the nation as a whole. However CHCs are not perfect in that CHC prenatal care rates are lower as compared to the general population.
- *Community-based Participatory Research:* Initiatives rooted in community-based participatory research (CBPR) with the goal of reducing racial and ethnic disparities in health have sprung up throughout the U.S. CBPR aims to include the community in all aspects of research to improve health outcomes and to develop sustainable change within the community. For example, Horowitz et al. (2004) employed principles of CBPR to develop a community advisory board of researchers and community leaders to study health disparities and to use peer educators to improve health outcomes. They also produced an educational newsletter that was widely distributed and their goal is to develop future

programs that are both effective and sustainable. Another example of CBPR initiatives to reduce racial and ethnic disparities is the CDC program called REACH (Racial and Ethnic Approaches to Community Health) 2010 which strives to eliminate health disparities within six main areas: cardiovascular disease, immunizations, breast and cervical cancer screening and management, diabetes, HIV/AIDS, and infant mortality (Collins, 2006). Throughout the country, REACH has performed research and developed interventions in hopes to reduce racial disparities in health (Collins, 2006; Graham, 2006; Kaplan et al., 2006; Wynn et al., 2006).

Initiatives to Improve Infant Care

- *Improving Quality of Care*: Two approaches around initiatives to improve infant care have been suggested in the improvement of infant mortality rates in the U.S.: 1) improving quality of care for infants in hospitals with negative health outcomes (collaborative quality care); and 2) referring high risk births to hospitals with better outcomes (selective referral) (Rogowski et al., 2004). Although this type of research has not been conducted for infant mortality itself, it is purported as a potential intervention to reduce infant mortality as this type of collaborations for quality improvement has been effective in other health venues such as reduced mortality rates from coronary artery bypass surgery (Rogowski et al., 2004).

Although there are practical challenges with these approaches, they hold promise for the reduction of infant mortality rates (Rogowski et al., 2004).

Best Practices

Although newly formulated, there are promising practices that may be effective in developing similar strategies aimed at reducing the racial disparities in infant mortality.

One such practice is preconception and interconception care.

- *Preconception & Interconception Care* is the care provided to women of reproductive age before pregnancy and in between pregnancies, respectively, to aid in the improvement of birth outcomes. Major components of preconception care include risk assessment, education, and interventions, while the key initiative in interconception care is to identify risks that may have caused a previous adverse pregnancy outcome and reduce or eliminate these risks for future pregnancies (Biermann et al., 2006).

Specifically, two programs have been presented as promising models of preconception and interconception care for African American women: The Grady Memorial Hospital Interpregnancy Care (IPC) program in Atlanta, Georgia, and the Magnolia Project in Jacksonville, Florida. The IPC program targeted African-American women who delivered a VLBW infant and investigated whether the program improved health status, pregnancy planning, and child spacing through 24 months of integrated case management and community outreach. All women

who successfully completed the IPC program (n=21) initiated a reproductive plan for themselves and none of the participants became pregnant nine months following their VLBW birth. Similar to the IPC project, the Magnolia Project targeted African-American women ages 15-44 living in a low SES area of two Florida counties. The project employed intensive case management to promote health and well-being for the mother including the reduction of repeat sexually transmitted infections and increased access to family planning. Through the program over 70% of project participants were able to resolve these key issues. Both of these studies demonstrate that this type of case management and outreach can improve health outcomes for this population when risk factors are identified and specific interventions are implemented. Thus, best practices of this nature can be used as effective models of care to help inform and reduce the problem of racial disparities in infant mortality.

VI. Conclusions

There are major and persisting racial disparities in fetal and infant mortality in the U.S. Although we do know a good deal about the medical causes of infant mortality, there are disparate findings when it comes to factors such as income, education, and access to care. Potentially stronger determinants of these disparities include neighborhood characteristics (residential segregation), racism (institutional and chronic stressor), and stress (social environment and family). There have been a handful of

explication models and suggested prevention strategies promulgated within the community, however more is needed. It is not known which factor or combination of factors, explication models, or intervention strategies can be used to reduce the black-white disparity in feto-infant mortality. It is possible that other risk factors exist which have yet to be explored. The persistent disparities in black-white fetal and infant death warrant a serious effort to understand, reduce, and eliminate these disparities.

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Appendix A: Table: Articles in Comparative Context