

**Advisory Committee  
on  
Infant Mortality**

***LOW BIRTH WEIGHT  
REPORT AND  
RECOMMENDATIONS***

**Final Report to  
Secretary of the U.S. Department of Health and Human Services**

**December, 2001**

The views expressed in this document are solely those of the Advisory Committee on Infant Mortality and do not necessarily represent the views of the Health Resources and Services Administration nor the United States Government.

# ACIM

## Advisory Committee on Infant Mortality

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December 2001

Dear Colleague:

The Advisory Committee on Infant Mortality (ACIM) was established to "advise the Secretary on Department programs, which are directed at reducing infant mortality and improving the health status of pregnant women and infants." Since low birth weight (less than 2,500 grams) is a major contributor to infant morbidity and mortality, this issue is of particular concern to the Committee, and reduction in the preterm delivery rate (before 37 weeks gestation) holds great promise for reduction in the low birth weight rate. In 1999, 11.8 percent of births in the United States were delivered preterm, with the rate being almost twice as high among blacks compared to whites. Preterm birth is the second leading cause of neonatal mortality in the United States. Survival rates of infants have been shown to increase as gestational age advances; therefore, an understanding of the causes of preterm birth can contribute significantly to the reduction of the infant mortality rate. Rising preterm delivery rates, as well as the persistent racial and ethnic disparities, were identified by the Committee as requiring immediate attention in order to make progress toward the national Healthy People 2010 goals of reducing the rate of low birth weight and eliminating disparities in birth outcomes.

We are pleased to present ACIM's final report entitled "Low Birth Weight Report and Recommendations." This document is the culmination of work by an ACIM-appointed subcommittee of 12 members who reviewed and synthesized current knowledge on the subject of preterm delivery and developed recommendations for further research and action. The ACIM subcommittee -- composed of experts in infant mortality, low birth weight, preterm delivery, disparities, and faith-based programs at the national, State, and local levels -- met over a 2-year period, invited expert opinion, reviewed the current literature, and sought consensus on its recommendations from the entire Committee.

We would like to call your attention to the following recommendations, which are discussed in more detail in the report:

1. Establish a coordinated approach to develop a research strategy by reestablishing the Department of Health and Human Services Interagency Working Group on Low Birth Weight;
2. Improve our understanding of molecular, genetic, biological, and psychosocial mechanisms of preterm birth through clinical and psychosocial investigations;
3. Assess the content, quality, organization and financing of the aspects of service delivery that impact low birth weight and preterm birth; and
4. Guide program and policy investments that will contribute to healthy families.

We believe that the recommendations in this report will serve as a guide for future research and policymaking as we seek to both lower the Nation's infant mortality rate and reduce disparities.

Sincerely,



Antoinette Parisi Eaton, M.D.  
Chairperson  
ACIM

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**Advisory Committee on Infant Mortality  
Low Birth Weight Report and Recommendations  
December 2001**

## **Executive Summary**

### **I. Introduction and Overview**

The Advisory Committee on Infant Mortality (ACIM) was established to “advise the Secretary on Department programs, which are directed at reducing infant mortality and improving the health status of pregnant women and infants.” In 1998, ACIM appointed a subcommittee of 12 members to review and synthesize current knowledge on the subject of preterm delivery and to develop recommendations for further research and action. The purpose of this report is to call to the attention of the Secretary the urgency of the problem of preterm delivery, one of the two major causes of low birthweight, and to encourage an intense and dedicated effort to improve the health of all mothers and infants.

### **II. Statement of the Problem**

Preterm delivery, or delivery before 37 completed weeks of gestation, represented 11.8 percent of births in the United States in 1999 (Ventura, 2001). Greater than one half of preterm births are the result of preterm labor and premature rupture of the membranes. After congenital anomalies, preterm birth has been identified as the second leading cause of neonatal mortality in the United States (Peters, 1998), and infants born early also face significant developmental and long term health risks if they survive infancy.

The rate of preterm delivery in the United States has risen steadily over the past two decades. Overall, the preterm delivery rate rose 25 percent between 1981 and 1999 (Ventura 2001). Moreover, disparities have continued to exist. The preterm delivery rate among African Americans remains significantly higher than that of all other races (Child Health USA 2001), but this disparity is decreasing, largely due to an increase in preterm delivery among Whites and a decrease among African Americans.

The increase in preterm delivery rates appears to be related to four major factors: (1) an increase in early delivery initiated by the physician to improve the outcome for either the mother or the infant; (2) an increase in multiple births, which is associated with the growing use of fertility-enhancing drugs and procedures; (3) more accurate assessment of gestational age, with increased use of early ultrasound, which provides earlier estimates of gestation in comparison to date of last menstrual period; and (4) a small increase in spontaneous births. Other major risk factors for preterm delivery include history and pre-pregnancy health status; behavioral risk factors, such as cigarette smoking and management of chronic diseases; infection; and psychosocial risks, such as maternal anxiety, violence, poor nutrition, and lack of social support. Many of the risk factors associated with preterm birth can be identified and some ameliorated with appropriate preconception counseling and continuous, high-quality prenatal care.

As the infant mortality rate has declined over the last decade, survival rates have increased for preterm infants. Therefore, more attention has shifted to the development and evaluation of interventions to prevent spontaneous preterm labor and low birth weight rates in general. However, evaluations of many of the approaches tried in the

recent past, such as tocolytics, home uterine monitoring, nutritional counseling, or enhanced prenatal care, have indicated that these strategies have met with inconsistent success.

### **III. Conclusion and Recommendations**

The limited success of the present efforts to reduce the incidence of preterm birth indicate that continued research is needed in several major areas, including the linkages between psychosocial risk factors and pregnancy outcomes; the effectiveness of medical and non-medical preconception and prenatal care; and the molecular, biological, and genetic mechanisms of preterm birth. A critical element of health services research and epidemiological study in the prevention of preterm birth is the development of standardized, defined, consistently collected, and compatible sources of data on pre-pregnant and maternal health status, psychosocial risk factors, and prenatal care services and interventions, as well as on longitudinal follow-up to prevent or ameliorate the long-term physical and/or developmental sequelae related to preterm delivery.

The findings reported here provide justification for a considerable investment in research, programs, and policies focused on the goal of decreasing the incidence of preterm delivery, and thus of low birth weight and infant mortality. This includes major efforts in the following areas:

- Elimination of racial, ethnic, and geographic disparities,
- Smoking prevention and cessation,

- Promotion of health education and healthy behavior,
- Understanding the causes of premature labor and premature rupture on the membranes,
- Investigation of health care delivery systems and their effect on birth outcomes.

Furthermore, ACIM recommends the establishment of a DHHS Interagency Working Group on Low Birth Weight and Preterm Birth to galvanize multidisciplinary research, scientific exchange, policy initiatives and collaboration among DHHS agencies and to assist DHHS in targeting efforts to achieve the greatest advances toward our national goal of reducing infant mortality.

## **I. Introduction and Overview**

The Advisory Committee on Infant Mortality (ACIM) was established to “advise the Secretary on Department programs, which are directed at reducing infant mortality and improving the health status of pregnant women and infants.” As a major contributor to infant morbidity and mortality, low birth weight is an issue of particular concern to the committee, and reduction in the rate of preterm delivery, in turn, holds great promise for overall reduction in the rate of low birth weight. The continued increases in preterm delivery rates, as well as the persistent racial and ethnic disparities in these rates, were identified by the Committee as requiring immediate attention in order to make progress toward the national Healthy People 2010 goals of reducing the rate of low birth weight and eliminating disparities in birth outcomes between blacks and other racial and ethnic groups in the United States.

In 1998, ACIM appointed a subcommittee of 12 members to review and synthesize current knowledge on the subject of preterm delivery and to develop recommendations for further research and action. The ACIM subcommittee met over a 2-year period, invited expert opinion, reviewed the current literature, and sought consensus on its recommendations from ACIM.

This report presents the results of this effort. The purpose of this report is to call to the attention of the Secretary the urgency of the problem of preterm delivery and to encourage an intense and dedicated effort to improve the health of all mothers and infants. The report discusses the current state of knowledge and provides justification for additional investment in research, programs, and policies focused on decreasing rates

of preterm delivery, low birth weight, and ultimately infant mortality. The report summarizes the current research on preterm delivery, including its consequences and its costs, rates of and trends in preterm delivery, possible causes and risk factors, and strategies for prevention. The report concludes with an assessment of areas for future research and recommendations for investment in research, programs, and policy development.

## **II. Statement of the Problem**

Preterm delivery, or delivery before 37 completed weeks of gestation, represented 11.8 percent of births in the United States in 1999 (Ventura, 2001). Preterm birth has been identified as the second leading cause of neonatal mortality in the United States (Peters, 1998). Preterm delivery, greater than one half of which is the result of preterm labor, is one of two major causes of low birth weight, which, in turn, is associated with the majority of cases of infant mortality. The second major cause of low birthweight is intrauterine growth retardation. While the overall infant mortality rate in 1997 was 7.2 deaths per thousand live births, among infants born at low birth weight, or less than 2500 grams (about 5.5 pounds), the mortality rate was 61.5 deaths per thousand (Mathews, 2000). Low birth weight infants may be born too early (preterm delivery), too small (a condition known as intrauterine growth restriction), or both, with two-thirds of cases attributable to preterm delivery (Ventura, 2001). Survival rates of infants have been shown to increase as gestational age advances, even among very preterm infants (Kramer, 1997; Lefebvre, 1996); therefore, an understanding of the causes and prevention of preterm birth can contribute significantly to the reduction of the infant mortality rate.

Infants born early also face significant risks if they survive infancy. Preterm birth is a major contributor to such conditions as cerebral palsy, mental retardation, vision and hearing impairments, and other developmental disabilities. Nearly half of neurological impairments in children have been attributed to preterm birth (Paneth, 1987; McCormick, 1985), and long-term developmental and neuralgic disabilities are more likely to occur in low birth weight and very low birth weight infants than those of normal weight (Hack 1995, Schendel 1997).

In addition to the human cost of these disabilities, preterm birth (and low birth weight in general) exacts a substantial economic cost. The additional costs associated with health care, education, and child care associated with low birth weight were estimated to be nearly \$6 billion in 1988, with the majority of costs occurring during infancy (Lewit, 1995).

#### A. Trends and Disparities in Preterm Delivery Rates

The rate of preterm delivery in the United States has risen steadily over the past two decades. Overall, the preterm delivery rate rose 25 percent between 1981, when 9.4 percent of births were preterm, to 1999, when the rate reached 11.8 percent (Ventura, 2001). This general trend may be analyzed according to several important variables:

- *Race and ethnicity.* In 1999, the preterm delivery rate among non-Hispanic African Americans was 17.5 percent, 63 percent higher than the rate among non-Hispanic Whites of 10.7 percent. The rate among Hispanics was 11.4 percent, six percent higher than the non-Hispanic White rate. Since 1981, the rate of preterm delivery among non-Hispanic Whites has risen 35 percent, while those of non-Hispanic African Americans and Hispanics have been more stable. (Ventura, 2001) (See graphs in Appendix II)
- *Plurality.* Multiple births (that is, twins, triplets, and higher-order births) are significantly more likely than singletons to be born preterm, and the rate of

multiple deliveries is increasing. Among singleton births, the rate of preterm delivery for African Americans is approximately twice that of other racial and ethnic groups. However, the singleton preterm delivery rate for non-Hispanic African Americans and Hispanics is decreasing, while that for non-Hispanic Whites is increasing. (CDC, 1999)

- *State.* The trend and disparity in preterm delivery rates varies by state as well. Between 1990 and 1997, White preterm delivery rates increased in 38 states, while African American rates declined in 24 states. Although these trends have led to declines in the ratio of African American to White preterm delivery rates in many states, all states continue to show a racial disparity, with the excess risk for African Americans ranging from 1.5 to 2.4 (CDC, 2000)

Thus, although the racial and ethnic disparity in preterm delivery remains significant, it is decreasing, largely due to an increase in preterm delivery among Whites and a decrease among African Americans.

#### B. Potential Causes and Risk Factors

The increase in preterm delivery rates appears to be related to four major factors: an increase in multiple births, associated with the growing use of fertility-enhancing drugs and procedures; an increase in early delivery initiated by the physician to improve the outcome for either the mother or the infant; changes in the measurement of gestational age, with increased use of early ultrasound, which provides earlier estimates of gestation in comparison to date of last menstrual period; and a small increase in spontaneous preterm labor which alone accounts for greater than 50 percent of all low birth weight infants. Other major risk factors for preterm delivery have been identified, although significant questions still remain about the mechanisms underlying many of these associations, as described below.

- *History and pre-pregnancy health status.* Prior history of preterm birth and spontaneous abortion and low pre-pregnancy weight are important indicators of risk for preterm delivery; however, these risk factors account for only one-third of all preterm births. In addition, short interpregnancy interval may increase risk for preterm delivery (Rawlings, 1995).
- *Behavioral Risks.* Cigarette smoking is the greatest known risk factor for low birth weight, accounting for 20 to 30 percent of all cases (Camas, 1997). Although smoking is primarily associated with intrauterine growth retardation, it is also related to preterm delivery. Interestingly, the rate of smoking is higher in White women who gave birth in 1999 (13.6%) compared to African-American women (9.6%) (Ventura, 2001). The use of cocaine during pregnancy, although uncommon, is associated with preterm birth and impaired fetal growth. Other risk factors that may be susceptible to behavioral intervention include low weight gain during pregnancy (Carmichael, 1997) and management of pre-existing maternal hypertension (Sibai, 2000) or other conditions (Copper, 1996).
- *Infection.* A number of types of infection have been associated with preterm delivery, including chorioamnionitis, urinary tract infections, pyelonephritis, bacterial vaginosis, upper genital tract infection, amniotic fluid infection, and periodontal infection (Paige 1998). Further research is needed to delineate the specific mechanisms that govern these relationships, and investigation is warranted to explore the potential for preventive antibiotic therapy.
- *Psychosocial Risks.* A range of psychosocial stressors have been shown to be related to preterm delivery (Orr 1996), including domestic violence (Petersen, 1997; Grimstad, 1997), maternal anxiety, poor nutrition, lack of social support, poverty, and unintended and/or unwanted pregnancy. Further research is necessary to delineate the linkage between these factors and the possible role of initiated pathophysiologic responses, which might include the release of corticotrophin-releasing hormone (CRH), the specific role of psychosocial risk factors and/or CRH in labor, and the influence of psychosocial and behavioral risk factors on placental function and uterine activity.

Many of the risk factors associated with preterm birth can be identified with appropriate preconception care and continuous, high-quality prenatal care. Preconceptional counseling, screening and family planning may provide an opportunity to identify and reduce risk factors before pregnancy begins. Prenatal visits also offer an opportunity to provide primary care to pregnant women, including cessation interventions for substance

and alcohol use and smoking, as well as carefully monitoring the pregnancy. However, since more than half of all pregnancies are unplanned, healthy maternal behaviors need to be addressed prior to the confirmation of pregnancy. Routine health promotion and prevention counseling of women of reproductive age in primary care settings may improve health by increasing the prevalence of recommended maternal behaviors, e.g., daily folic acid consumption, smoking cessation, sexually-transmitted diseases (including HIV) prevention, as well as optimizing the management of such conditions as diabetes, epilepsy, asthma, and chronic hypertension. Appropriate nutrition and adequate weight gain, particularly during the second and third trimesters, for example, are important determinants of fetal growth, and can be effectively monitored and modified with quality prenatal care (IOM 1990, Hickey 1996, Siega-Riz 1994). Consequently, prenatal care should not only begin early in pregnancy; it should continue throughout pregnancy, according to accepted standards of periodicity. (ACOG/AAP 1997).

#### C. Potential Strategies to Reduce Preterm Delivery Rates

High-quality neonatal intensive care is responsible for the significant progress in reducing mortality related to preterm birth. The introduction of synthetic surfactant and use of antenatal steroids in the early 1990's decreased the likelihood of intraventricular hemorrhage and decreased the severity of respiratory disease (Palta 1994). As survival rates have increased for preterm infants, attention has shifted to the development and evaluation of interventions to prevent preterm delivery and low birth weight rates in general.

The reported results of the Low Birth Weight Patient Outcomes Research Team (PORT), which reviewed a large number of strategies aimed at the prevention of low birth weight and its sequelae, provided a wake-up call to reassess our current understanding of the causes and potential interventions to prevent preterm birth (Goldenberg 1998). The PORT findings concluded that neither the most common medical/obstetrical interventions to attack preterm labor (such as the use of tocolytics and home uterine monitoring) nor behavioral approaches (such as smoking reduction or drug cessation programs, nutritional counseling or supplementation, or provision of culturally appropriate and supportive prenatal care) have had a significant impact on the rate of preterm birth. However, other studies found that some interventions may be effective in reducing preterm birth. Some studies have concluded that delaying the timing of the preterm delivery is an effective approach for the reduction of both mortality and morbidity rates (Phillip 1995, Rawlings 1995). Some researchers have also found that effective intervention programs targeting complete cessation of smoking may be the single most important modifiable risk factor for reducing the incidence of low birth weight deliveries (Chomitz, et al 1995).

Although models have been proposed to mediate the effects of psychosocial stressors, as a means to lessen the risk of premature labor, these interventions as well have met with variable success. Past interventions, including increased frequency of prenatal nursing contact, and social support programs providing such care as home making services, job training, education, and transportation, have been tested in randomized controlled trials and found to be inconsistent in their effectiveness. However, further examination of the reasons for the failure of these interventions may help to identify new approaches that may, if better targeted or scientifically grounded, prove to be more successful.

Direct attention to primary strategies, which include non-medical interventions to combat pre-pregnancy risk factors, is also imperative. Important variables amenable to primary prevention of preterm birth are avoidance of pregnancy in adolescence, especially those less than 16 years of age, avoidance of smoking and illicit drugs, avoidance of genital infection, and promotion of good nutritional status (Hall, 2000). In addition, our country must deal with an unplanned pregnancy rate of over 40%. Non-medical efforts to impact pre-pregnancy risk factors might include: 1) Efforts to remodel K-12 school-based health curricula, 2) Training of parents, adults and youth mentors in health promotion, and 3) Health programs run by public and private agencies, including those in the faith community. School and community-based education programs have contributed to reductions in adolescent pregnancy rates (Vincent, 1987). The primary behavioral objectives of these programs has been to postpone initial voluntary sexual intercourse among never-married teens and pre-teens, with a second behavioral objective to promote consistent use of effective contraception in teens or pre-teens who choose to become sexually active and who do not desire pregnancy. Components addressed to affect modifiable factors contributing to unintended pregnancy among unmarried adolescents were 1) to increase decision making skills, 2) to improve interpersonal communication skills, 3) to enhance self-esteem, 4) to align personal values with those of the family, church, and community, and 5) to increase knowledge of human reproductive anatomy, physiology, and contraception.

In addition to the evaluation of targeted interventions, the effects of changes in the health care delivery and financing systems on the preterm delivery rate and subsequent survival are important areas for evaluation. The preterm delivery rate for multiple births has

increased substantially since 1981, and may partly be due to changes in obstetric practices (Kogan, 2000). Studies have documented the benefits of delivering high-risk infants in settings equipped to care for them, and very low birth weight infants have lower mortality rates when they are delivered at Level III hospitals, which offer facilities such as mechanical ventilation and neonatal surgery under the direction of a neonatologist (Powell, 1995; Kirby, 1996; Paneth, 1987). To ensure that pregnant women have access to appropriate levels of obstetric care, many States have implemented perinatal regionalization strategies. However, there is some evidence that these systems may be eroding as health care networks and financing systems change as managed care becomes the more dominant form of health care financing and delivery in the United States (Powell, 1995; McCormick, 1995).

### **III. Conclusions**

As the above discussion makes clear, continued research is needed in several major areas, including the linkages between psychosocial risk factors and pregnancy outcomes; the effectiveness and content of preconception and prenatal care; and the molecular, biological, and genetic mechanisms of preterm birth. In addition, the significant contribution of multiple gestation to preterm delivery requires continued investigation of optimal fertility treatments to minimize the risk of multiple gestations, as well as continued investigation of optimal management of multiple pregnancies to help reduce the consequences of this condition.

The effects of changes in health care delivery and financing systems on both costs and outcomes warrant further investigation as well. While the increasing role of managed

care in health care delivery has the potential to decrease medical treatment costs, some studies have shown other, less encouraging effects, such as de-regionalization of high-risk perinatal care, which may have a negative impact on birth outcomes. In addition, new developments in both neonatal technology and the health care marketplace are likely to change the estimates of treatment costs for preterm infants (Rogowski, 1995). Thus, the cost of neonatal care will have to be reassessed in the context of market-driven changes in health care delivery and utilization in order to provide more exact measures of the costs associated with preterm delivery.

A key limitation in understanding pre-term birth is the lack of adequate data. The variety of health care systems, payers, and public health programs serving pregnant women each produce separate, often incompatible data, making the development of such a database unlikely in many States. A critical element of health services research and epidemiological study in the prevention of preterm birth is the development of consistent, compatible sources of data on pre-pregnant and maternal health status, psychosocial risk factors, and prenatal care services and interventions, as well as on longitudinal follow-up to prevent or ameliorate the long-term physical and/or developmental sequelae related to preterm delivery. Progress toward the development of a standard electronic obstetric form has the potential to provide accurate and detailed obstetrical statistics and can be used to investigate the effectiveness of interventions across multiple settings. We may also learn valuable lessons and effective interventions through studying the policies of other countries, cultures, and religions.

Over the past three decades, much effort has been placed on preventing preterm delivery and low birth weight, with the primary objective of improving access to services. However, despite best efforts, reducing the incidence of preterm birth has been unsuccessful, as evidenced by the rise in preterm delivery rates over the past two decades. The belief was that certain interventions worked and improvement in access to those services would reduce the rates of preterm delivery and low birth weight. In retrospect, these efforts produced results that were less encouraging than expected.

Preterm birth and low birth weight are complex phenomena that have multiple dimensions and multiple consequences. A concerted effort toward improved understanding of preterm birth and low birth weight is essential in order to make progress in prevention efforts. We now know that more research is needed on effectiveness and efficacy of both medical and nonmedical interventions in preconception and antenatal care and on understanding the multiple origins of preterm delivery and low birth weight. It is also clear that a research agenda on the understanding of preterm delivery and low birth weight must take a multi-disciplinary approach. The committee desires to build on the past efforts while developing new sources of knowledge. To attain the national goal of eliminating disparities in preterm delivery and infant mortality among US racial/ethnic groups by 2010, further research is needed into the social, environmental, and biological variables that contribute to preterm deliveries and low birth weight births.

#### **IV. Recommendations**

The findings reported here provide justification for a considerable investment in research, programs, and policies focused on the goal of decreasing the incidence of preterm

delivery, and thus of low birth weight and infant mortality. This includes major efforts in the following areas:

- Elimination of racial, ethnic, and geographic disparities
- Smoking prevention and cessation
- Promotion of health education and healthy behavior
- Understanding the causes of premature labor and premature rupture on the membranes
- Investigation of health care delivery systems and their effect on birth outcomes

Furthermore, ACIM recommends the establishment of a DHHS Interagency Working Group on Low Birth Weight and Preterm Birth to galvanize multidisciplinary research, scientific exchange, and collaboration among DHHS agencies and to assist DHHS in targeting efforts to achieve the greatest advances toward our national goal.

Partnerships between federal agencies, integrated systems of care, foundations and communities will be important in the development of appropriate new knowledge, and shared resources. Several agencies within DHHS have contributed to the development of a research agenda, but no coordinated interagency effort is currently in place. The Maternal and Child Health Bureau (MCHB) led the initial coordination of DHHS interagency efforts, including research in the 1980's. The National Institute of Child Health and Human Development (NICHD) has been a champion of biomedical research initiatives designed to address premature birth and low birth weight through increased basic science research to understand the causes and mechanisms of LBW and explain

differences in outcomes. MCHB and the Centers for Disease Control and Prevention (CDC) share the responsibility for applied research in the prevention of preterm birth. The Agency of Healthcare Research and Quality (AHRQ) provides mechanisms to understand the changes in healthcare delivery and its impact on cost, quality and utilization of health services. Collaboration with organized health delivery systems which have the administrative capacity and potential to follow patients and analyze their full use of health care services is needed.

## **RECOMMENDATIONS**

**Mission:** To promote an intense, dedicated effort to improve the health of all mothers and babies.

**Goal 1:** To decrease maternal and infant mortality rates and incidence of LBW (preterm birth and growth restriction) in newborn infants.

**Goal 2:** To improve the health status of women, infants, and children across the Nation by using the most current knowledge to make program and policy investments.

The Subcommittee recommends that significant investment by the Department of Health and Human Services is needed in the following areas:

### **Establish a coordinated approach to develop a research strategy**

1. Reestablish the DHHS Interagency Working Group on Low Birth Weight to fully develop and execute a strategy for the prevention of preterm birth in consultation with multidisciplinary experts, women, and families;
2. Encourage partnerships with integrated systems of care, providers and consumers of care.

### **Clinical and Psychosocial Investigation**

1. Increase behavioral modification science necessary to eliminate the use of tobacco, alcohol, and other illicit drugs, especially among pregnant women and teenagers; and to make conception of pregnancy a planned event rather than an accidental or unwanted occurrence.
2. Improve our understanding of racial/ethnic/geographical disparities and their effects on adverse birth outcomes.
3. Study molecular, genetic, and biological mechanisms of preterm birth.
4. Improve our understanding of how early life (fetal, infant, and childhood) experiences influence adult pregnancy outcome.
5. Improve our understanding of how stress and socioeconomic status influence birth outcomes.
6. Identify influences and roles of partners and families on birth outcomes.

### **Healthcare Delivery Investigation**

1. Study the ethical issues surrounding the difficult decisions related to the limits of medical care.
2. Identify and address the relationship between risk factors for infant mortality and morbidity outcomes through long-term follow-up of birth cohorts.
3. Identify patterns associated with successful outcomes in families and communities at risk for increased infant mortality rates.
4. Assess the contribution of assisted reproductive technology to low birth weight and preterm birth.

5. Study the content, quality, and organization and financing of the aspects of service delivery that impact low birth weight (e.g., best practices, primary care, high-risk care, etc.) and preterm birth.
6. Review the current status of perinatal regionalization and its association with infant mortality and short- and long-term morbidity.
7. Assess policies and procedures of other countries, cultures, and religions that lead to positive birth outcomes.
8. Evaluate quality, content, and utilization of maternal interconceptional health care.
9. Re-evaluate the cost/benefit and cost effectiveness of "best practices" in preconception, prenatal, and postpartum care.
10. Understand factors that optimize patient-provider communication.
11. Study mechanisms that increase the speed by which research findings can be disseminated and transferred into practice, program, and policy.
12. Assess policies and procedures of states, with wide geographic disparities, designed to prevent adverse perinatal outcomes.
13. Evaluate by pilot studies and/or other means mechanisms and/or systems delivery components, which contribute to state and local variation of LBW rates.

#### **Program and Policy Investments:**

1. Target a broader audience to call attention to the problems of low birth weight and preterm delivery, reinforce good habits, encourage preconceptional counseling, and promote early prenatal care and practices that reduce the risk of infant mortality and morbidity.
2. Develop programs and curricula, starting in childhood, which focus on a positive lifetime approach to reproductive and family issues.
3. Target high-risk groups, for example, teenagers who smoke or engage in substance use in pregnancy, and those at risk for a second pregnancy in less than 2 years.
4. Advance broader societal and governmental policies for promoting the general well being of women of childbearing age, and pregnant women and their families, including provision of family planning services, especially for those with a previous low birthweight baby. Promote women's health before, during, and after childbirth.
5. Identify educational programs and health services most likely to prevent unwanted pregnancy and promote healthy behaviors.
6. Improve the coordination of preconception, prenatal, delivery, and postnatal care of our health care system.
7. Enhance effective vehicles and partnerships for health education and promotion of healthy behaviors, including such activities as abstinence education, condom use to reduce the incidence of sexually transmitted diseases and the current unintended pregnancy rate, and providing general health and reproductive health education to the entire population.
8. Expand physician utilization of standards of obstetrical, perinatal, and neonatal care, including the appropriate use of corticosteroids.
9. Review the current status of perinatal regionalization, supporting policies that are family-centered.

10. Develop and support systems of care that identify infants who survive the risk factors for infant mortality and who develop special needs in order to refer them to appropriate developmental services, medical homes, and family support. Provide families whose infants have special needs with access to objective quality information about resources and services available to them and their infants.
11. Develop effective mechanisms involving a pilot study at the Federal, State, community, and census tract level for tracking and systematic collection of standard electronic obstetric record patient care data.
12. Focus on the reduction of racial disparities in order to meet the Healthy People 2010 goals outlined for the Nation.
13. Enhance local-state, as well as private sector partnerships to improve the health and well-being of women, infants, and children.

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## **APPENDIX I**

### **DEFINITIONS**

Term Delivery (TD) – Greater than or equal to 37 weeks gestation

Preterm Delivery (PTD) – Less than 37 weeks gestation

Low Birth Weight (LBW) – Less than 2500 grams

Very Low Birth Weight (VLBW) – Less than 1500 grams

### **ABBREVIATIONS AND ACRONYMS**

AAP – American Academy of Pediatrics

ACIM – Advisory Committee on Infant Mortality

ACOG – American College of Obstetrics and Gynecology

AHRQ – Agency for Healthcare Research and Quality

CDC – Centers for Disease Control and Prevention

DHHS – Department of Health and Human Services

LBW – Low Birth Weight (Less than 2500 grams)

MCHB – Maternal and Child Health Bureau

NICHD – National Institute of Child Health and Human Development

PORT – Patient Outcomes Research Team

PTD – Preterm Delivery (Less than 37 weeks gestation)

SIDS – Sudden Infant Death Syndrome

TD – Term Delivery (Greater than or equal to 37 weeks gestation)

VLBW – Very Low Birth Weight (Less than 1500 grams)

## **APPENDIX II**

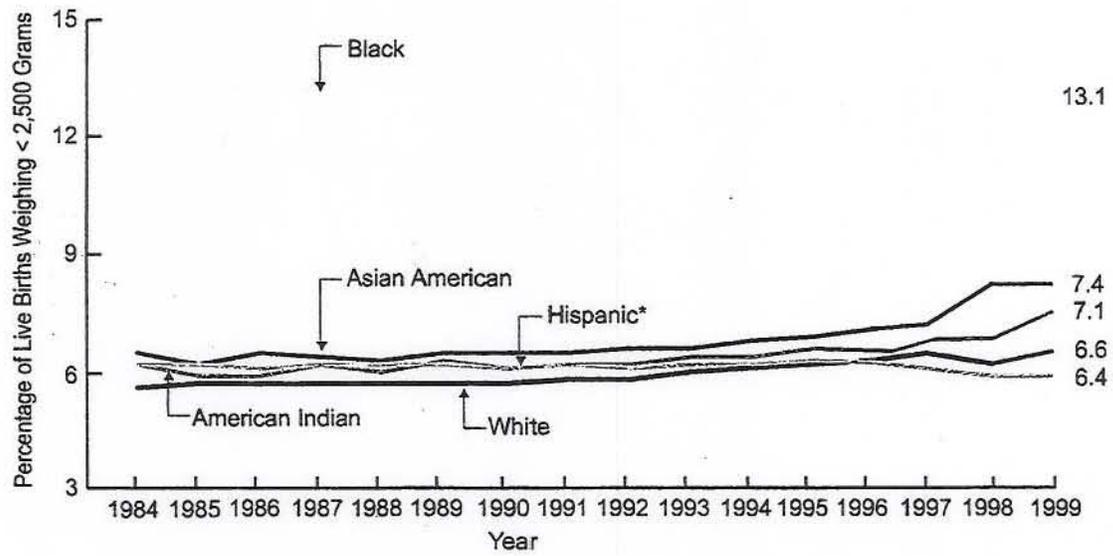
### **Illustrations from Child Health USA 2001 (pp.20-21, 23-25)**

(U.S. Department of Health and Human Services.  
Health Resources and Services Administration  
**Maternal and Child Health Bureau)**

Low Birth Weight  
Very Low Birth Weight  
Infant Mortality  
Neonatal and Postneonatal Mortality  
Maternal Mortality

# PERCENTAGE OF INFANTS BORN AT LOW BIRTH WEIGHT BY RACE: 1984-1999

Source (II.2) National Center for Health Statistics

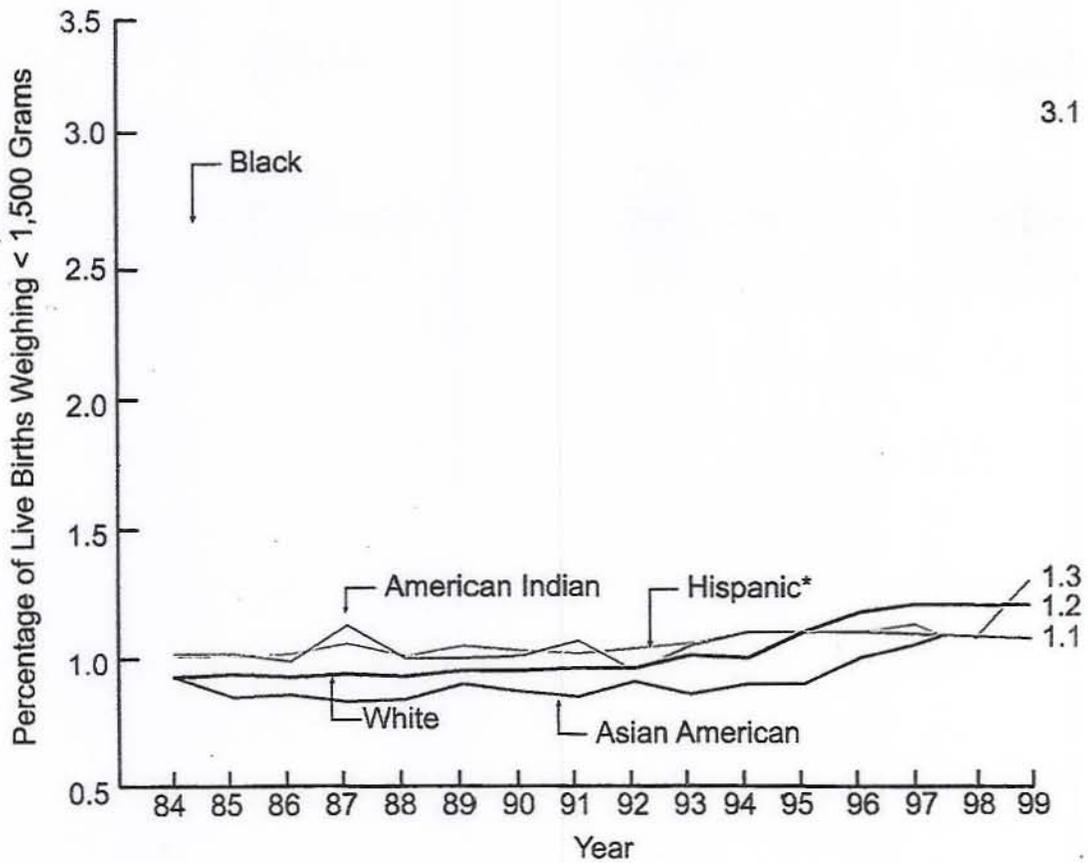


\*Hispanic can be of any race.

Note: 1984-1988 data based on race of child; 1989-1999 data based on race of mother.

### PERCENTAGE OF INFANTS BORN AT VERY LOW BIRTH WEIGHT BY RACE: 1984-1999

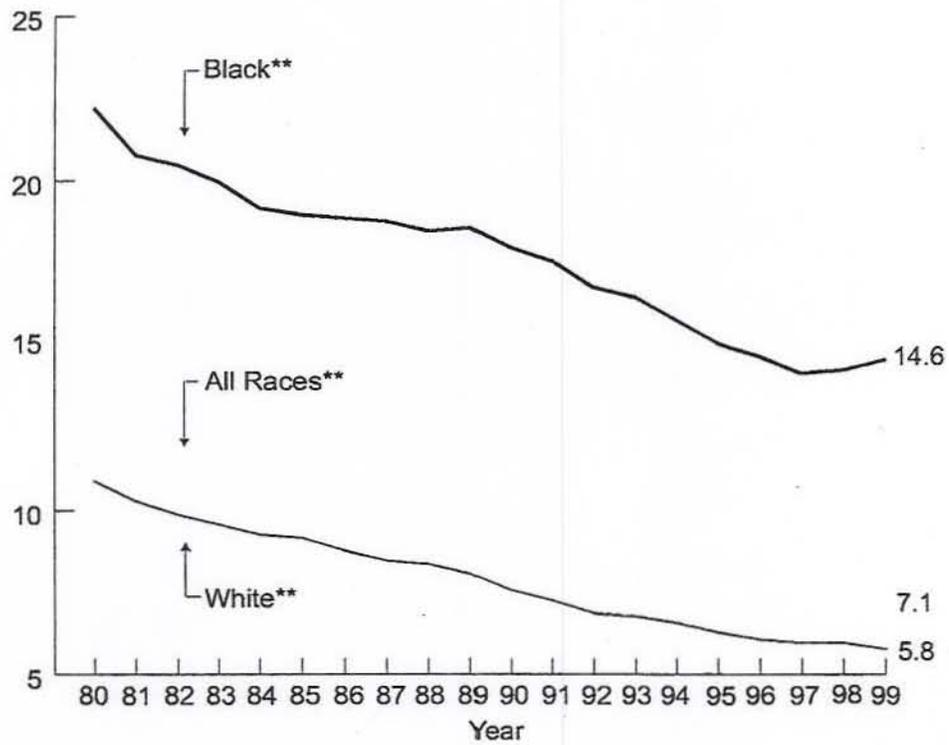
Source (II.2): National Center for Health Statistics



\* Hispanic can be of any race.

### U.S. INFANT MORTALITY RATES BY RACE OF MOTHER: 1980-1999\*

Source (II.4): National Center for Health Statistics

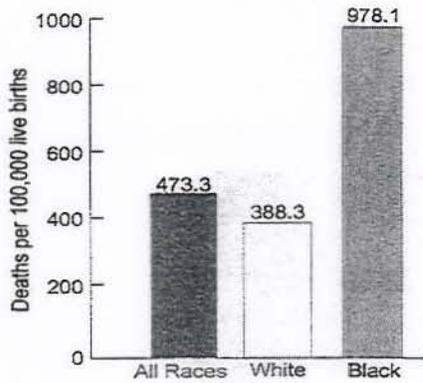


\*preliminary data

\*\*Includes the ethnic classification of Hispanic.

### PRELIMINARY NEONATAL MORTALITY RATES BY RACE OF MOTHER: 1999\*

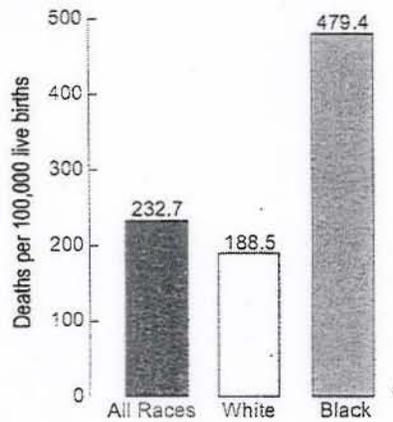
Source (II.4): National Center for Health Statistics



\*preliminary data

### PRELIMINARY POSTNEONATAL MORTALITY RATES BY RACE OF MOTHER: 1999\*

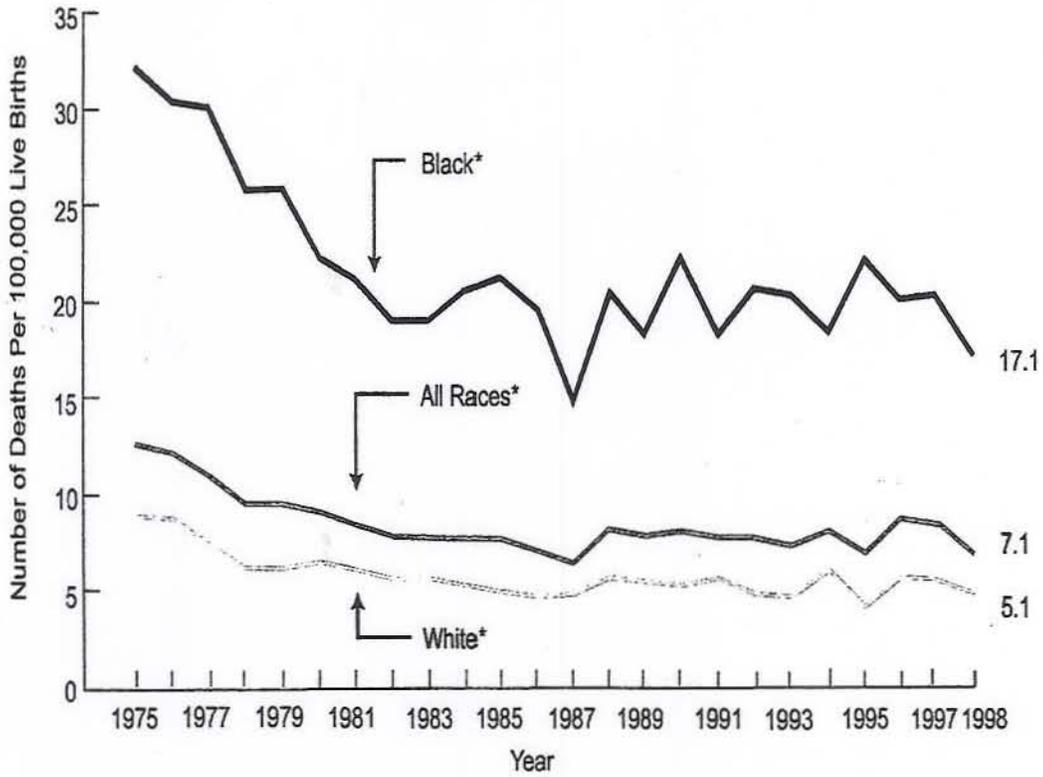
Source (II.4): National Center for Health Statistics



\*preliminary data

### MATERNAL MORTALITY RATES BY RACE OF MOTHER: 1975-1998

Source (II.5): National Center for Health Statistics



\*Includes the ethnic classification of Hispanic