

Committee on Understanding Premature Birth and Assuring Healthy Outcomes

Each year more than 400,000 (about 1 in 8) infants are born prematurely. Compared with infants born at term or with birth weights of 2,500 grams or more, preterm and low birth weight (LBW) infants have a much greater risk of death and long-term disability. The prevalence of preterm birth constitutes a public health issue. There are significant disparities in preterm rates across various populations. In addition, preterm deliveries have increased in the past twenty years, resulting in significant psychological and economic costs for families and communities, and have a serious impact on the use of health care services. Children born prematurely are more likely to suffer a variety of motor, cognitive, academic, and behavioral problems and families experience significant emotional and financial costs. Although vast improvements have been made in treating premature infants, little success has been attained in understanding and preventing premature birth, and the knowledge that has been gained about premature labor has not translated into an improvement in perinatal outcomes. The challenge remains to identify interventions that prevent preterm birth, reduce morbidity and mortality of the mother and/or fetus/infant once preterm birth occurs, and reduce the incidence of long-term disability in children in the most comprehensive and cost-effective manner possible.

An IOM committee will define and address the health related and economic consequences of premature birth. The broad goals are to: 1) describe the current state of the science and clinical research with respect to the causes of premature birth; 2) address the broad costs – economic, medical, social, psychological, and educational - for children and their families; and 3) establish a framework for action in addressing the range of priority issues, including a research and policy agenda for the future. In support of these broad goals, the study will:

- Review and assess the various factors contributing to the growing incidence of premature birth, which may include the trend to delay childbearing and racial and ethnic disparities;
- Assess the economic costs and other societal burdens associated with premature births;
- Address research gaps/needs and priorities for defining the mechanisms by which biological and

environmental factors influence premature birth; and,

- Explore possible changes in public health policy and other policies that may benefit from more research.

In order to assess research gaps and needs, the committee will plan an additional meeting that will address barriers to clinical research in the area of preterm birth. A workshop hosted by the committee will seek to:

- Identify major obstacles to conducting clinical research, which may include: the declining number of residents interested in entering the field of obstetrics and gynecology (OB/GYN) and the resulting effect on the pipeline of clinical researchers; the impact of rising medical malpractice premiums on the ability of academic programs to provide protected time for physicians to pursue research; and ethical and legal issues in conducting research on pregnant women (for example, the consideration of safety issues, informed consent).
- Provide strategies for removing barriers - including those targeting resident career choices, departments of OB/GYN, agencies and organizations that fund research, and professional organizations.

The study is sponsored by the National Institute for Child Health and Human Development, Centers for Disease Control and Prevention, Health Resources and Services Administration, Environmental Protection Agency, NIH Office of Research on Women's Health, March of Dimes, Burroughs Wellcome Fund, American College of Obstetricians and Gynecologists, American Society for Reproductive Medicine, and the Society for Maternal-Fetal Medicine.

In conducting this activity, the study committee will review relevant scientific literature and conduct public workshops to ensure that the committee hears the perspectives of relevant stakeholders. The committee's schedule will include five committee meetings, parts of which will be open to the public.

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Committee on Understanding Premature Birth and Assuring Healthy Outcomes

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The IOM was chartered in 1970 as a component of the National Academy of Sciences to enlist distinguished members of the appropriate profession in the examination of policy matters pertaining to the health of the public. In this, the Institute acts under both the Academy's 1863 congressional charter responsibility to be an adviser to the federal government and its own initiative in identifying issues of medical care, research, and education.

Inquiries for public access materials should be made to the Public Access Records Office via publicac@nas.edu.

Individuals wishing further information should contact the study staff at (202) 334-1755 or visit the homepage at www.iom.edu.

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OF THE NATIONAL ACADEMIES

**Preterm Birth
Causes, Consequences, and Prevention**

Committee Task

Assess the state of the science with respect to causes of preterm birth, address the consequences for infants and families, and establish a framework for action. Specifically:

- Review and assess factors contributing to preterm birth
- Assess economic and other societal burdens
- Address research gaps, including barriers to clinical research
- Explore changes in public policy that may benefit from more research

Themes that Guided the Committee's Approach

- Clarity of terminology
- Racial-ethnic and socioeconomic disparities
- Preterm birth as a complex cluster of problems

Task 1: Review and assess factors contributing to preterm birth

- Behavioral and psychosocial factors
 - Tobacco, alcohol, illicit drugs, nutrition, physical activity, employment
 - Stress, life events, anxiety, depression, racism
- Sociodemographic and community factors
 - Maternal age, marital status, race, ethnicity
 - Adverse neighborhood conditions
- Medical and pregnancy conditions
 - Hypertension, diabetes, weight, interpregnancy interval, infertility treatments

Task 1: Review and assess factors contributing to preterm birth (Continued)

- **Biological pathways**
 - systemic and intrauterine infections, maternal stress, uteroplacental thrombosis and decidual hemorrhage, uterine overdistension
- **Genetics**
 - Genetic influences, gene-genital tract infection, gene-smoking, epigenetics, proteomics, genetics and racial-ethnic disparities
- **Environmental toxicants**
 - Air pollution, lead, tobacco smoke, agricultural chemicals

Task 2: Assess economic and other societal burdens

- **Economic consequences**
 - Medical care, early intervention, special education, productivity, family costs
- **Mortality and acute complications**
 - Lung, immune system, cardiovascular, hearing, vision, neurological
- **Neurodevelopmental disabilities**
 - Motor, cognitive, behavioral, social-emotional

Task 2: Assess economic and other societal burdens (Continued)

- Health and growth problems
 - Rehospitalization, growth, quality of life, adult disease
- Impact on families
 - Maternal distress, family functioning, marital stress, resilience

Task 3: Address research gaps and priorities, including barriers to clinical research

- Research needs identified in review of causes and consequences of preterm birth
- Barriers to clinical research on preterm birth
 - Available workforce
 - Career development
 - Funding for research
 - Ethical and liability issues
 - Training of scientists
 - Academic leadership challenges

Task 4: Explore changes in public policy that may benefit from more research

- **Public program expenditures**
 - Health insurance, education, SSI, TANF, Title V MCH

- **Role of public policies and programs in reducing preterm birth**
 - Health care financing, organization and quality of care

Framework for Action

- I. Establish Multidisciplinary Research Centers**
- II. Priorities Areas for Research**
 - Better define the problem of preterm birth with improved data
 - Conduct clinical and health services research investigations
 - Conduct etiologic and epidemiologic investigations
- III. Study and Inform Public Policy**

I. Establish Multidisciplinary Research Centers

The National Institutes of Health and private foundations should establish integrated multidisciplinary research centers. The objective of these centers will be to focus on understanding the causes of preterm birth and the health outcomes for women and their infants who were born preterm.

Consistent with the Roadmap initiative of the National Institutes of Health, these activities should include the following:

- Basic, translational, and clinical research involving the clinical, basic, and behavioral and social science disciplines.
- Sustained intellectual leadership
- Mentored research training programs should be integral parts of these centers. Fostering the development of basic and clinical researchers is critical.
- Funding agencies should provide ample and sustained funds to allow these centers to investigate the complex syndrome of preterm birth.

II. Priorities Areas for Research Better Define the Problem of Preterm Birth with Improved Data

1. **Promote the collection of improved perinatal data.** NCHS should promote and use a national mechanism to collect, record, and report perinatal data.

Encourage the use of ultrasound early in pregnancy to establish gestational age. Professional societies should encourage the use of ultrasound early in pregnancy (less than 20 weeks of gestation) to establish gestational age and should establish standards of practice and recommendations for the training of personnel to improve the reliability and the quality of ultrasound data.

Develop indicators of maturational age. Funding agencies should support and investigators should develop reliable and precise perinatal (prenatal and postnatal) standards as indicators of maturational age.

II. Priorities Areas for Research

Better Define the Problem of Preterm Birth with Improved Data (Continued)

2. **Investigate the economic consequences of preterm birth.** Researchers should investigate the gaps in understanding of the economic consequences of preterm birth to establish the foundation for accurate economic evaluation of the relative value of policies directed at prevention and guidelines for treatment.

II. Priorities Areas for Research

Conduct Clinical and Health Services Research Investigations

1. **Improve methods for the identification and treatment of women at increased risk of preterm labor.** Researchers should investigate ways to improve methods to identify and treat women with an increased risk of preterm labor.
2. **Develop guidelines for the reporting of infant outcomes.** The NIH, Dept. of Ed., other funding agencies, and investigators should develop guidelines for determining and reporting outcomes for infants born preterm that better reflect their health, neurodevelopmental, educational, social, and emotional outcomes across the life span and conduct research to determine methods that can be used to optimize these outcomes.
3. **Investigate the causes of and consequences for preterm births that occur because of fertility treatments.** The NIH and other agencies, such as the CDC and AHRQ, should provide support for researchers to conduct investigations to obtain an understanding of the mechanisms by which fertility treatments, such as assisted reproductive technologies and ovulation promotion, may increase the risk for preterm birth. Studies should also be conducted to investigate the outcomes for mothers who have received fertility treatments and who deliver preterm and the outcomes for their infants.

II. Priorities Areas for Research

Conduct Clinical and Health Services Research Investigations

(Continued)

Institute guidelines to reduce the number of multiple gestations. ACOG, ASRM, and state and federal public health agencies should institute guidelines that will reduce the number of multiple gestations. Particular attention should be paid to the transfer of a single embryo and the restricted use of superovulation drugs and other nonassisted reproductive technologies for infertility treatments. In addition to mandatory reporting to the CDC by centers and individual physicians who use assisted reproductive technologies, the use of superovulation therapies should be similarly reported.

4. **Establish a quality agenda.** Investigators, professional societies, state agencies, payors, and funding agencies should establish a quality agenda with the intent of maximizing outcomes with current technology for infants born preterm.

II. Priorities Areas for Research

Conduct Clinical and Health Services Research Investigations

(Continued)

5. **Conduct research to understand the impact of the health care delivery system on preterm birth.** The NIH, AHRQ, and private foundations should conduct and support research to understand the consequences of the organization and financing of the health care delivery system on access, quality, cost, and the outcomes of care as they relate to preterm birth throughout the full reproductive and childhood spectrum.

II. Priorities Areas for Research

Conduct Etiologic and Epidemiologic Investigations

1. **Support research on the etiologies of preterm birth.** Funding agencies should be committed to sustained and vigorous support for research on the etiologies of preterm birth to fill critical knowledge gaps.
2. **Study multiple risk factors to facilitate the modeling of the complex interactions associated with preterm birth.** Public and private funding agencies should promote and researchers should conduct investigations of multiple risk factors for preterm birth simultaneously rather than investigations of the individual risk factors in isolation. These studies will facilitate the modeling of these complex interactions and aid with the development and evaluation of more refined interventions tailored to specific risk profiles.

II. Priorities Areas for Research

Conduct Etiologic and Epidemiologic Investigations (Continued)

3. **Expand research into the causes and methods for the prevention of the racial-ethnic and socioeconomic disparities in the rates of preterm birth.** The NIH and other funding agencies should expand current efforts in and expand support for research into the causes and methods for the prevention of the racial-ethnic and socioeconomic disparities in the rates of preterm birth. This research agenda should continue to prioritize efforts to understand factors contributing to the high rates of preterm birth among African-American infants and should also encourage investigation into the disparities among other racial-ethnic subgroups.

III. Study and Inform Public Policy

Study the effects of public programs and policies on preterm birth.

The NIH, CMS, and private foundations should conduct and/or support research on the role of social programs and policies on the occurrence of preterm birth and the health of children born preterm.

Conduct research that will inform public policy. In order to formulate effective public policies to reduce preterm birth and assure healthy outcomes for infants, public and private funding agencies and organizations, state agencies, payors, professional societies, and researchers will need to work to implement all of the previous recommendations. Research in the areas of better defining the problem of preterm birth, clinical investigations, and etiologic and epidemiologic investigations is critical to conduct before policy makers can create policies that will successfully address this problem.

Future Plans

- Prepublication copy of report can be viewed at www.nap.edu
- Final report published late fall 2006
- Preliminary plans for dissemination
 - report summaries to professional organizations
 - report briefs to Hill and other lay audiences
 - presentations by committee members at conferences