Preventing Late Preterm Births:
Progress and Persistent Challenges

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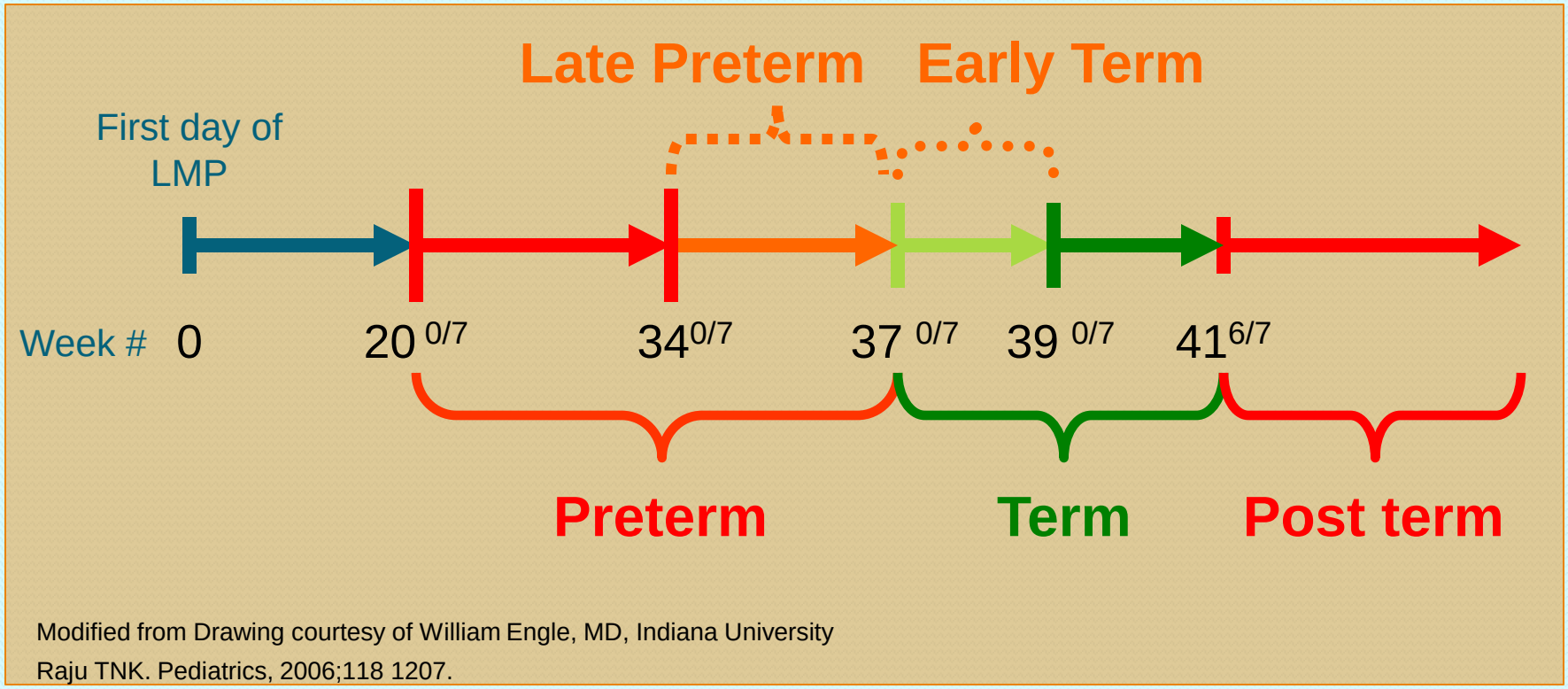
Objectives

- Present the impact of late preterm birth (34 0/7-36 6/7 weeks) on rates of preterm birth in the US
- Briefly review the evidence that “every week counts”
- Describe challenges and evidence-based solutions for the prevention of late preterm births
  - *Healthy Babies are Worth the Wait*
  - *Perinatal Quality State Collaborative*

Preterm Birth in the US

- #1 obstetric challenge
- Major cause of loss
  - majority of all perinatal mortality
  - leading cause of neonatal mortality (since 1999)
  - leading cause of all infant mortality
- IOM (2006) estimate annual national costs at a minimum of $26.2 billion
- Leading problem in pediatrics responsible for
  - most common cause of neonatal morbidity
  - half of all neurodevelopmental conditions
  - one in five children with mental retardation
  - one in three children with vision impairments
  - almost half of all children with cerebral palsy
- Associated with higher rates of chronic illness in adults (eg heart disease, diabetes, etc) and risk of their offspring being born preterm
- The prevention of preterm birth provides the opportunity to affect a diverse group of conditions, ranging from short-term to long-term sequelae

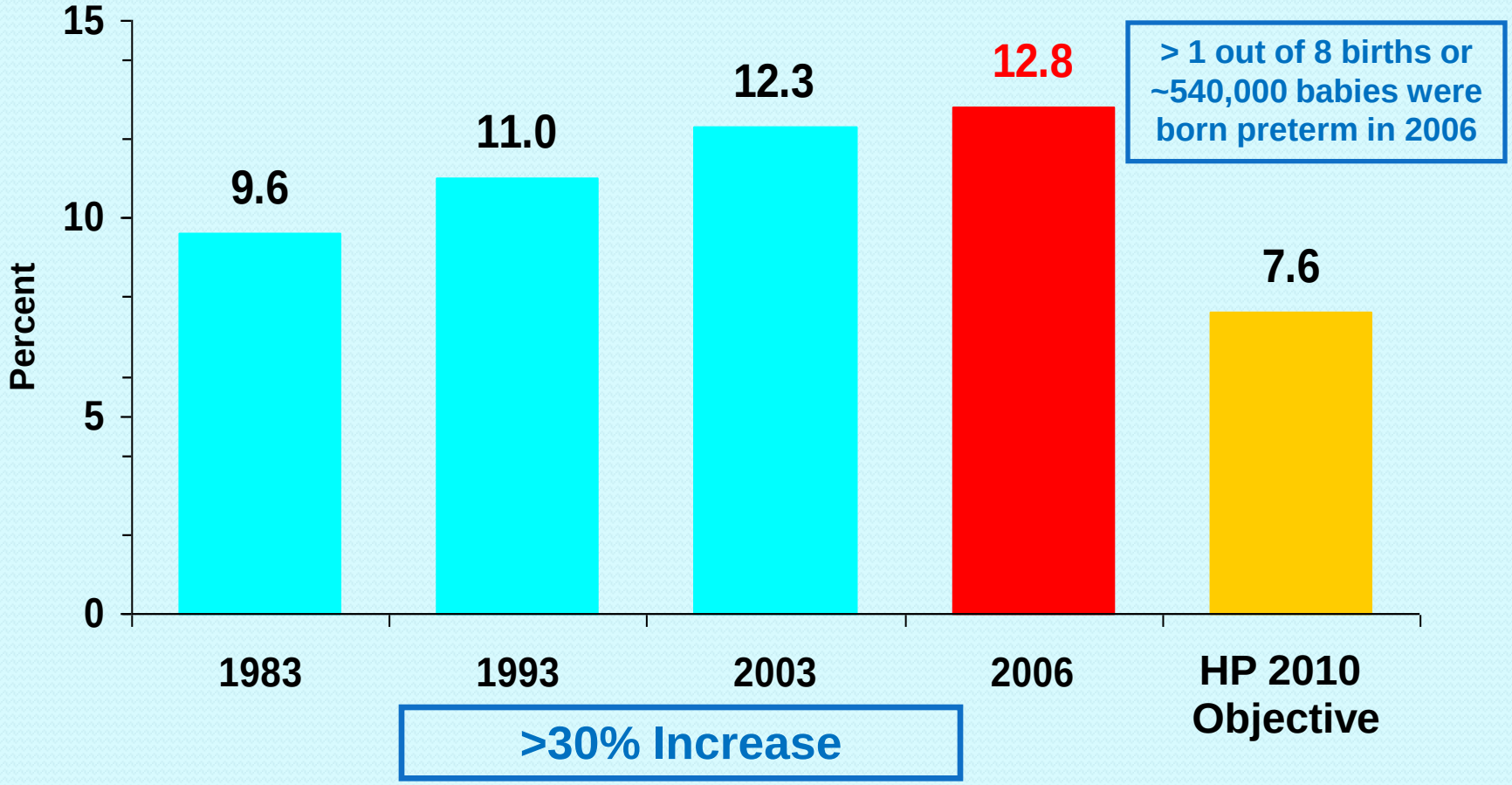
Definitions Based on the Last Menstrual Period



Modified from Drawing courtesy of William Engle, MD, Indiana University

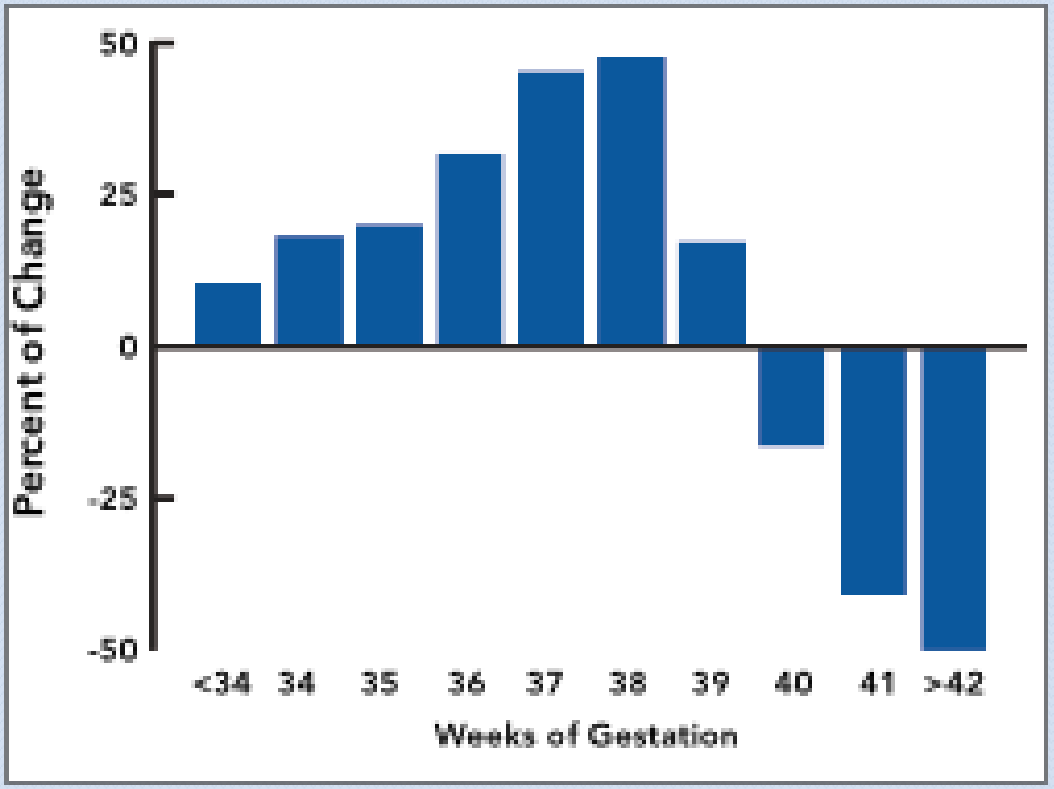
Raju TNK. Pediatrics, 2006;118 1207.

Preterm Birth Rates
United States, 1983, 1993, 2003, 2006



Preterm is less than 37 completed weeks gestation.
Source: National Center for Health Statistics, final natality data
Prepared by March of Dimes Perinatal Data Center, 2008

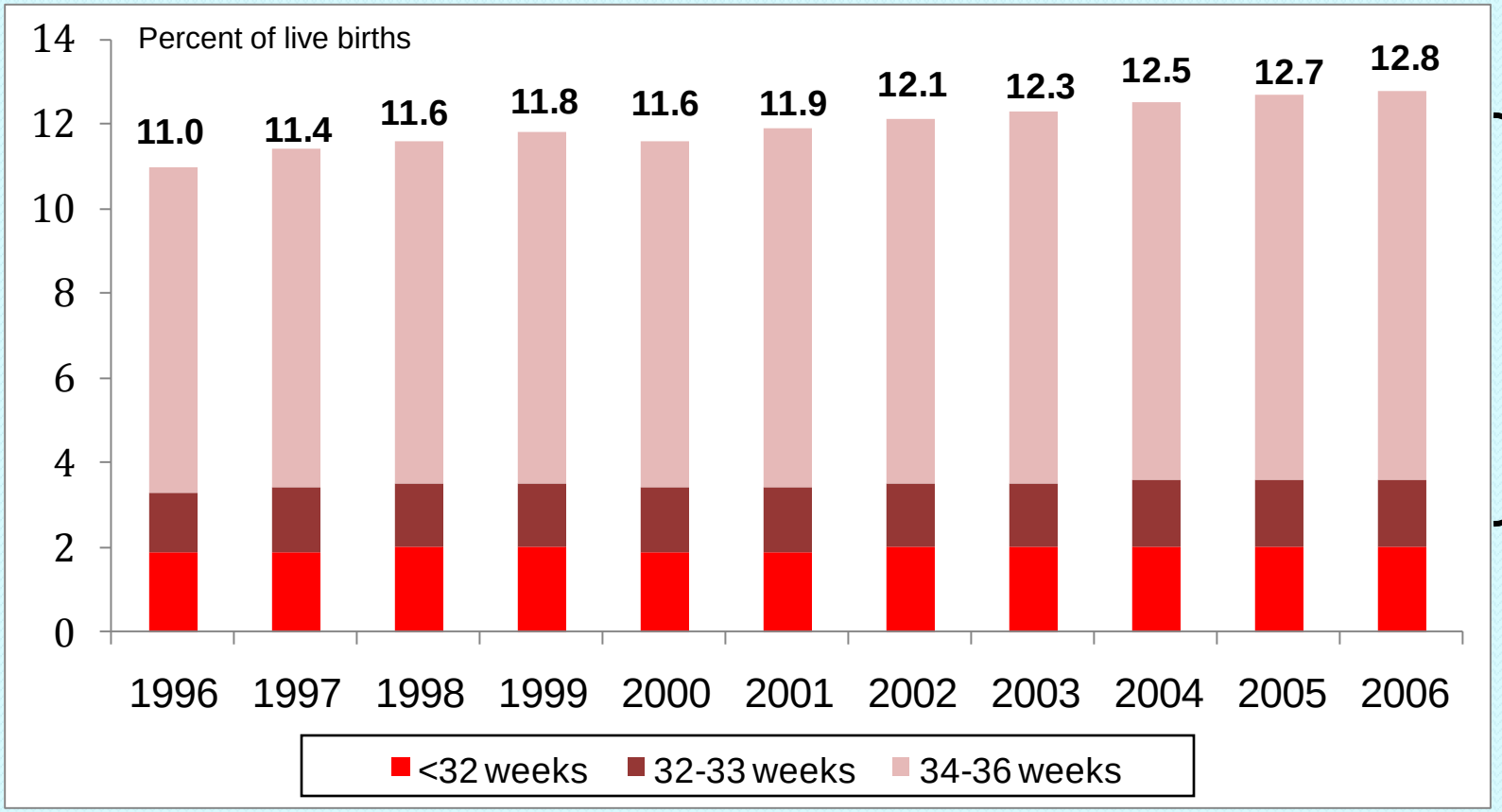
Change in Distribution of Births by Gestational Age United States, 1990-2006



Source: CDC/NCHS, National Vital Statistics Systems.

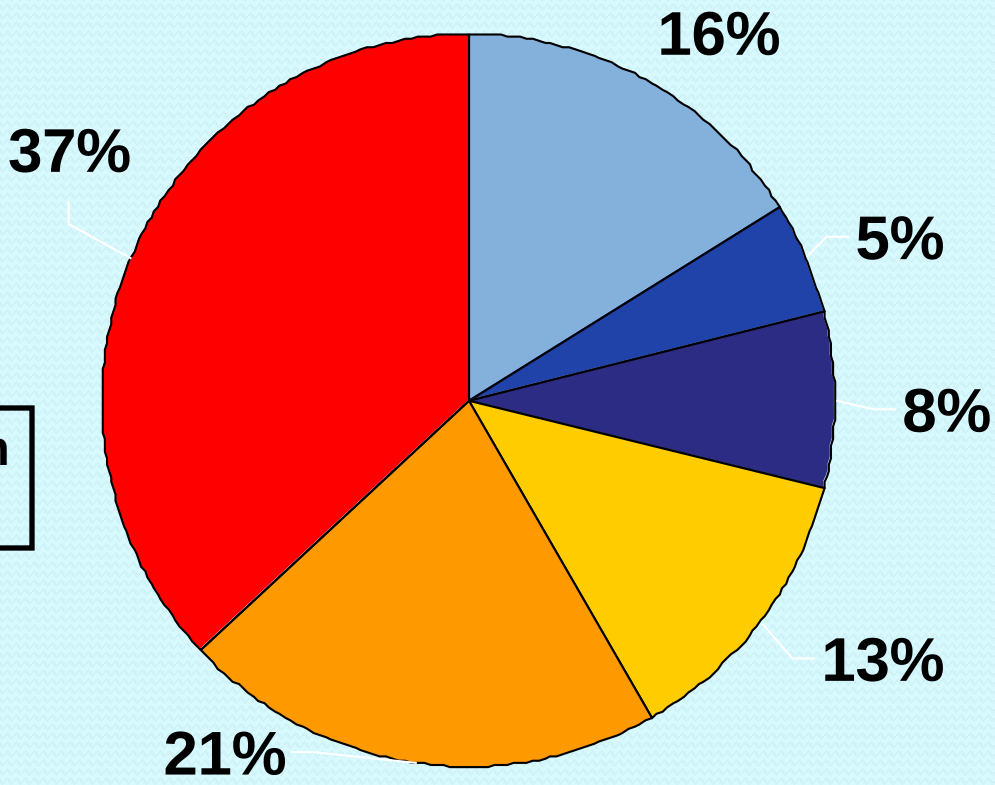
Martin JA, Hamilton BE, Sutton PD, Ventura SJ, et al. Births: Final data for 2006. National vital statistics reports; vol 57 no 7. Hyattsville, MD: National Center for Health Statistics. 2009.

Preterm Births by Gestational Age Category US, 1996-2006



Source: National Center for Health Statistics
Prepared by March of Dimes, Periantal Data Center, 2009

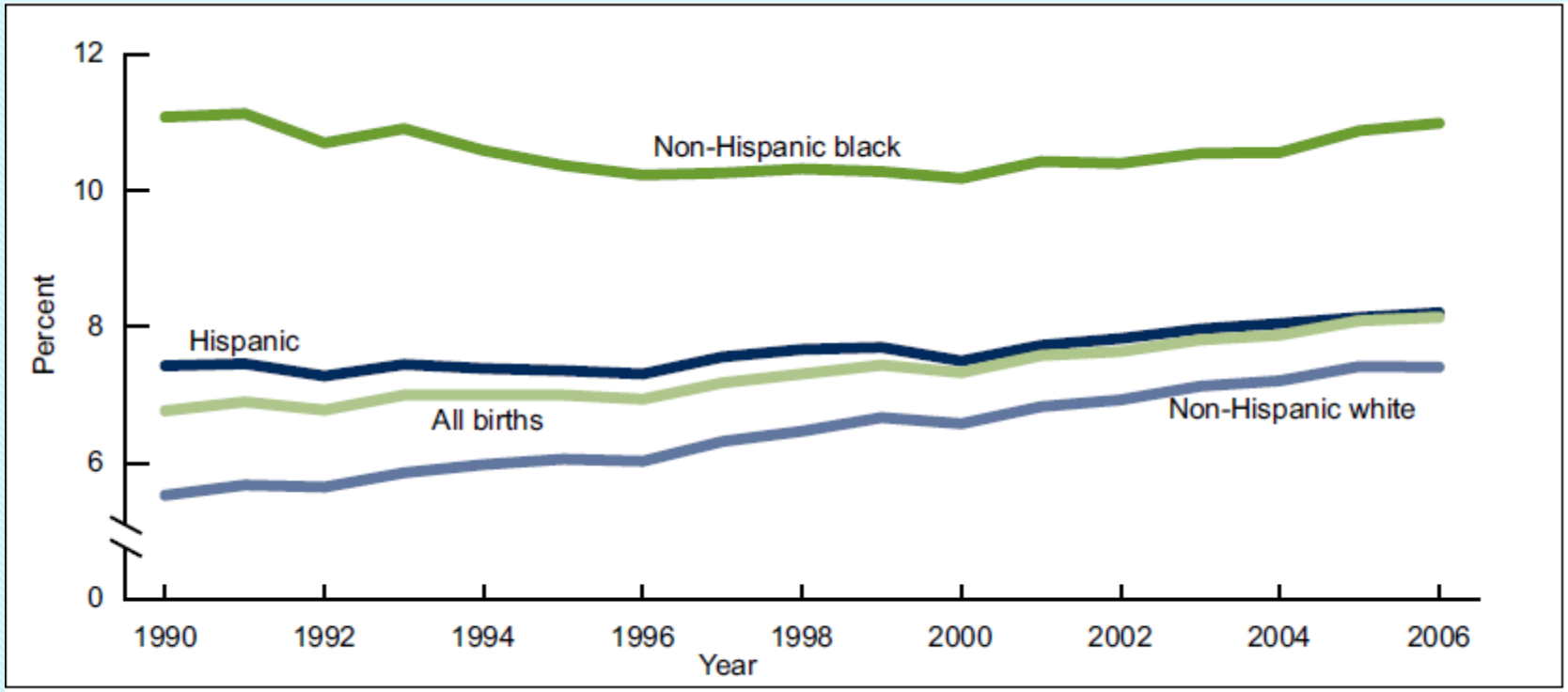
Percent of Preterm Births by Week of Gestation, US, 2006



Late preterm 71%

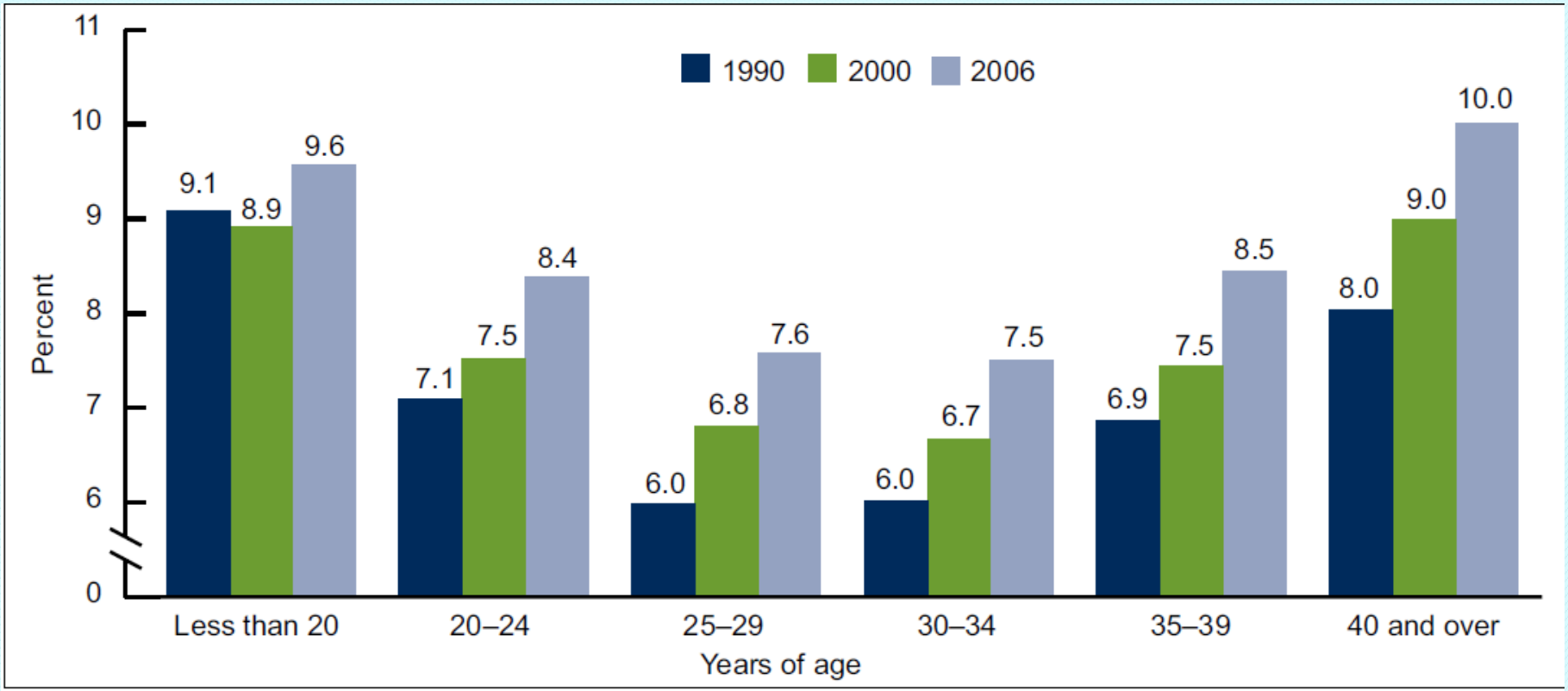
Source: National Center for Health Statistics, 2005 final natality data
Prepared by March of Dimes Perinatal Data Center, 2009

Late Preterm Birth Rates by Race and Hispanic Origin of Mother, United States, 1990-2006



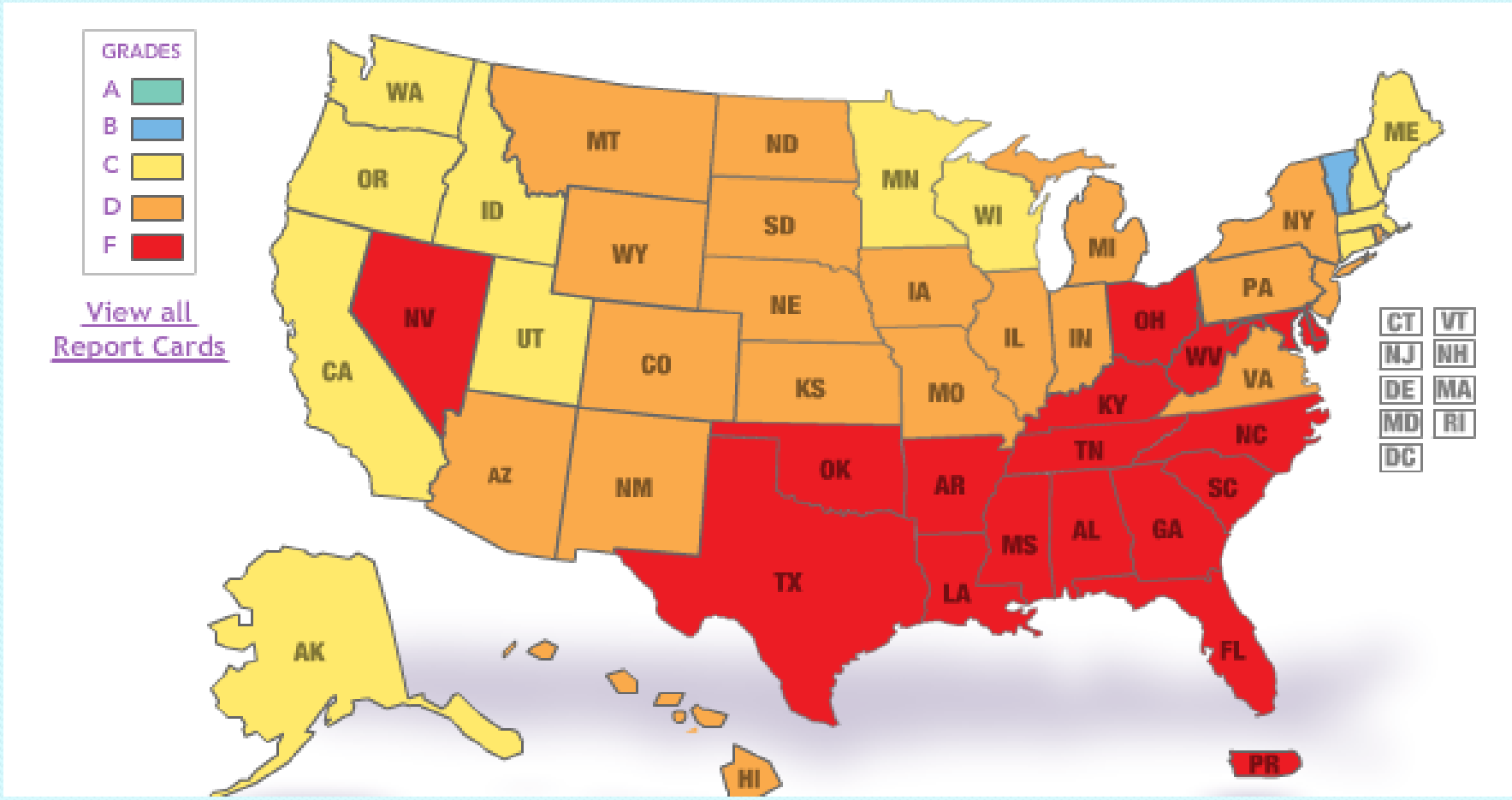
NOTE: Singleton births only.
SOURCE: CDC/NCHS, National Vital Statistics System.

Late Preterm Birth Rates by Age of Mother United States, 1990, 2000 and 2006



NOTE: Singleton births only.
SOURCE: CDC/NCHS, National Vital Statistics System.

2009 Premature Birth Report Cards



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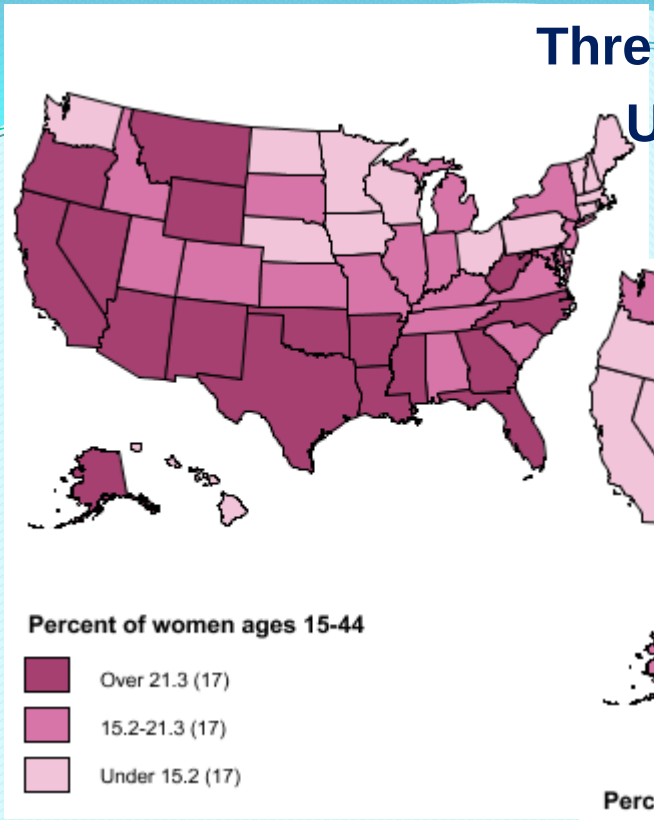
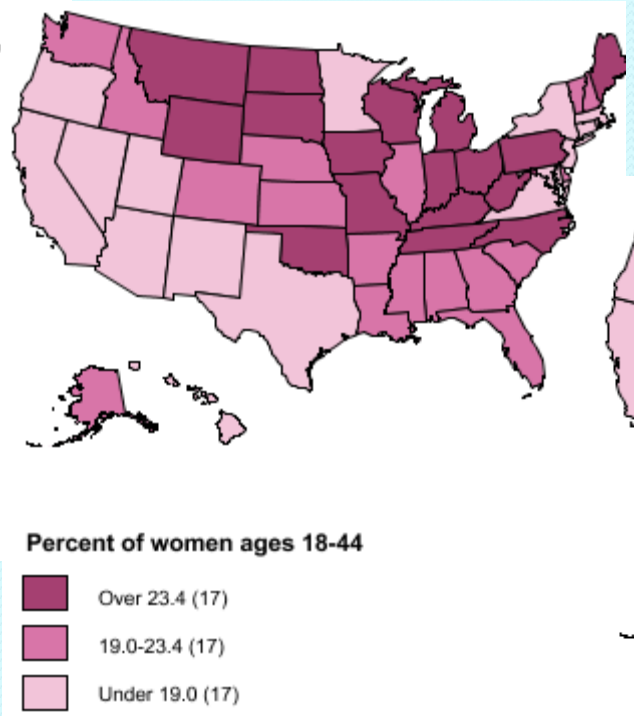
Three Major Factors Affecting Preterm Birth Rates:

Uninsured and Smoking Rates in Women of Childbearing Age, Late Preterm Births



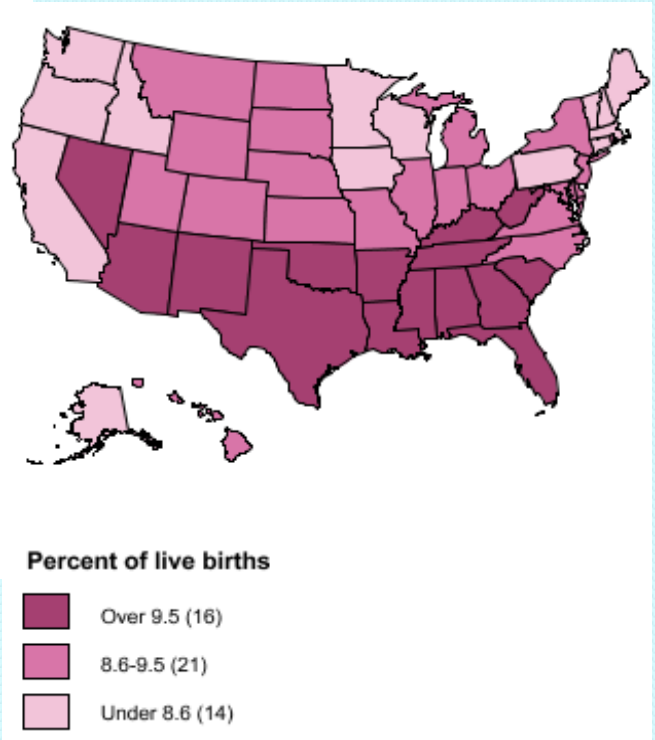
Uninsured women: US, 2005-2007 Avg

US 20.1%



Smoking among women of childbearing age, US, 2007

US 21.2%



Late preterm: US, 2006

US 9.1%

www.marchofdimes.com/peristats

5 States with Greatest Increase in Total and Singleton Late Preterm Births, 1995-2005

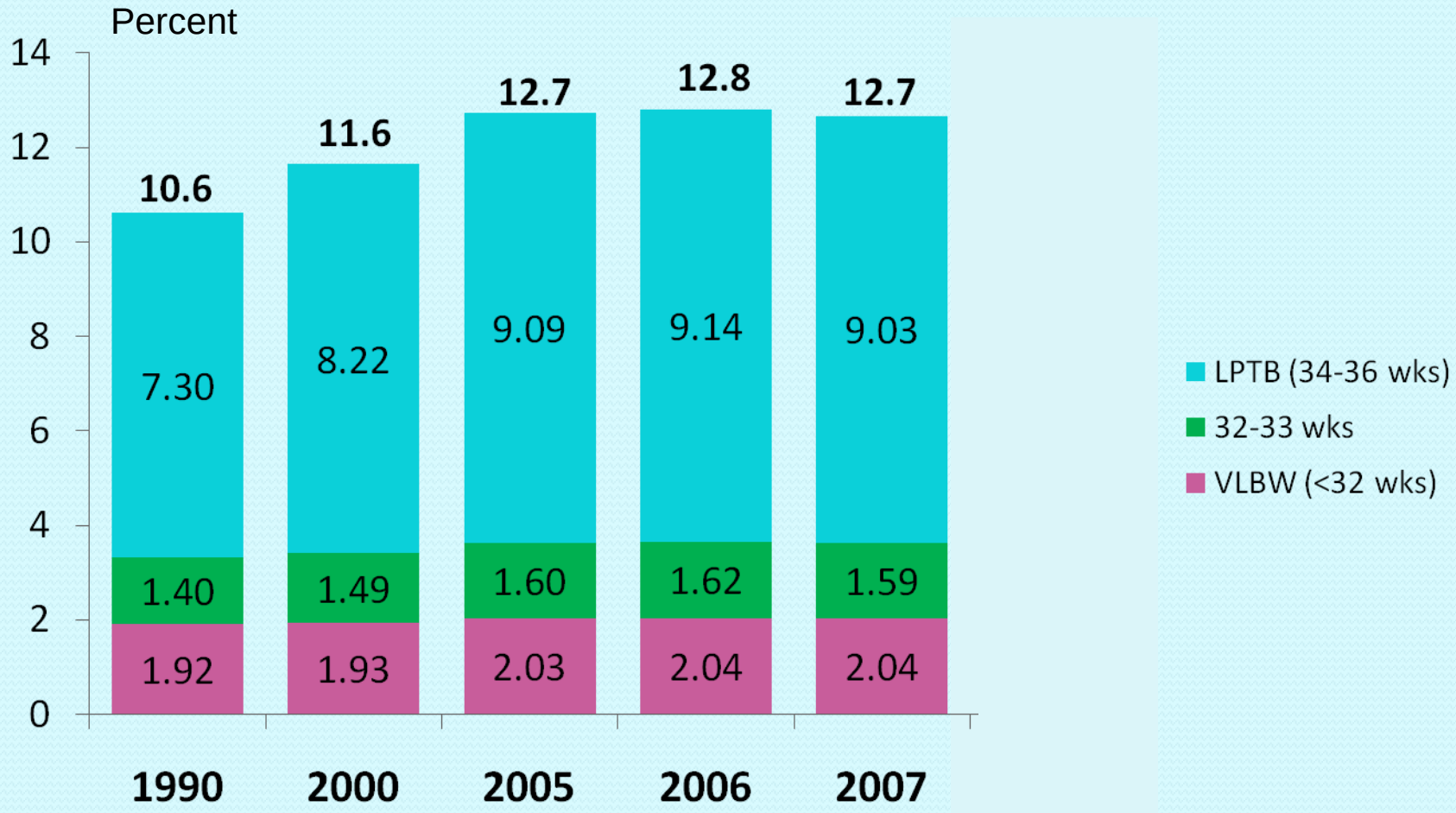
Late Preterm Births			
State	1995	2005	% Change
MA	5.8	8.0	37.9
WV	7.8	10.7	37.2
KY	8.2	11.0	34.1
AK	6.1	8.1	32.8
MS	10.2	13.2	29.4

www.marchofdimes.com/peristats

US Preterm Birth Falls for First Time in a Decade

- US 2006 preterm birth rate was 12.8%
- US 2007 preterm birth rate was 12.7%
- 72% (n=36) states the rate **decreased**
- 12% (n=6) states **no change**
- 16% (n=8) states the rate **increased**
- visit www.marchofdimes.com/peristats for data on your state

Preterm Birth Rates by Gestational Age Categories United States, 1990, 2000, 2005, 2006, 2007, 2008*

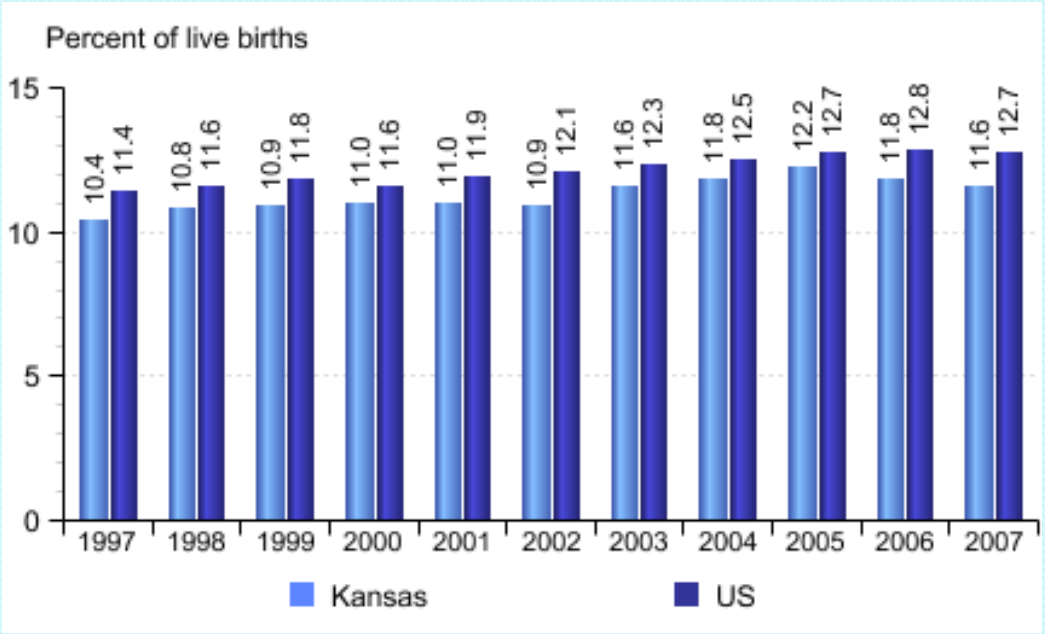


**preliminary*

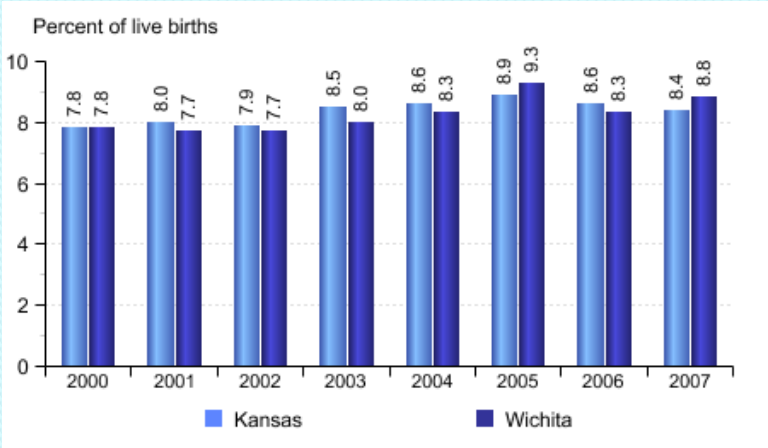
Source: National Vital Statistics Reports Vol 58, Number 16 April 2010

Prepared by KD 4-10

Preterm Birth Rates
Kansas and US, 1997-2007

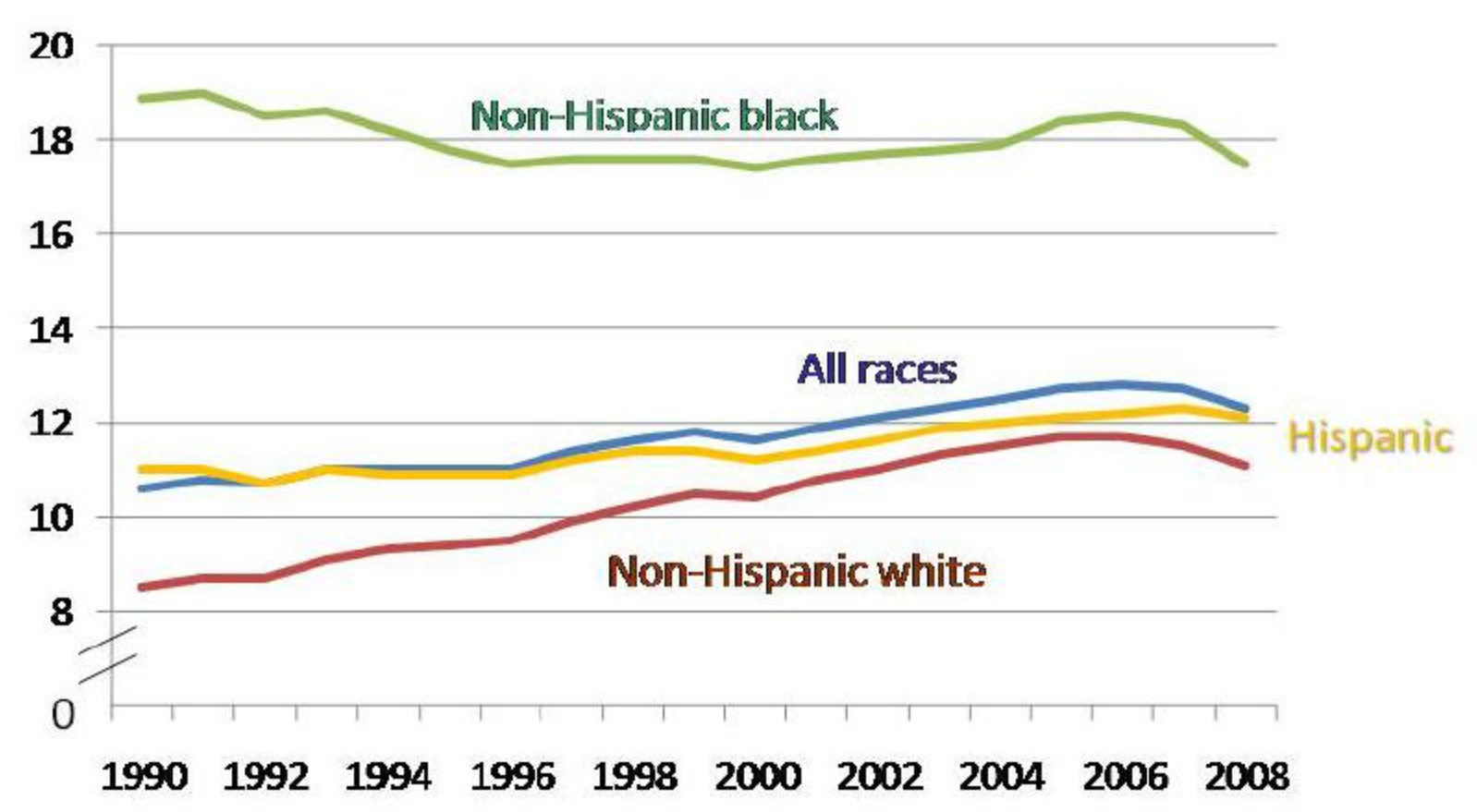


Late Preterm Births
KS and Wichita, 2000-2007



Source: CDC/NCHS , National Vital Statistics Systems
Prepared by MOD PDC www.marchofdimes.com/peristats

Preterm Birth Rates* by Race and Hispanic Origin of Mother United States, 1990-2006 & preliminary 2007-2008



** <37 wks/100 live births*
Source: CDC/NCHS , National Vital Statistics Systems
Prepared by KD 4-10

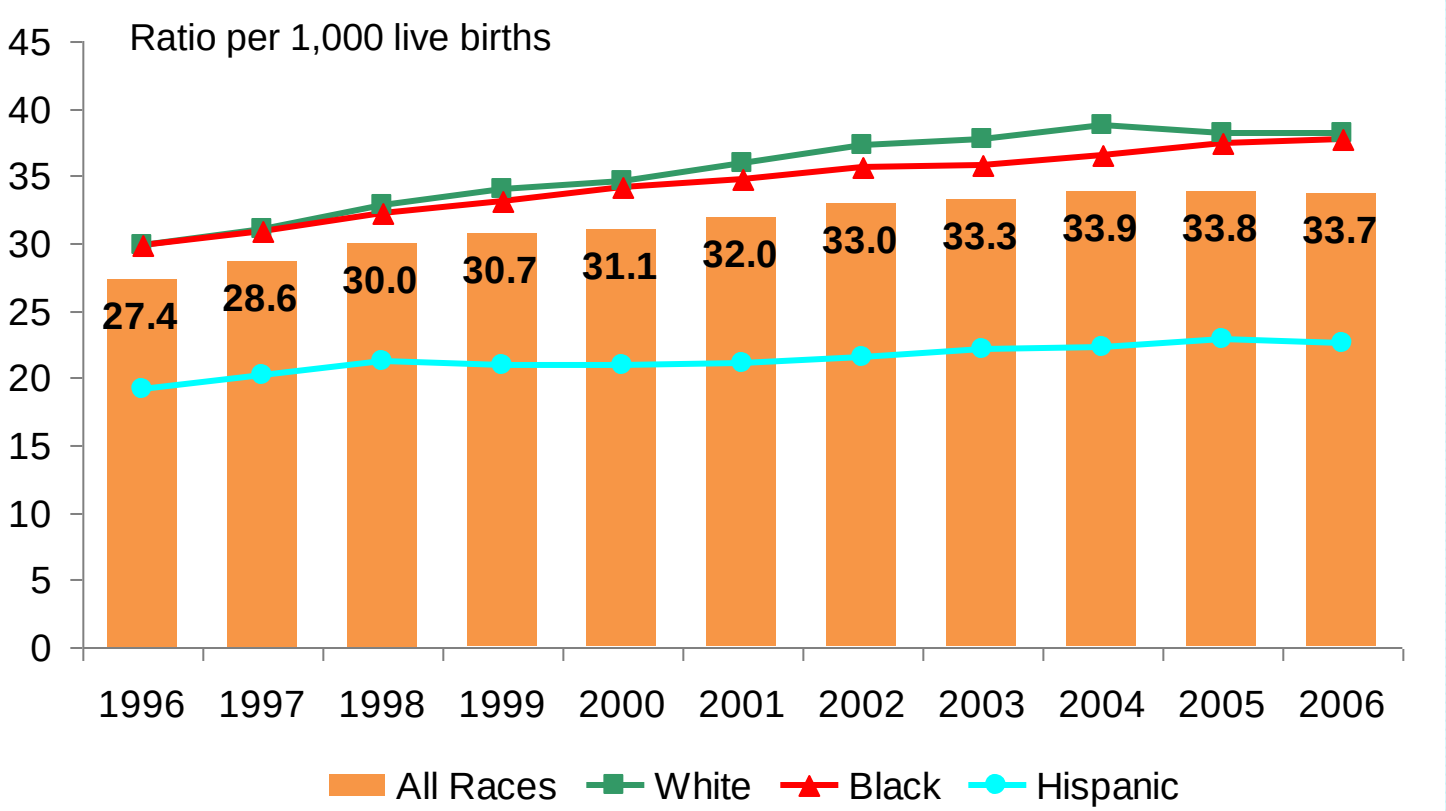
Risk Factors for Preterm Labor/Delivery

- The best predictors of having a preterm birth are:
  - ✓ current multifetal pregnancy
  - ✓ a history of preterm labor/delivery or prior low birthweight
  - ✓ mid trimester bleeding (repeat)
  - ✓ some uterine, cervical and placental abnormalities
- *Other risk factors:*
  - unintended pregnancy
  - maternal age (<17 and >35 yrs)
  - black race
  - low SES
  - unmarried
  - previous fetal or neonatal death
  - 3+ spontaneous terminations
  - uterine abnormalities
  - incompetent cervix
  - cervical procedures
  - genomic predisposition
  - low pre-pregnant weight
  - obesity
  - infections
  - anemia
  - major stress
  - lack of social supports
  - tobacco use
  - illicit drug use
  - alcohol abuse
  - folic acid deficiency

Challenges: Changing culture of childbearing

- More high risk pregnancies
  - advanced maternal age, advanced paternal age
  - more complications such as infections, high blood pressure, gestational diabetes, obesity
  - more multiple births
  - women unable to get pregnant before now conceive
  - more women now pregnant with serious health problems advised not to get pregnant in the past
  - high risk behaviors including substance abuse (smoking, drinking, illicit drug use)
- Public preferences/autonomy
  - date of delivery scheduled for convenience
  - cesarean delivery on maternal request (CDMR)

Multiple Birth Ratios by Maternal Race/Ethnicity United States, 1996 - 2006



All race categories exclude Hispanic births.

Source: National Center for Health Statistics, final natality data

Prepared by March of Dimes Perinatal Data Center, 2009

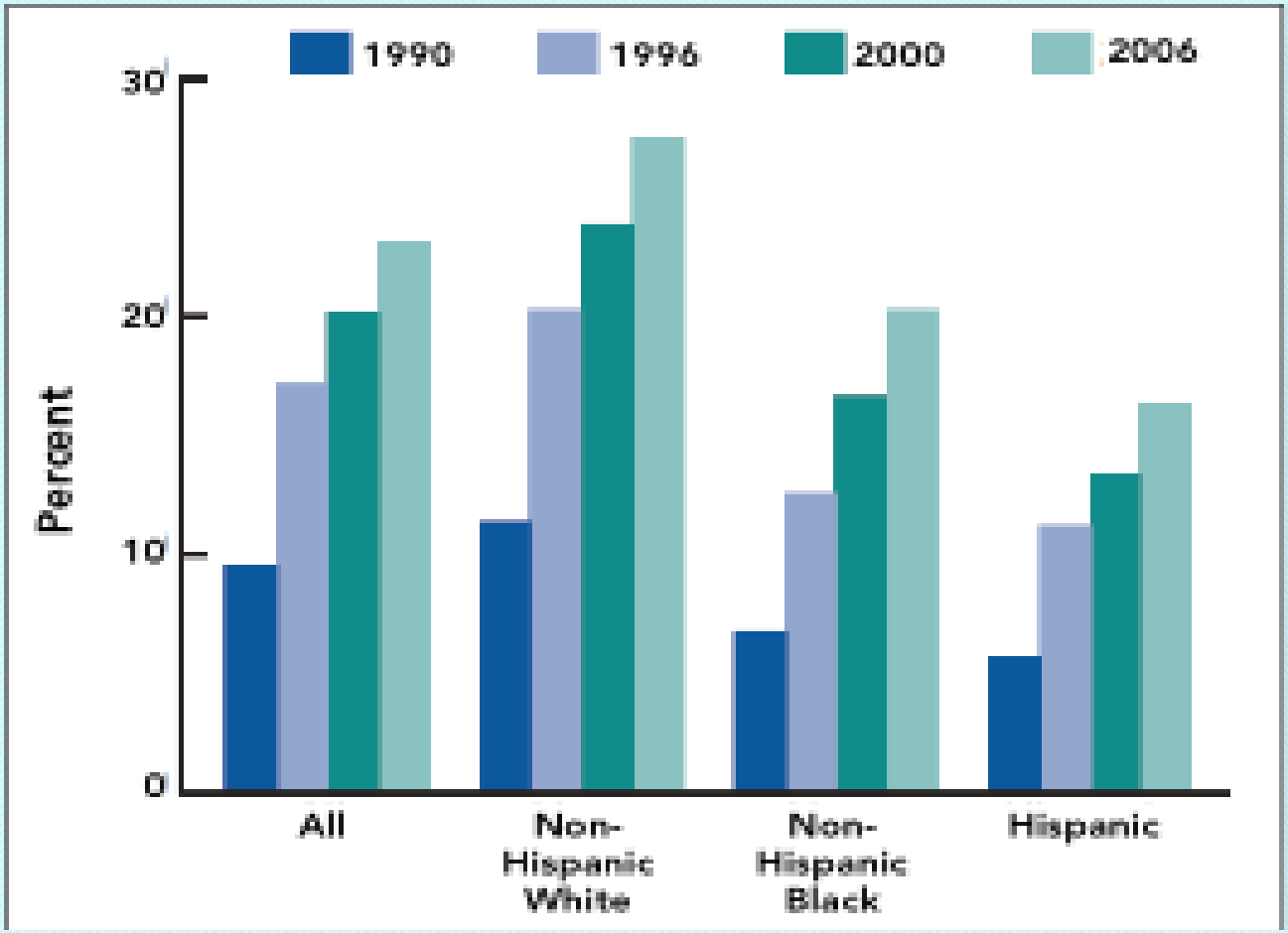
Challenges: Changing culture of obstetrical practice

- Clinical management (more interventions)
  - more provider suggested scheduled deliveries
  - escalating rates of labor inductions
  - escalating rates of cesarean deliveries
  - if cesarean rates increase, rates of late preterm birth usually increase
- Litigious environment, defensive medicine
  - 9 out of 10 obstetricians named in at least one law suit
  - on average 2.6 suits/career
    - 2006 ACOG liability survey
  - earlier delivery to prevent adverse outcomes such as fetal demise

Inductions of Labor

- Since 1979, ACOG has cautioned against inductions before 39 weeks in the absence of a medical indication.
- Confirmation of gestational age is **critical:**
  - Ultrasound before 20 weeks gestation to establish accurate gestational age of the fetus
  - Documentation of fetal heart tones for 30 weeks using Doppler ultrasonography
  - Confirmation that it has been 36 weeks since a positive pregnancy test was obtained

Rates of Induction of Labor for Singleton Births by Race and Hispanic Origin in the U.S.



Martin JA, et al. Births: Final data for 2006. National vital statistics reports; vol 57 no 7. Hyattsville, MD: National Center for Health Statistics. 2009.

"Non-medical" Indications Often Given for Inductions

- Maternal intolerance to late pregnancy
  - Excess edema, backache, indigestion, insomnia
- Prior labor complication
- Prior shoulder dystocia
- Suspected fetal macrosomia
- History of rapid labor/ lives far away
- Possible lower risk for mom or baby
  - Lower stillbirth rate, less macrosomia, less preeclampsia

Reasons for Some Obstetricians to Perform Elective Inductions

- Physician convenience
  - Guarantee attendance at birth
  - Avoid potential scheduling conflicts
  - Reduce being woken at night
- … what's the harm?
  - Amnesia due to rare occurrence
  - The NICU can handle it

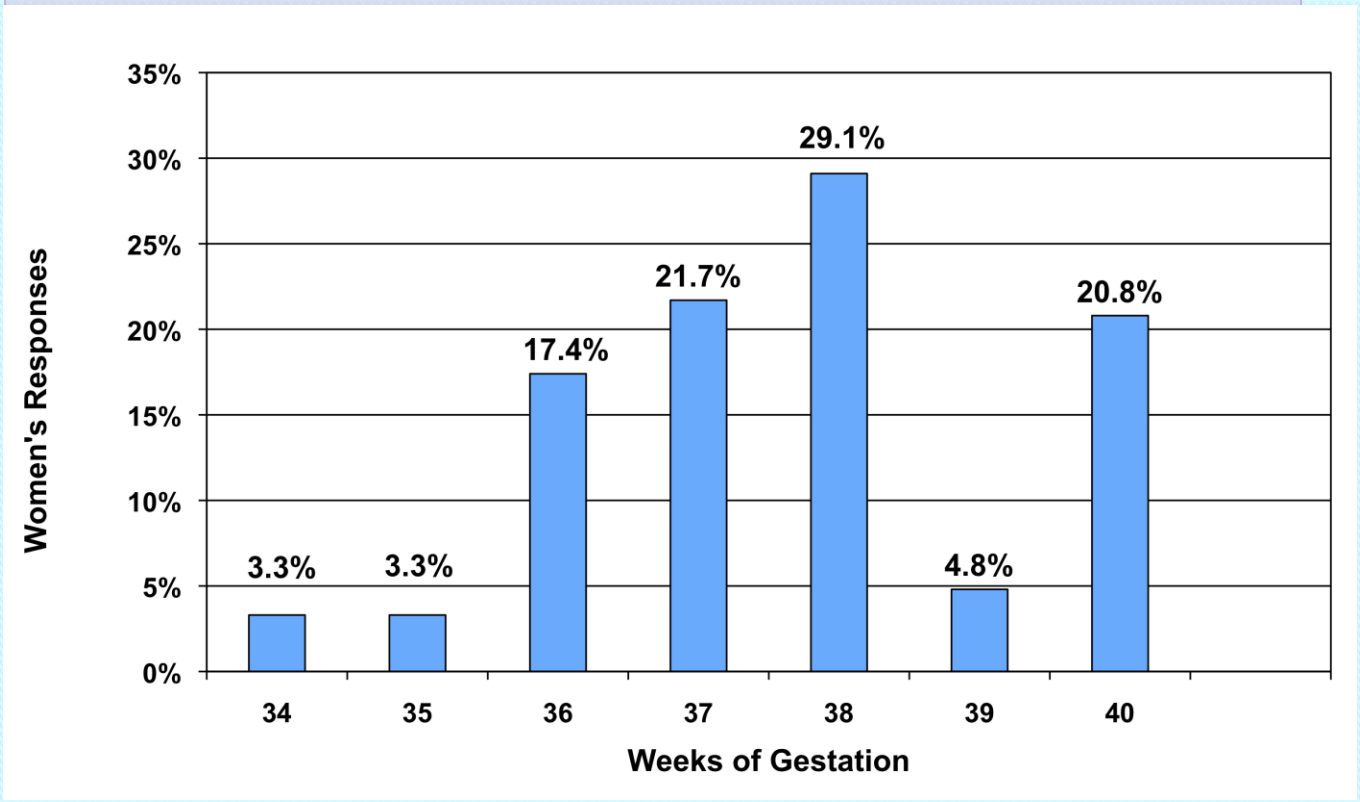
Clin Obstet Gynecol 2006;49:698-704

Do Women Understand "Full Term" or "Late Preterm"?

- 650 women surveyed about full term birth and safety of giving birth at various GAs
- 24% thought 34-36 weeks was full term
- 51% thought 37 weeks was full term
- Only 25% thought 39-40 was full term
- Most women believe it is safe to give birth before 39 weeks

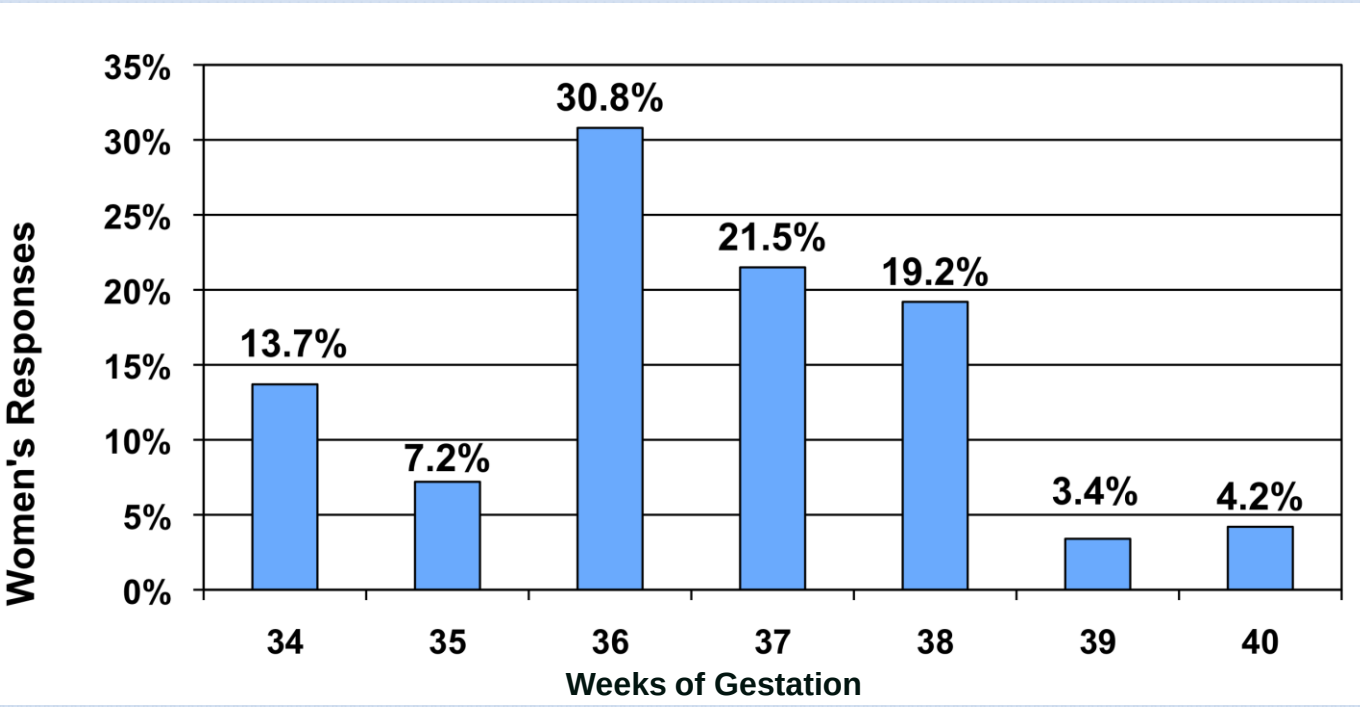
Goldenberg RL, et al. Women's perceptions regarding the safety of births at various gestational ages. Obstet and Gynecol 2009 114(6):1254.

The Gestational Age that Women Considered a Baby to be Full Term



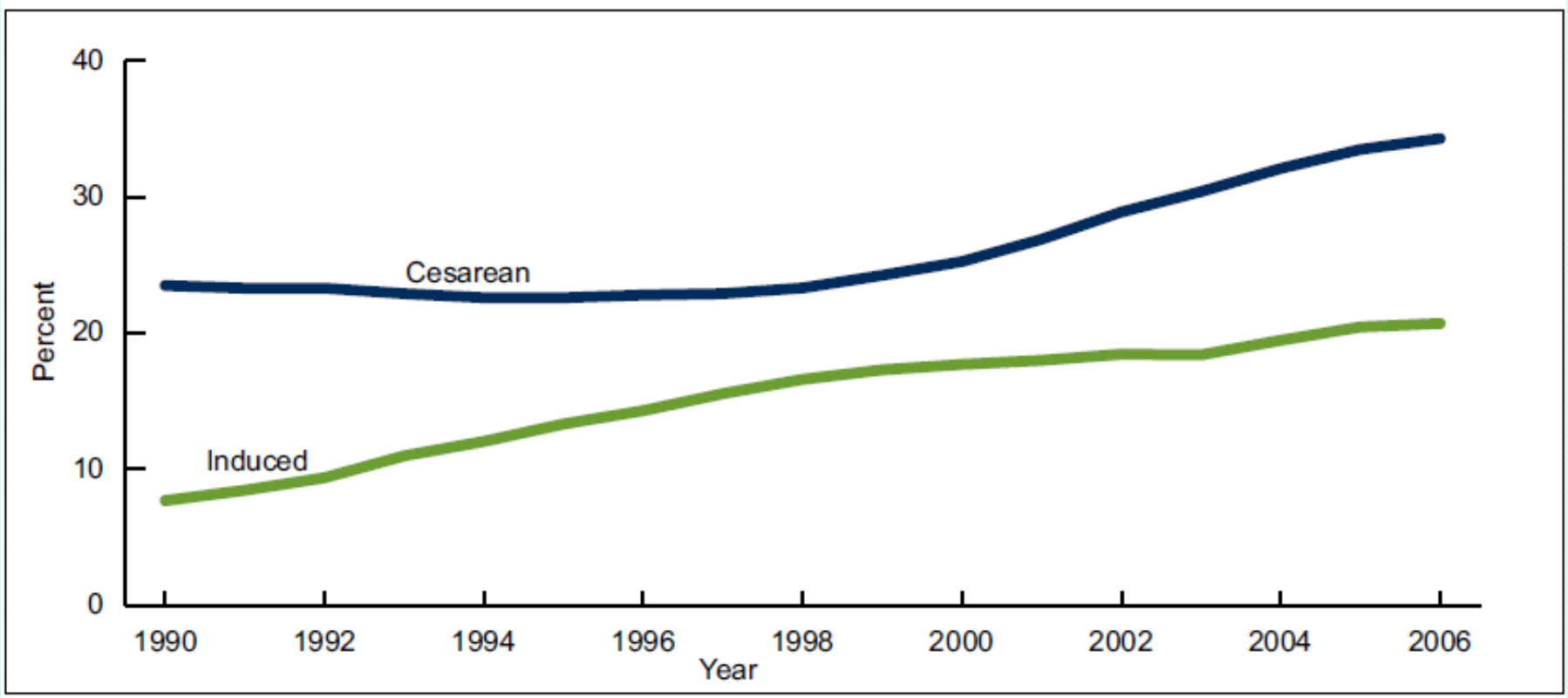
Obstet Gynecol 2009;114:1254

The Gestational Age that Women Considered it Safe to Deliver



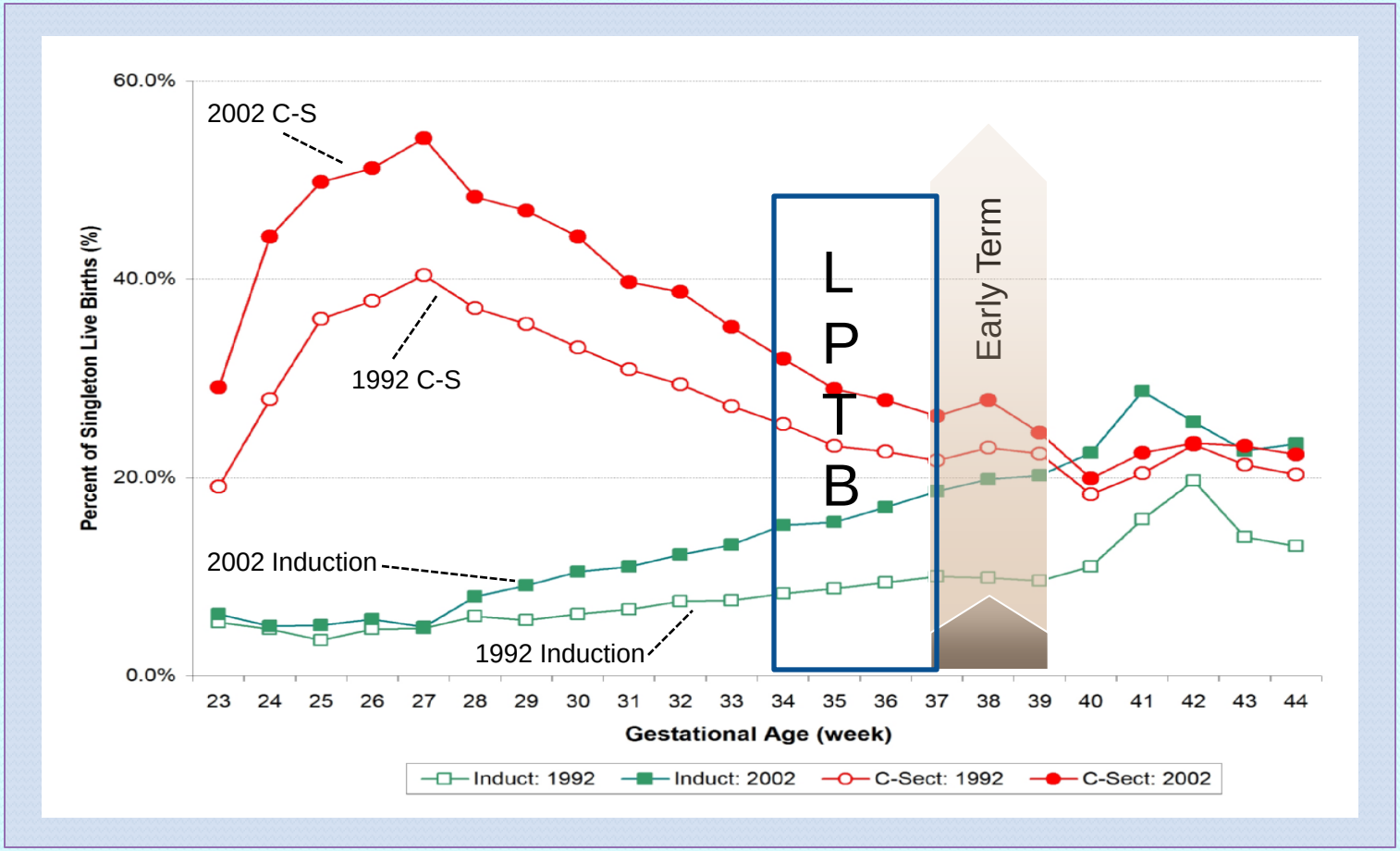
Obstet Gynecol 2009;114:1254

Induction of Labor and Cesarean Delivery Rates for Late Preterm Births, United States, 1990-2006



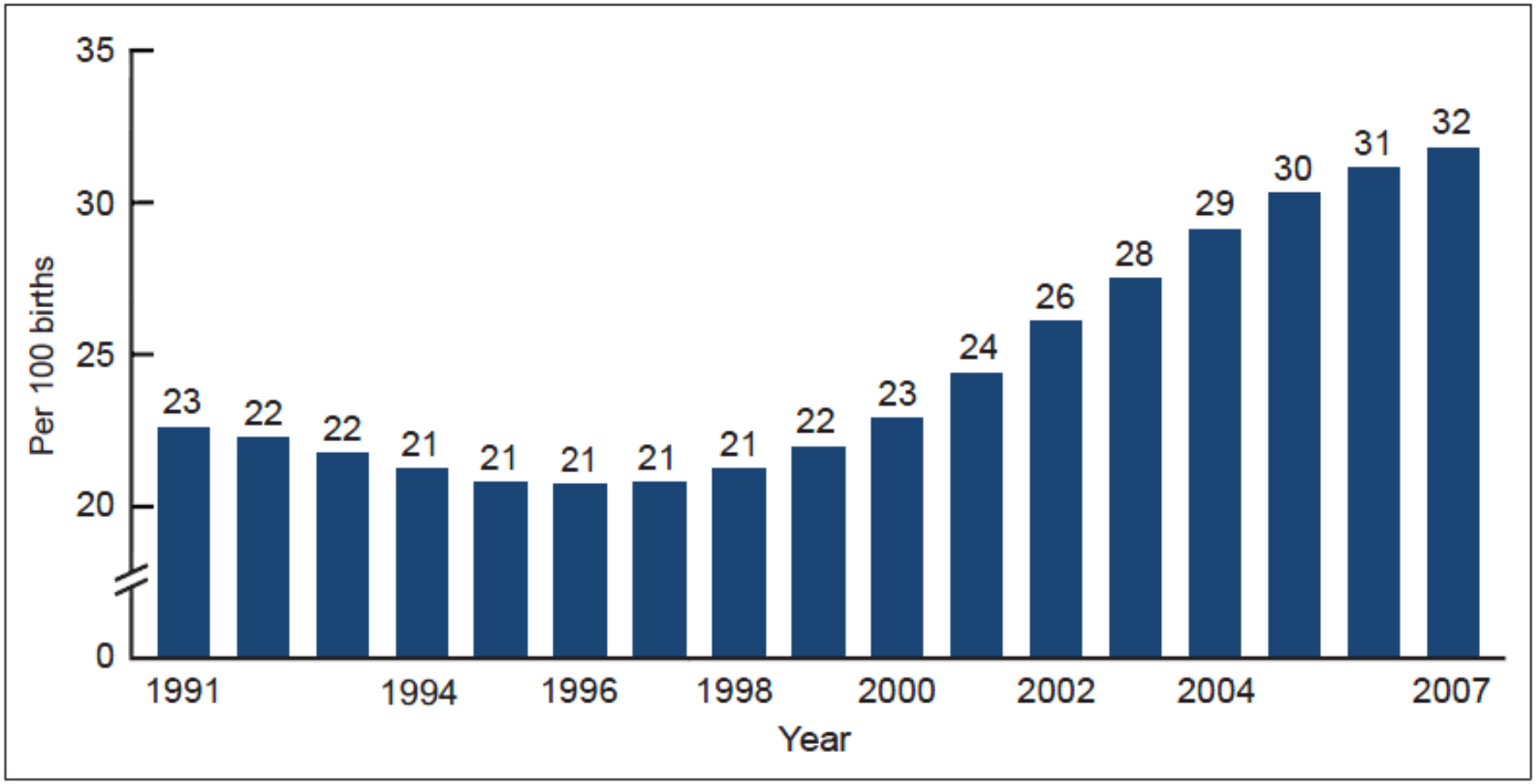
NOTES: Singleton births only. Induction of labor rates are for vaginal births only.
SOURCE: CDC/NCHS, National Vital Statistics System.

U.S. Cesarean Section and Labor Induction Rates Among Singleton Live Births by Week of Gestation, 1992 and 2002



Source: NCHS, Final Natality Data, Prepared by March of Dimes Perinatal Data Center, April 2006.

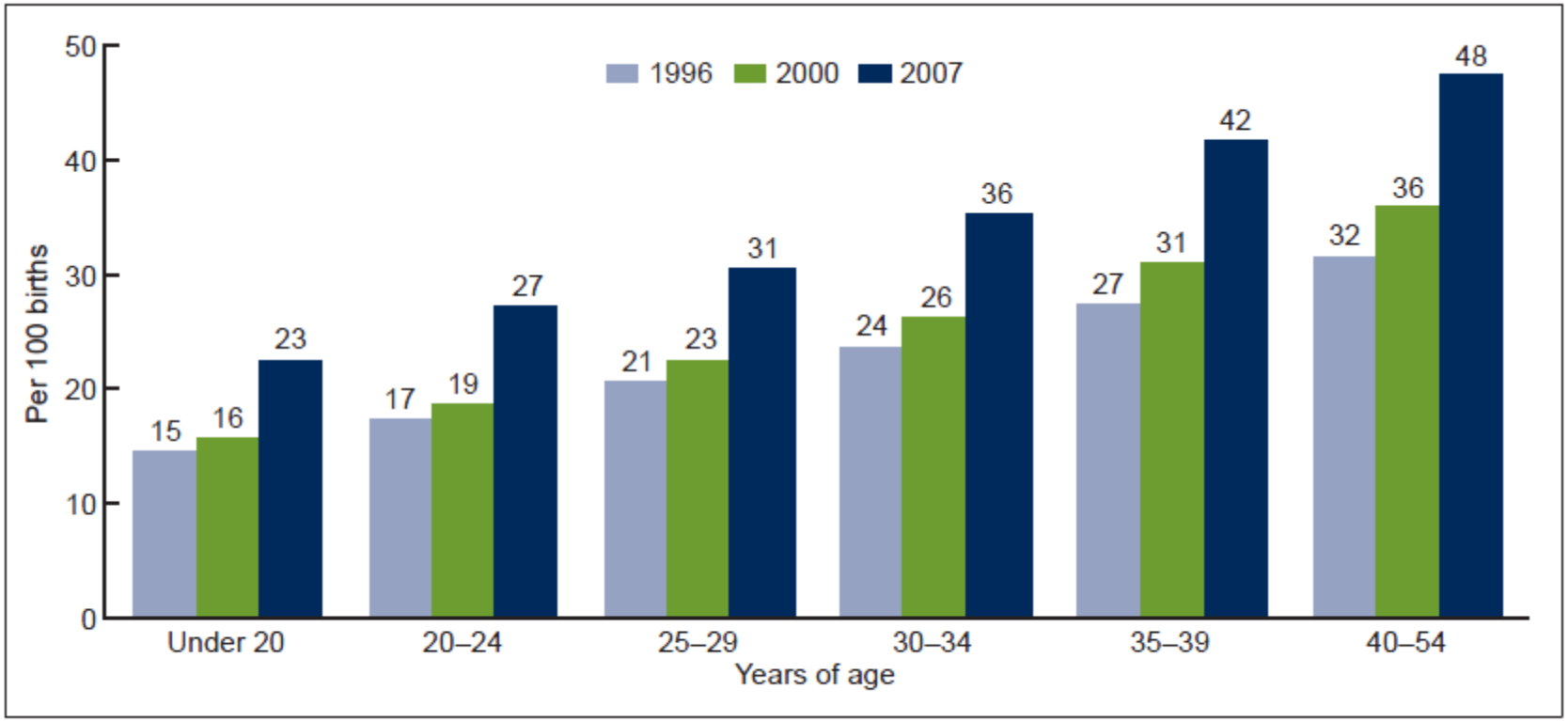
Cesarean Delivery Rates US, 1991-2007



SOURCE: CDC/NCHS, National Vital Statistics System.

Source: NCHS Databrief, No 35, Mar 3010

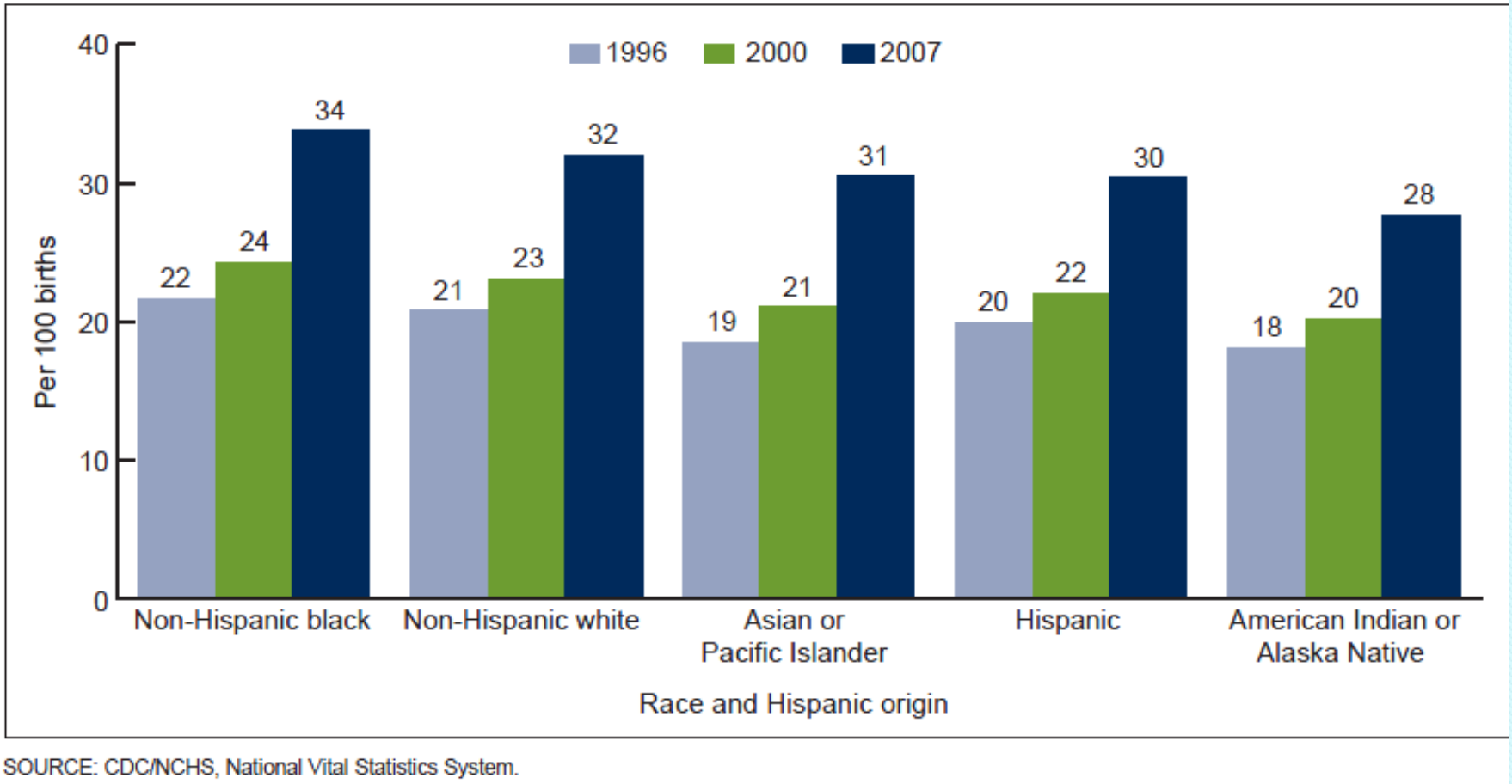
Cesarean Delivery Rates by Maternal Age Categories, US, 1996, 2000, 2007



SOURCE: CDC/NCHS, National Vital Statistics System.

Source: NCHS Databrief, No 35, Mar 3010

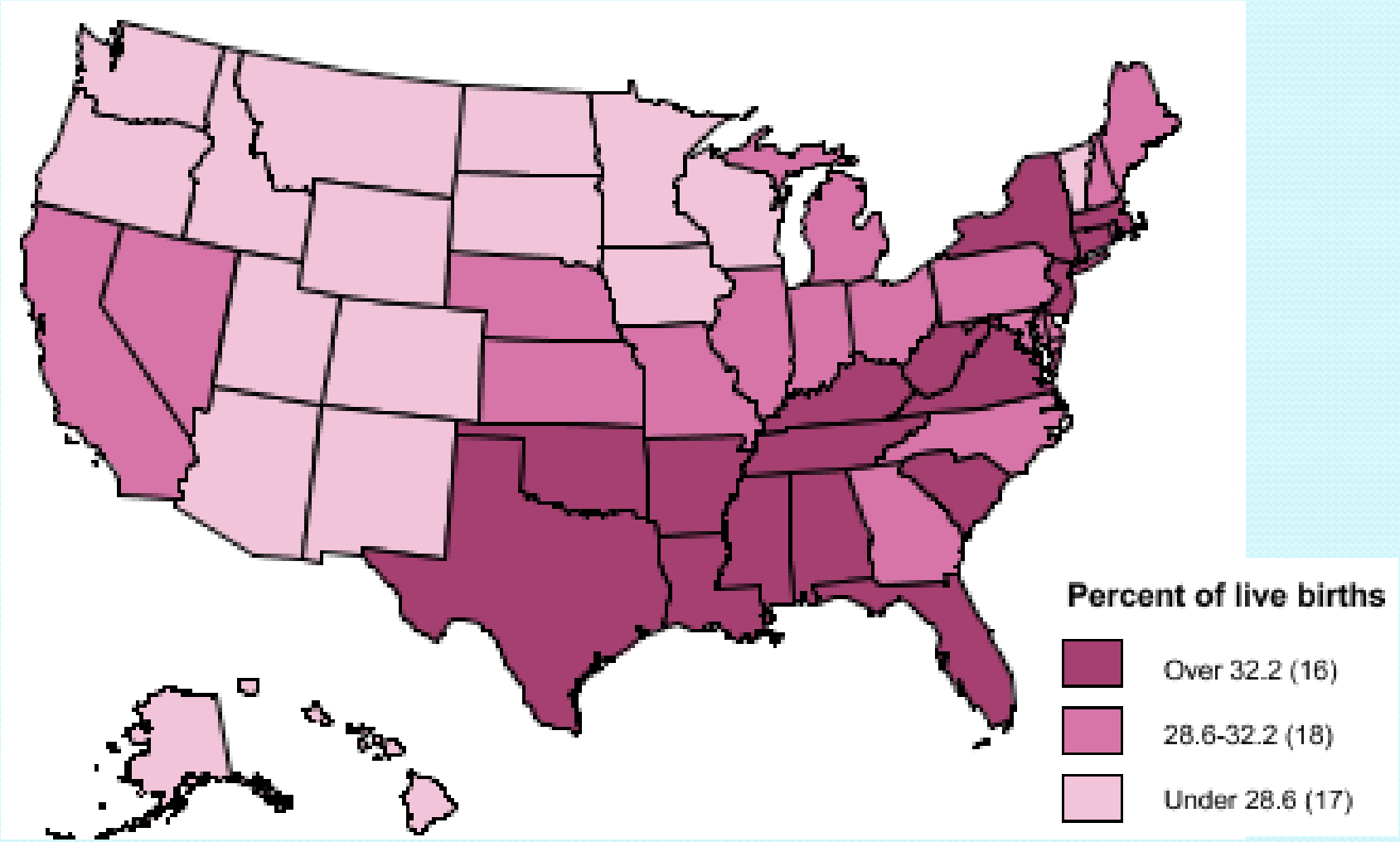
Cesarean Delivery Rates by Race, Ethnicity and Hispanic Origin, US, 1996, 2000, 2007



SOURCE: CDC/NCHS, National Vital Statistics System.

Source: NCHS Databrief, No 35, Mar 3010

Rates of Total Cesareans for All States, 2006



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Challenges: Additional Factors

- Few evidence-based interventions after 34 weeks
  - window to administer antenatal steroids to women in preterm labor is 24-34 weeks
  - increase in neonatal survival to almost 100% at 34 weeks
- Health care delivery system issues
  - reimbursement based on provider performing the delivery, not necessarily the provider of the prenatal care
  - inadequate coverage of anesthesia or other staff during some days of the week
  - administrative or defensive medicine driven decisions

    to not offer procedures such as vaginal birth after cesarean (VBAC)

NICHD Invitational Conference on Late Preterm (Near term) Birth

- In July 2005 NICHD convened an invitational conference with March of Dimes support to address growing concerns about infants born 3 to 6 weeks before their due date
- Representatives from the March of Dimes, all three Prematurity Campaign partners (AWHONN, ACOG, and AAP), SMFM, clinicians, basic science and clinical researchers and policy members participated
- Papers were presented to address the myriad of issues related to late preterm births. The papers were peer reviewed and published in two supplements of *Seminar in Perinatology* in the spring of 2006 and a summary article in *Pediatrics* in September 2006

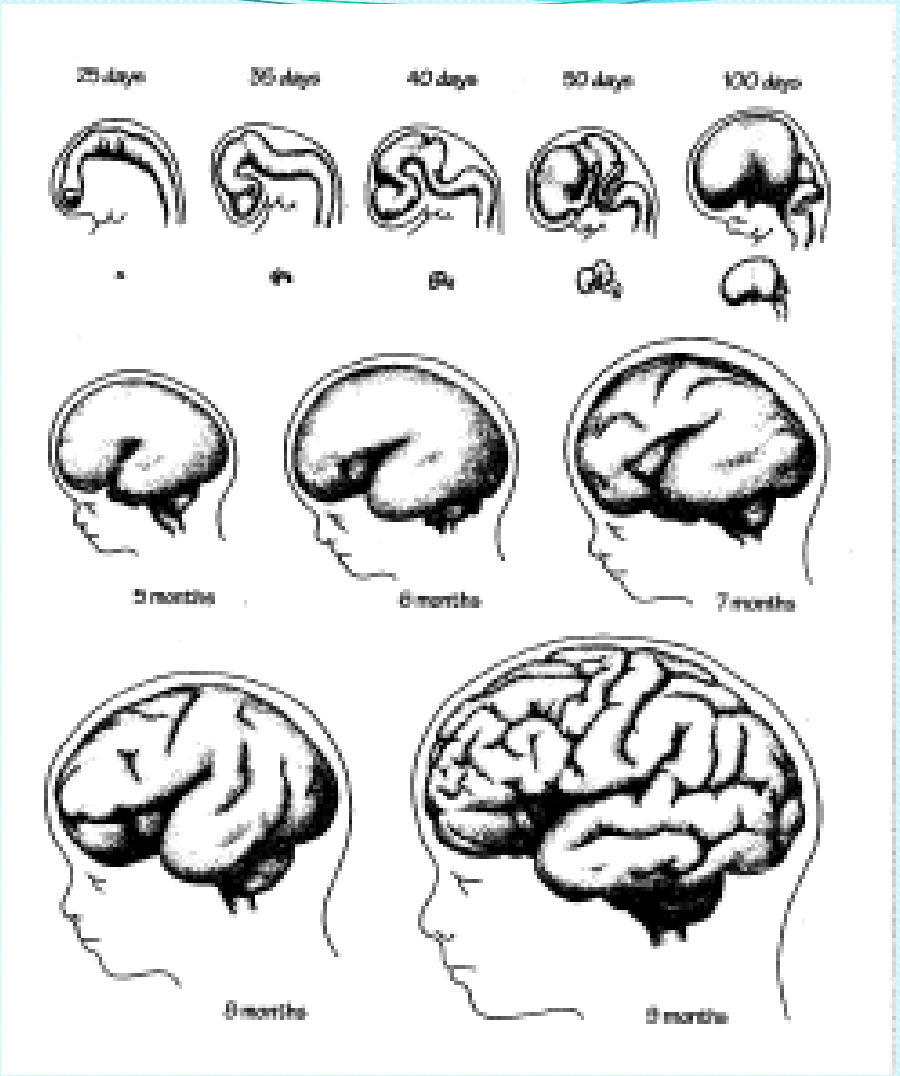
“Late Preterm” is Still Premature

- Late preterm infants (34-36 weeks) typically receive routine care in well-baby nurseries and are presumed low risk
- Problems may not be noticed until illness is more advanced and symptoms are evident.
- Late Preterm infants are much more likely than term infants to have:
  - NICU Admission
  - Depression at birth (low Apgar scores)
  - Respiratory Distress, including respiratory failure
  - Hypoglycemia
  - Feeding problems
  - Temperature Instability
  - Apnea

NICHD Invitational Conference, July 2005

Development of the Human Brain through Gestation

- Lower functions mature first
- Cortex is last to develop
- Brain at 35 wks weighs only 2/3 what it will weigh at term



Fetal Brain Development and Growth

- Lower functions mature first; the cerebral cortex is last to develop
- The immature control of the late preterm brain evidenced by problems with periodic breathing, apnea, decreased HR variability, REM sleep and feeding difficulties.
- Volume of the cerebellum at 34 weeks is only 55% of that at term
- Cerebellar function is related to: fine motor control, coordination, motor sequencing, cognition and language, social function and learning
- Volume of the white matter increases 5-fold from 35-41 weeks
- Cerebral cortex volume at 34 weeks is only 53% of term volume
- Cerebral cortex is the seat of higher order functions – cognition, perception, reason, motor control
- The brain organizes during late preterm period; there is huge development of synapses, axon growth, dendrites, and neurotransmitters

Kinney HC. Semin Perinatol 30: 81-88, 2006.
Adams- Chapman I. Clin Perinatol 33: 947-964, 2006

Brain Development in the Late Preterm Infant- Outcomes

- Compared to term infants, late preterm infants:
  - twice as likely to die of SIDS
  - 80% increased risk of ADHD
  - 20% risk of clinically significant behavior problems at 8 yrs of age
  - more likely to be diagnosed with Developmental Delay in the first 3 years
  - more likely to be referred for special needs in pre-school
  - more likely to have problems with school readiness
  - more likely to have severe hyperbilirubinemia and resultant neurologic consequences

Fuchs K, Wapner R. Elective cesarean section and induction and their impact on late preterm births. Clin Perinatol 33: 793-801, 2006.

Adams- Chapman I. Neurodevelopmental outcome of the late preterm infant. Clin Perinatol 33: 947-964, 2006.

Late Preterm Infant: Morbidity And Potential Impact

- "Because one out of 11 births in this country is a late preterm birth, and since the brain of the late preterm infant is less mature than that of the term infant, even a minor increase in the rate of neurologic disability and scholastic failure in this group can have a huge impact on the health care and educational systems."

Raju TNK. Epidemiology of Late Preterm Births. Clin Perinatol 33 751-763, 2006

Late Preterm Infant Morbidity Neurodevelopmental Outcomes

- Increased risk cerebral palsy and mental retardation
  - Petrini et al. J Peds, 2008
  - Moster et al. NEJM 2008; 359:262-73
  - Himmenlman et al. Acta Paediatr; 2005;94:287-94
- Increased risk developmental delay, special needs in preschool, problems with school readiness
  - Morse SB et al. Pediatrics 2009;123:e622-629 [Healthy LPTB]
  - Petrini et al. J Peds, 2008
  - Chyi LJ et. al. J Pediatr 2008: 153:25-31
- Increased risk of ADHD and other clinically significant behavior problems
  - Linnet KM et al Arch Dis Child 2006; 91:655-60
  - Gray RF et al Pediatrics 2004; 114:736-43
  - McCormick et al Pediatrics 1996; 97:18-25

Late Preterm Infant Morbidity Neurodevelopmental Outcomes

- Increased cognitive dysfunction and learning problems
  - Chyi LJ et al. J Pediatr 2008: 153:25-31
  - Saigal S et al. Lancet 2008;371:261-69
  - Pietz et al early Hum Dev 2004;79:131-43
- Increased risk of mental/psychiatric problems
  - Moster et al. NEJM 2008; 359:262-73
- Increased risk for long-term medical disability as adults
  - Moster et al. NEJM 2008; 359:262-73
  - Lindstrom K et al. Pediatr 120:70, 2007
- Increased risk for chronic disease as adults
  - Barker, Rich-Edwards

Late Preterm Infants: Outcomes as Young Adults

- Compared to infants born at term, Late Preterm have:
- Increased risk of cerebral palsy (RR 2.7)
- Increased risk mental retardation (RR 1.6)
- Increased risk schizophrenia and mental disorders (RR 1.6)
- 40% increased risk for medical disability that severely limits working capacity as an adult

Moster et al. Long-Term Medical and Social Consequences of Preterm Birth. NEJM 2008; 359:262-73

AWHONN Late Preterm Infant Initiative

The AWHONN Late Preterm Infant Initiative, launched in 2005 as a multi-year endeavor, addresses the special needs of infants born between 34 and 36 completed weeks of gestation. Goals include increasing health care provider and consumer awareness of the risks associated with late preterm birth. Also, ensuring evidence-based educational resources are available for nurses and health care providers to provide appropriate assessment and care for these vulnerable newborns.

New professional resources, released in 2007, include Late Preterm (Near-Term) Infant Assessment Guide and Optimizing Health for the Late Preterm Infant Presentation Package. AWHONN began a national multi-year research-based practice project in late 2007.

Johnson & Johnson Pediatric Institute LLC

Johnson & Johnson Pediatric Instititute, LLC, is the Premiere Partner for the AWHONN Late Preterm Infant Initiative.

Position Statements

- National Standards for Newborn Screening
- Universal Screening for Hyperbilirubinemia

Education, Products & Services

- Breastfeeding Support: Prenatal Care
- Emerging Issues in Near-Term Infant Care
- Hyperbilirubinemia in Term/Near-Term Infant
- Late Preterm Infant Assessment Guide
- Neonatal Nursing Clinical Competencies
- Optimizing Health for the Late Preterm Infant

Two part series on Late Preterm Birth

- *Late Preterm Birth: A Rising Trend*
- *Late Preterm Infants: Clinical Complications and Risk*

- **Four U's of Late Preterm Birth:**
  - **Unrecognized as premature**
  - **Underestimated for morbidity and mortality**
  - **Unpredictable timing of presentation**
  - **Understudied and under-researched population**

Jorgensen AM. Nursing for Women's Health, Aug/Sep 2008

Neonatal Mortality and Morbidity Rates in Late Preterm Births Compared With Births at Term

Donald D. McIntire, MD, and Kenneth J. Leveno, MD

OBJECTIVE: To analyze neonatal mortality and morbidity rates at 34, 35, and 36 weeks of gestation compared with births at term over the past 18 years at our hospital and to estimate the magnitude of increased risk associated with late preterm births compared with births later in gestation.

METHODS: We performed a retrospective cohort study of births at our hospital over the past 18 years. The study included all liveborn singleton infants between 34 and 40 weeks of gestation and without anomalies that were delivered to women who received prenatal care in our hospital system. Neonatal outcomes for late preterm births were compared with those for infants delivered at 39 weeks.

RESULTS: Late preterm singleton live births constituted approximately 9% of all deliveries at our hospital and accounted for 76% of all preterm births. Late preterm neonatal mortality rates per 1,000 live births were 1.1, 1.5, and 0.5 at 34, 35, and 36 weeks, respectively, compared with 0.2 at 39 weeks ($P<.001$). Neonatal morbidity was significantly increased at 34, 35, and 36 weeks, including ventilator-treated respiratory distress, transient tachypnea, grades 1 or 2 intraventricular hemorrhage, sepsis work-ups, culture-proven sepsis, phototherapy for hyperbilirubinemia, and intubation in the delivery room. Approximately 80% of late preterm births were attributed to idiopathic preterm labor or ruptured membranes and 20% to obstetric complications.

CONCLUSION: Late preterm births are common and associated with significantly increased neonatal mortality and morbidity compared with births at 39 weeks. Preterm labor was the most common cause (45%) for late preterm births.

(*Obstet Gynecol 2008;111:35–41*)

LEVEL OF EVIDENCE: II

Many obstetric and neonatal management strategies have been developed during the last 40 years in efforts to improve the outcome of preterm births. These strategies, to name but a few, have included regionalized maternal–neonatal transport systems, development of neonatal intensive care units, and interventions such as attempting to delay delivery using tocolytic drugs or enhancing fetal lung maturation by administration of corticosteroids to the mother. This time period is also important because it was the era during which the disciplines of maternal–fetal medicine and neonatology came into being. Throughout this period of progress in perinatal medicine, most studies have shown that interventions intended to improve the outcome of preterm infants primarily benefit those born before 32–34 weeks of gestation. For example, in the studies by Liggins and Howie[1] demonstrating that corticosteroids prevented respiratory distress in preterm infants, the beneficial effect was limited to births before 34 weeks. As a result, the National Institutes of Health Consensus Conference on Corticosteroids (1994) and organiza-

Conclusions:
Late preterm births are common and associated with significant increased neonatal mortality and morbidity compared to births at 39 weeks.

McIntire DD, Leveno KJ. Obstet Gynecol 111(1):35-41, 2008

Adverse neonatal outcomes: examining the risks between preterm, late preterm, and term infants

Jamie A. Bastek, MD; Mary D. Sammel, ScD; Emmanuelle Paré, MD; Sindhu K. Srinivas, MD; Michael A. Posencheg, MD; Michal A. Elovitz, MD

OBJECTIVE: There is a relative paucity of data regarding neonatal outcomes in the late preterm cohort (34 to 36 6/7 weeks). This study sought to assess differences in adverse outcomes between infants delivering 32 to 33 6/7, 34 to 36 6/7 weeks, and 37 weeks or later.

STUDY DESIGN: Data were collected as part of a retrospective cohort study of preterm labor patients (2002-2005). Patients delivering 32 weeks or later were included (n = 264). The incidence of adverse outcomes was assessed. Significant associations between outcomes and gestational age at delivery were determined using χ^2 analyses and Poisson regression modeled cumulative incidence and controlled for confounders.

RESULTS: Late preterm infants have increased risk of adverse outcomes, compared with term infants. Controlling for confounders, there was a 23% decrease in adverse outcomes with each week of advancing gestational age between 32 and 39 completed weeks (relative risk 0.77, $P < .001$, 95% confidence interval, 0.71-0.84).

CONCLUSION: Further investigation regarding obstetrical management and long-term outcomes for this cohort is warranted.

Key words: adverse neonatal outcomes, late preterm infant, preterm birth, preterm labor

Cite this article as: Bastek JA, Sammel MD, Paré E, et al. Adverse neonatal outcomes: examining the risks between preterm, late preterm, and term infants. Am J Obstet Gynecol 2008;199:367.e1-367.e8.

The preterm birth rate has risen 31% since 1981, most notably because of

★ EDITORS' CHOICE ★

Materials and Methods

Data collection for this study was per-

AJOG 199 (4), 365, Oct 2008.

- Despite potential limitations, the findings suggest that the obstetrical practices regarding delivery of the late preterm cohort between 34 0/7 and 36 6/7 weeks may need to be reexamined, with greater emphasis placed on the more conservative management of infants in this cohort.
- Although current guidelines do not recommend tocolysis and administration of betamethasone beyond 34 weeks gestation, the delivery of a 34 week neonate should not be considered routine or without significant neonatal risks.

Morbidity of Late Preterm Infants in Massachusetts

- Late preterm infants: **22.2%** vs Term infants: **3%**
  - Sample: Term (377,638), Late Preterm (26,170)
- **Morbidity** rates doubled for each gestational week earlier than 38 weeks

40 wks: 2.5%
39 wks: 2.6%
38 wks: 3.3%
37 wks: 5.9%
36 wks: 12.1%
35 wks: 25.6%
34 wks: 51.9%

Shapiro-Mendoza CK et al. Effect of late-preterm birth and maternal medical conditions on newborn morbidity risk. *Pediatrics.* 2008;121:e223–e232

Preterm Birth Rates by Delivery Method
US, 1996 and 2004

60,000 additional singleton preterm births

	Vaginal			Cesarean section		
	1996	2004	Absolute difference	1996	2004	Absolute difference
Preterm	263,520	268,172	4,652	91,477	145,882	54,405
Total births	2,944,204	2,802,472	-141,732	722,756	1,071,082	348,326
Preterm birth rate	9.0%	9.6%	0.6%	12.7%	13.6%	0.9%

Bettegowda VR, Dias T, Davidoff MJ, Damus K, Callaghan WM, Petrini JR. The relationship between cesarean delivery and gestational age among US singleton births. Clinics in Perinatology. 2008;35: 309–323.

Study Links Cesareans With Births Before Term

- Premature single births have been increasing in the US, mostly among infants delivered by cesarean section
  - researchers say some of the increase may be due to cesareans that are not medically necessary
- The trend is worrisome because preterm births are at risk for breathing and feeding disorders, delayed brain development, other health problems and death.
- The study of single births from 1996 to 2004 found an increase in premature deliveries, from 9.7% to 10.7%.
  - 92% of those premature deliveries were by cesarean.
  - most were “late preterm,” born 34 to 36 weeks

May 28, 2008 NY Times

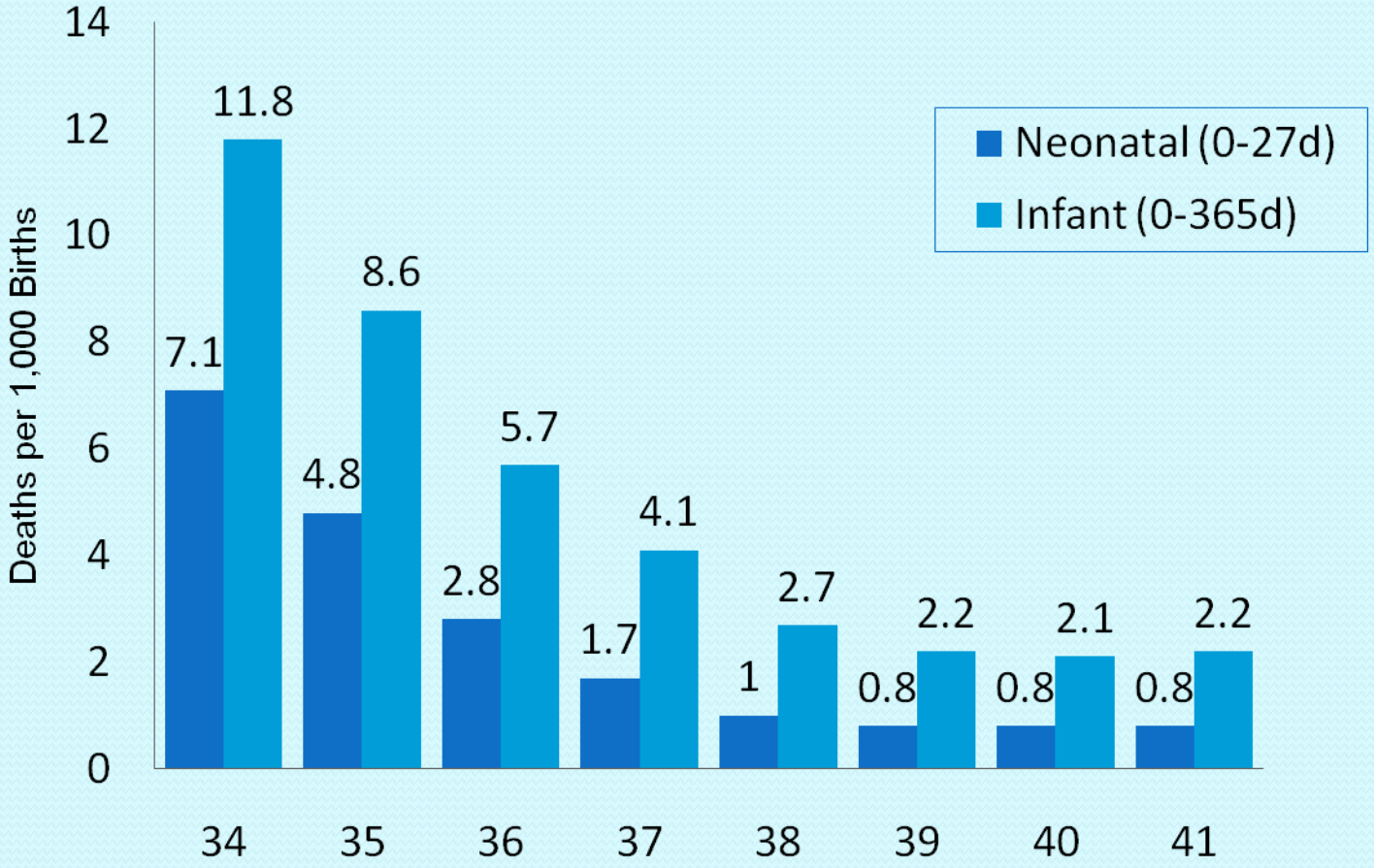
Mortality Rates for Late Preterm Births

The Wall Street Journal, *November 13, 2007*

- Babies born even 3 weeks before their due date are more likely to die in their first week of life compared with term infants
- "late-preterm" infants account for the vast majority of early births, and are rising in number due, in part, to increased use of cesarean deliveries and labor induction, according to data from the NCHS
- Babies born in the 34-36 week window, the mortality rate was 6 times higher in the first week of life and 3 times higher in the first year than term babies
- The research, on 27.2 million US births from 1995-2002, is the first to quantify death rates among late preterm infants

Tomasek KM et al. Differences in Mortality between Late-Preterm and Term Singleton Infants in the United States, 1995–2002. J Pediatr 2007;151:450-6.

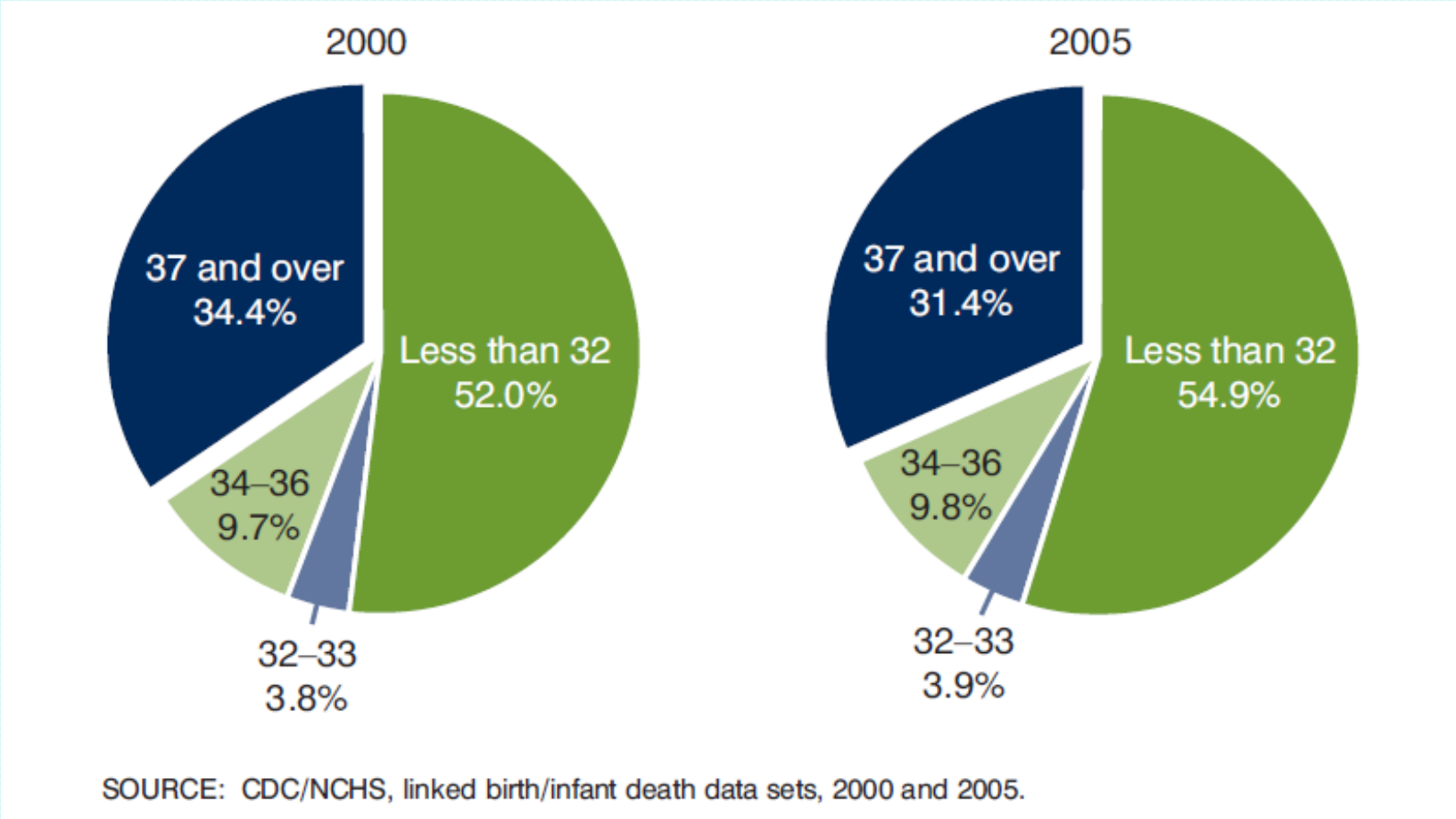
Neonatal and Infant Death Rates for Singleton Births by Gestational Age



Reddy, et al, 2009

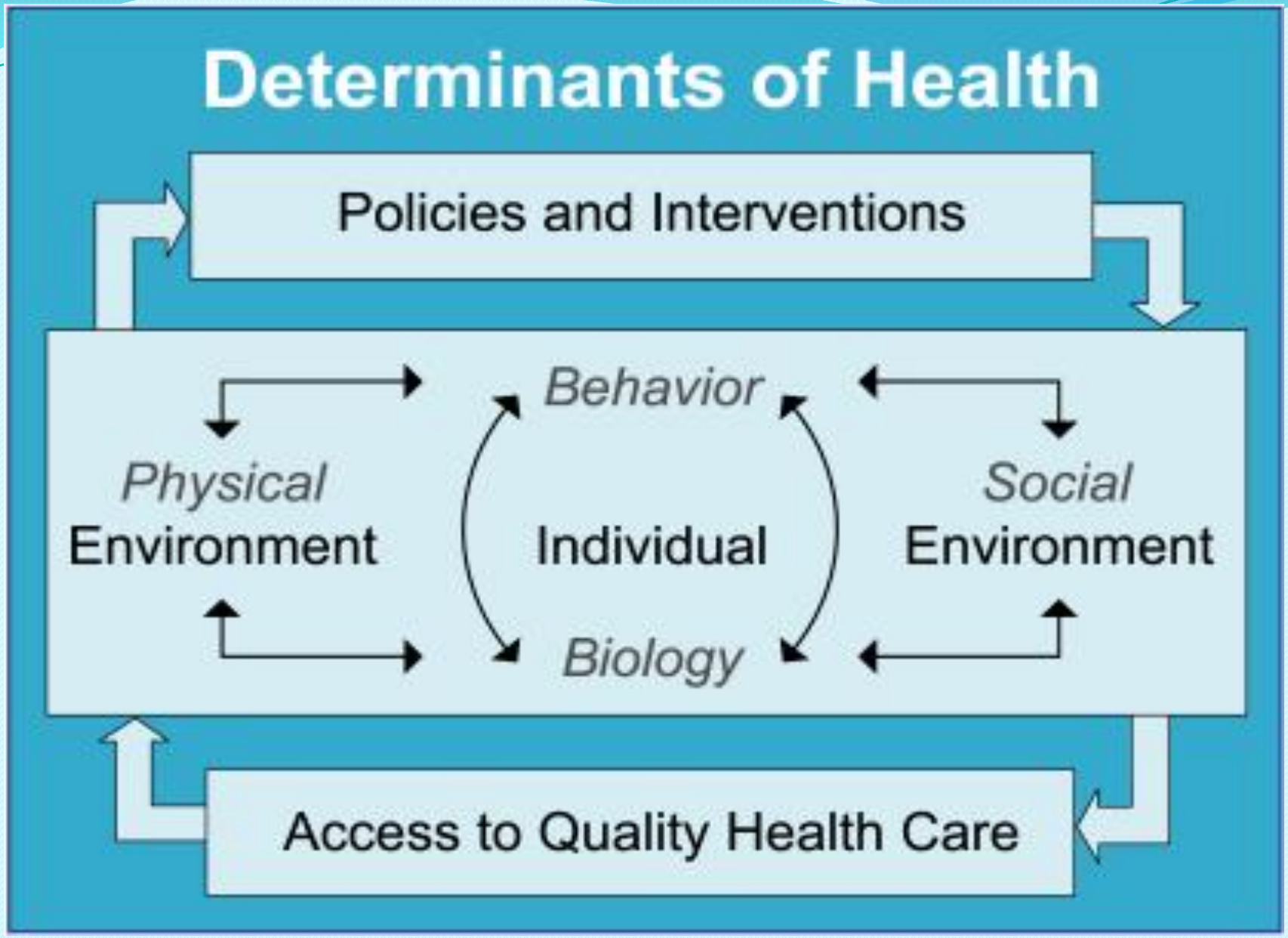
$p < 0.001$ for each week 34-38 compared with 39 weeks

Percentage of Infant Deaths by Weeks of Gestation: United States,2000 and 2005



SOURCE: CDC/NCHS, linked birth/infant death data sets, 2000 and 2005.

How can we prevent “preventable” preterm birth?



www.healthypeople.gov

American Journal of Obstetrics and Gynecology (2005) 193, 626–35

ELSEVIER

American Journal of Obstetrics & Gynecology

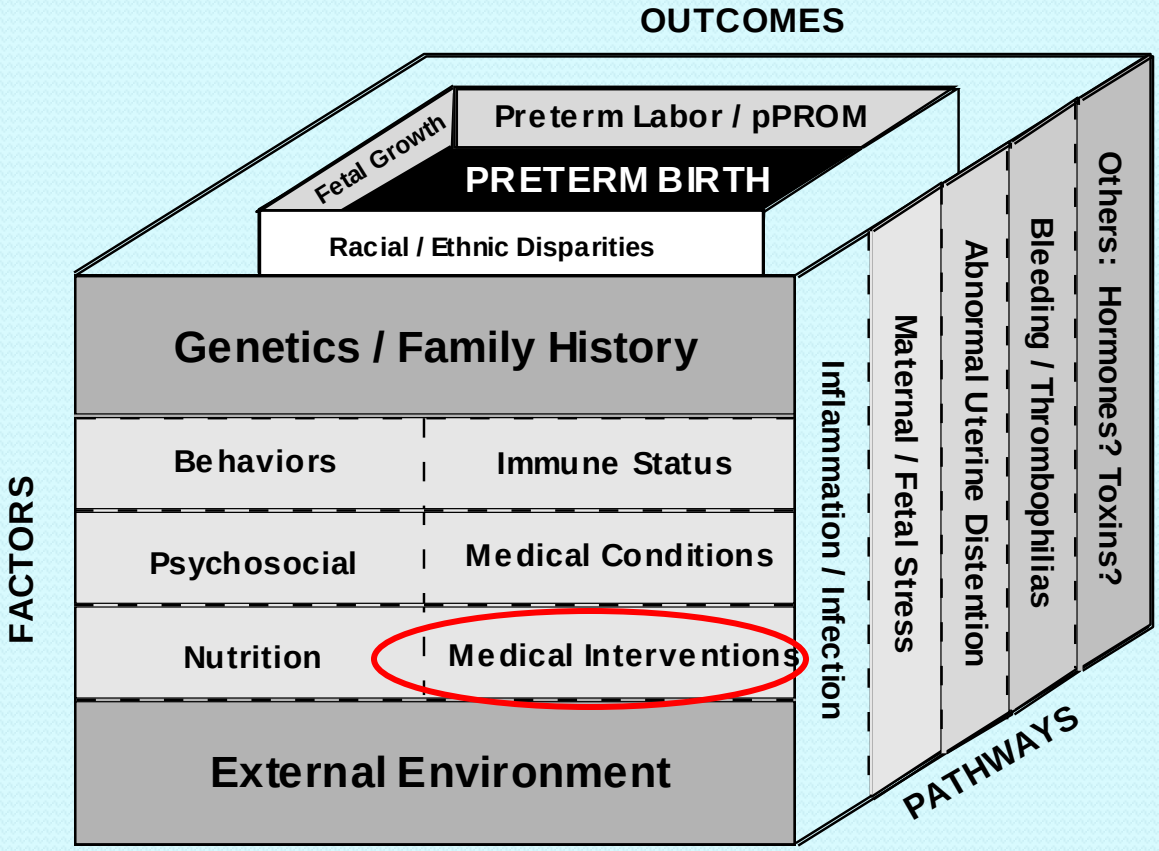
www.ajog.org

CLINICAL OPINION

Research agenda for preterm birth: Recommendations from the March of Dimes

Nancy S. Green, MD,[a,b,*] Karla Damus, RN, PhD,[a,c] Joe Leigh Simpson, MD,[d] Jay Iams, MD,[e] E. Albert Reece, MD, PhD, MBA,[f] Calvin J. Hobel, MD,[g] Irwin R. Merkatz, MD,[c] Michael F. Greene, MD,[h] Richard H. Schwarz, MD,[i] and the March of Dimes Scientific Advisory Committee on Prematurity

March of Dimes, White Plains, NY[a]; Departments of Pediatrics and Cell Biology,[b] and Department of Obstetrics & Gynecology and Women's Health,[c] Albert Einstein College of Medicine, Bronx, NY; Department of Obstetrics and Gynecology and Molecular and Human Genetics, Baylor College of Medicine, Houston, TX[d]; Department of Obstetrics and Gynecology, Ohio State University, Columbus, OH[e]; Department of Obstetrics and Gynecology, Dean's Office, University of Arkansas for Medical Sciences, Little Rock, AR[f]; Departments of Obstetrics, Gynecology and Pediatrics, Cedars-Sinai Medical Center, University of California Los Angeles School of Medicine, Los Angeles, CA[g]; Department of Obstetrics and Gynecology and Reproductive Biology, Harvard Medical School, Boston, MA[h]; Department of Obstetrics and Gynecology, Maimonides Medical Center, Brooklyn, NY[i]



Green NS, Damus K, Simpson JL, et al. AJOG 193:626, 2005.

March of Dimes Call for Action

1. We urge the federal government to increase support for prematurity-related research and data collection as recommended by the Institute of Medicine and the Surgeon General's Conference on the Prevention of Preterm Birth, to: (a) identify the causes of premature birth; (b) test strategies for prevention; (c) improve the care, treatment and outcomes of preterm infants; and (d) better define and track the problem of premature birth.
2. We urge federal and state policymakers to expand access to health coverage for women of childbearing age and to support smoking cessation programs as part of maternity care.
3. We call on hospitals and health care professionals to voluntarily assess c-sections and inductions which occur prior to 39 weeks gestation to ensure consistency with professional guidelines.
4. We call on the business community to create workplaces that support maternal and infant health.

www.marchofdimes.com

Current Commentary

Surgeon General's Conference on the Prevention of Preterm Birth

Diane M. Ashton, MD, MPH, Hal C. Lawrence III, MD, Nelson L. Adams III, MD, and Alan R. Fleischman, MD

- Several of the recommendations can be implemented in existing clinical care settings with modest resources, such as:
  - **the development of quality improvement activities to monitor preterm birth rates and reduce elective inductions and cesarean deliveries <39 weeks**
  - employing clinical practices to accurately determine gestational age as early as possible
  - collecting data on birth outcome by race and ethnicity to identify disparities and implement locally specific methods to eliminate them
  - establishing culturally competent, multidisciplinary clinical teams to provide comprehensive and integrated patient care addressing the importance of preconception care, early risk assessment, and active interventions to prevent preterm birth.

Obstet Grynecol 113(4):925-30, 2009

OBSTETRICS

Improved outcomes, fewer cesarean deliveries, and reduced litigation: results of a new paradigm in patient safety

Steven L. Clark, MD; Michael A. Belfort, MD, PhD; Spencer L. Byrum, LCDR (ret.) USCG; Janet A. Meyers, RN; Jonathan B. Perlin, MD, PhD

The Hospital Corporation of America (HCA) is the nation's largest private health care delivery system, providing approximately 220,000 deliveries annually in 120 facilities in 21 states. Representing approximately 5% of all births in the United States, we describe here our assessment and approaches to 4 major challenges in contemporary obstetric practice and the initial results of these initiatives. Notably, and as part of a concerted effort to incorporate the features of high-reliability organizations into HCA's obstetrical services, these interventions have been associated with improved perinatal outcomes, a reduced primary cesarean delivery rate, and lower maternal and fetal injury, with re-

In a health care delivery system with an annual delivery rate of approximately 220,000, a comprehensive redesign of patient safety process was undertaken based on the following principles: (1) uniform processes and procedure result in an improved quality; (2) every member of the obstetric team should be required to halt any process that is deemed to be dangerous; (3) cesarean delivery is best viewed as a process alternative, not an outcome or quality endpoint; (4) malpractice loss is best avoided by reduction in adverse outcomes and the development of unambiguous practice guidelines; and (5) effective peer review is essential to quality medical practice yet may be impossible to achieve at a local level in some departments. Since the inception of this program, we have seen improvements in patient outcomes, a dramatic decline in litigation claims, and a reduction in the primary cesarean delivery rate.

Key words: litigation, patient outcomes, patient safety, quality medical practice

Cite this article as: Clark SL, Belfort MA, Byrum SL, et al. Improved outcomes, fewer cesarean deliveries, and reduced litigation: results of a new paradigm in patient safety. Am J Obstet Gynecol 2008;199:105.e1-105.e7.

Clark SL, et al. AJOG, 2008;199:105.e1-105.e7.

FIGURE 4

Trends in obstetrical malpractice claims

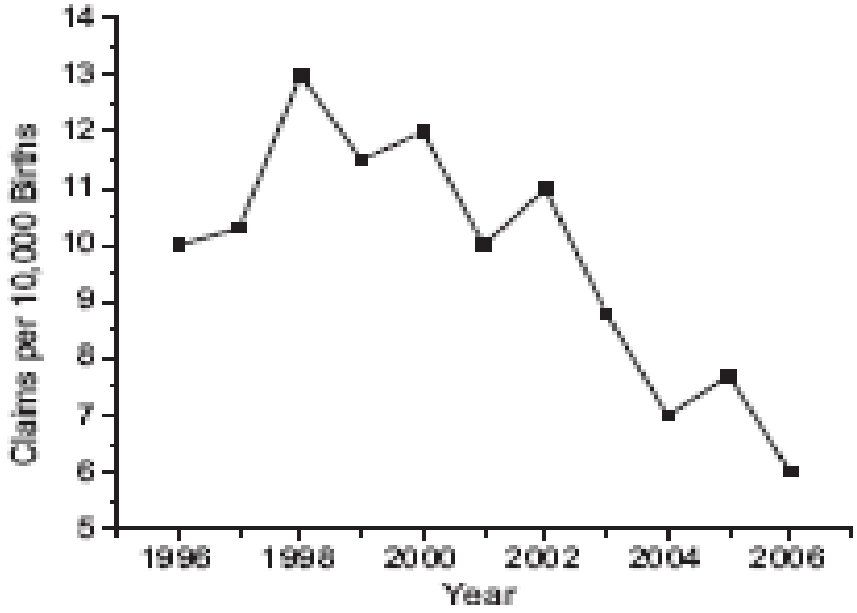
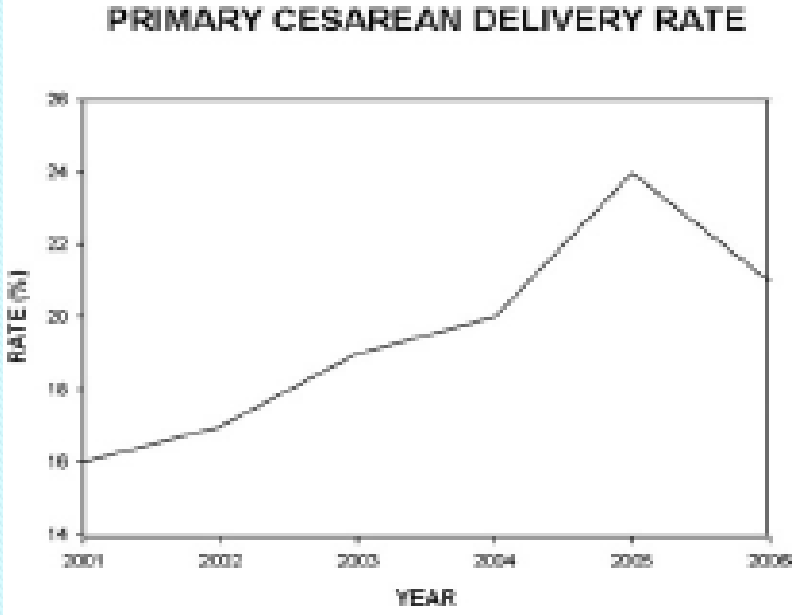


FIGURE 5

Trends in primary cesarean delivery rate



•For the first time in many years, the primary cesarean delivery rate in our system in 2006 fell significantly (p.001), despite the tolerance of a liberal general approach to operative delivery

•In our large system, this translates annually into the avoidance of tens of thousands of primary and future repeat cesarean deliveries.

Clark SL, et al. AJOG, 2008;199:105.e1-105.e7.

Decreasing Elective Deliveries Before 39 Weeks of Gestation in an Integrated Health Care System

Bryan T. Oshiro, MD, Erick Henry, MPH, Janie Wilson, RN, D. Ware Branch, MD, and Michael W. Varner, MD, for the Women and Newborn Clinical Integration Program

OBJECTIVE: The American College of Obstetricians and Gynecologists has recommended that elective deliveries not be performed before 39 weeks of gestation, to minimize prematurity-related neonatal complications. Because a worrisome number of elective deliveries were occurring before 39 weeks of gestation in our system, we developed and implemented a program to decrease the number of these early term elective deliveries. Secondary objectives were to monitor relevant clinical outcomes.

METHODS: The electronic medical records of an integrated health care system involving nine labor and delivery units in Utah were queried to establish the incidence of patients admitted for elective induction of labor or planned elective cesarean delivery. These facilities have open staff models with obstetricians, family practitioners, and certified nurse midwives. Guidelines were developed and implemented to discourage early term elective deliveries. The prevalence of early term elective deliveries was tracked and reported back regularly to the obstetric leadership and obstetric departments at each facility.

RESULTS: The baseline prevalence of early term elective deliveries was 28% of all elective deliveries before the initiation of the program. Within 6 months of initiating the program, the incidence of near-term elective deliveries decreased to less than 10% and after 6 years continues to be less than 3%. A reduced length of stay in labor and delivery occurred with the introduction of the program, and there were no adverse effects on secondary clinical outcomes.

CONCLUSION: With institutional commitment, it is possible to substantially reduce and sustain a decline in the incidence of elective deliveries before 39 weeks of gestation.

(Obstet Gynecol 2009;113:804–11)

LEVEL OF EVIDENCE: III

Induction of labor in the United States has more than doubled as a proportion of all births, from 9% if 1989 to 21% in 2002, with a sharper increase in elective than in medically indicated inductions.[1] The induction rate in Utah has also increased and has been higher than that reported nationally.[2] Although these birth certificate data could not distinguish between elective and indicated induction of labor, they did show that women who had labor induced were also likely to deliver on weekdays (Monday through Friday) compared with the weekend and during the day and early evening hours compared with women who did not have their labors induced, raising the possibility that many of these inductions were performed for reasons of convenience.[2] Similarly, an evaluation of deliveries in the State of New York indicated that a quarter of their induced deliveries lacked documentation of a medical indication.[3] Also, the delivery of infants between 37 and 38 weeks of gestation has increased over the past decade and now accounts for approximately 17.5% of live births in the United States.[4,5]

It is known that perinatal morbidity is higher in infants delivered before 39 weeks of gestation, with cesarean delivery being an independent risk factor for increased respiratory morbidity at term.[6–16] A retrospective analysis of 179,701 births showed that the

From the Women & Newborn Clinical Integration Program, Intermountain Healthcare, Salt Lake City, Utah; Department of Obstetrics and Gynecology, University of Utah, Salt Lake City, Utah; and Department of Obstetrics and Gynecology, Loma Linda University, Loma Linda, California.

Presented at the annual meeting of the Central Association for Obstetricians and Gynecologists, Washington, DC, October 13–16, 2004.

Corresponding author: Bryan T. Oshiro, MD, Department of Obstetrics and Gynecology, Section of Maternal-Fetal Medicine, Loma Linda University School of Medicine, 11234 Anderson Street, Suite 3400, Loma Linda, CA 92354; e-mail: boshiro@llu.edu.

Financial Disclosure

The authors did not report any potential conflicts of interest.

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- **CONCLUSION:**

  With institutional commitment, it is possible to substantially reduce and sustain a decline in the incidence of elective deliveries before 39 weeks of gestation.

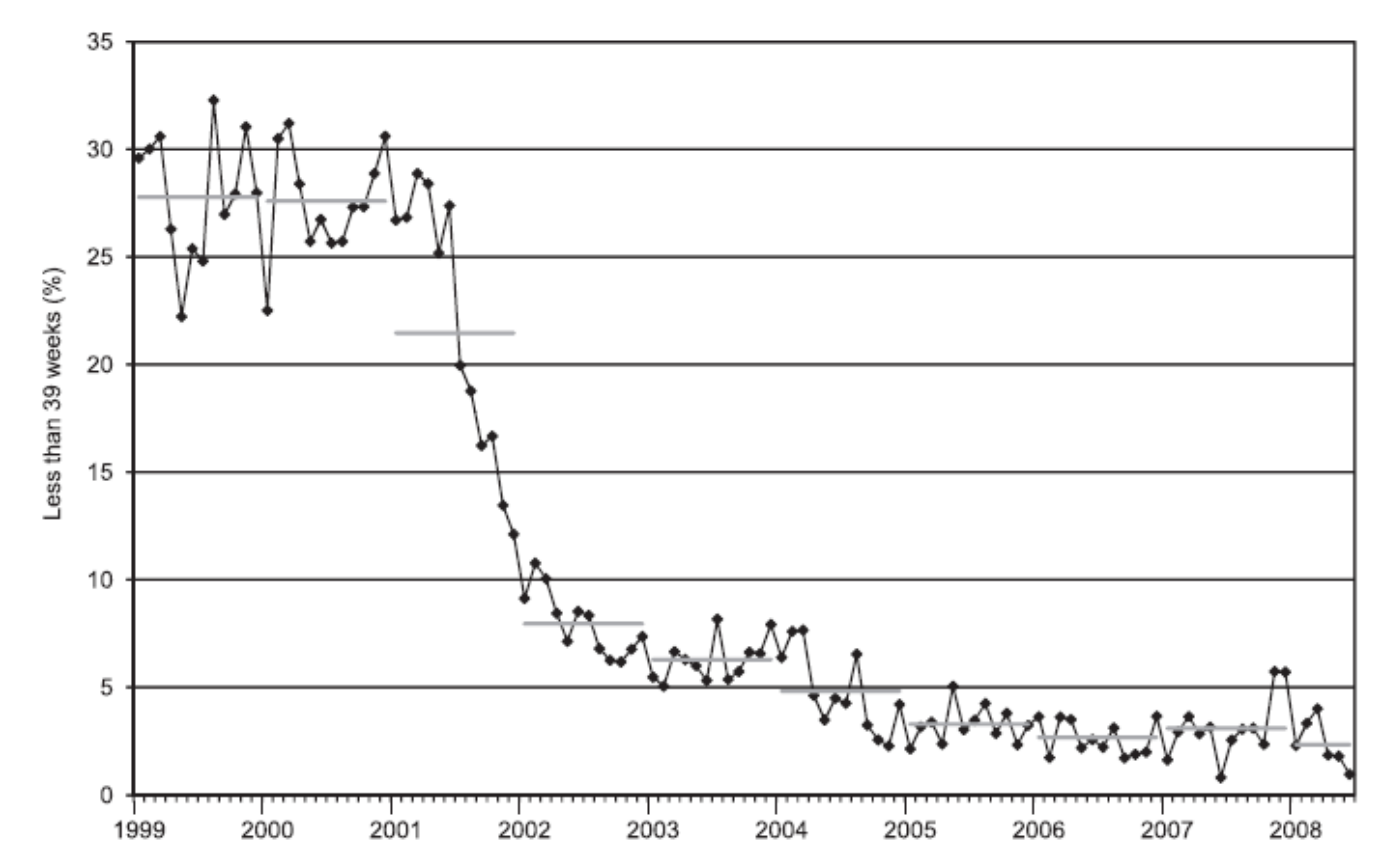
Intermountain Healthcare's Experience

- Intermountain Healthcare is a vertically integrated healthcare system that operates 21 hospitals in Utah and southeast Idaho and delivers approximately 30,000 babies annually.
- Computerized L&D system.
- MFMs hired by system, but OBs are independent.
- January 2001-- 9 urban facilities participated in a process improvement program for elective deliveries.
- 28% of elective deliveries were occurring before 39 completed weeks of gestation

Oshiro, B. et al. Obstet Gynecol 2009;113:804-811.

Intermountain Healthcare
Healing for life®

Percent of Non-medically Indicated Deliveries <39 Weeks, January 1999 – December 2005



Oshiro, B. et al. Obstet Gynecol 2009;113:804-811.

Intermountain Healthcare
Healing for life®

Stillbirths Before and After Implementation of Guidelines at Intermountain Healthcare

1999-2000				July 2001 to June 2006				
Weeks of Gestation	Stillbirths	Deliveries	%	Stillbirths	Deliveries	%	Odds Ratio	95% CI
37	17	4,117	0.41	22	13,077	0.17	0.406	0.22-0.77
38	19	9,954	0.19	21	28,209	0.07	0.390	0.21-0.72
39	10	13,752	0.07	28	51,721	0.05	0.744	0.36-1.53
40	10	7,925	0.13	14	24,140	0.06	0.459	0.20-1.03
41	2	1,938	0.10	3	5,571	0.05	0.522	0.09-3.12
All	58	37,686	0.15	88	122,718	0.07	0.466	0.33-0.65

Oshiro, B. et al. Obstet Gynecol 2009;113:804-811.

Lessons Learned from the Intermountain Healthcare Experience

- Education provided to obstetricians regarding ACOG guidelines, best practice.
- Little change until physicians were held accountable, nurses were empowered, and guidelines were enforced.
- Medical leadership important.

Intermountain Healthcare
Healing for life®

Ohio Perinatal Quality Collaborative

- Reduce inappropriate scheduled deliveries at $36^{0/7}$ to $38^{6/7}$ weeks
- 20 maternity hospitals
- 18,384 births in this gestational window in the 14-month study period
- Of these, 4,780 were scheduled deliveries (26% of the $36^{0/7}$ to $38^{6/7}$ week population)
- www.OPQC.net

Am J Obstet Gynecol 2010; 202:243.e1-243.e8

OPQC
Ohio Perinatal Quality Collaborative

Goal: *Assure that all initiation of labor or caesarean sections on women who are not in labor occur only when obstetrically or medically indicated*

Project Aim: ***In one year, reduce by 60%,*** *the number of women in Ohio of 36.1 to 38.6 weeks gestation for whom initiation of labor or caesarean section is done in absence of appropriate medical or obstetric indication* ***(Scheduled delivery)***

Key Drivers

Awareness of risks & expected benefits of LPTB delivery by patients and consumers

Dating criteria: optimal estimation of gestational age

Hospital and physician practice policies that facilitate ACOG criteria

Awareness of risks & expected benefit of near-term delivery by clinician

Culture of safety and improvement

Interventions

Inform consumers of risk/benefits of deliveries < 39 weeks
Communicate to patient/clinic/hospital ultrasound results
Promote need for early dating to practitioners and consumers
Public awareness campaign

Promote need for early dating to practitioners and consumers
Promote sonography < 20 weeks to establish dates
Document criteria used to establish EDC
Appropriate use of fetal maturity testing
Empower nurses /schedulers to require dating criteria
Identify a specific contact for authorization dispute re: dating
Provide patient with hard copy results of ultrasound

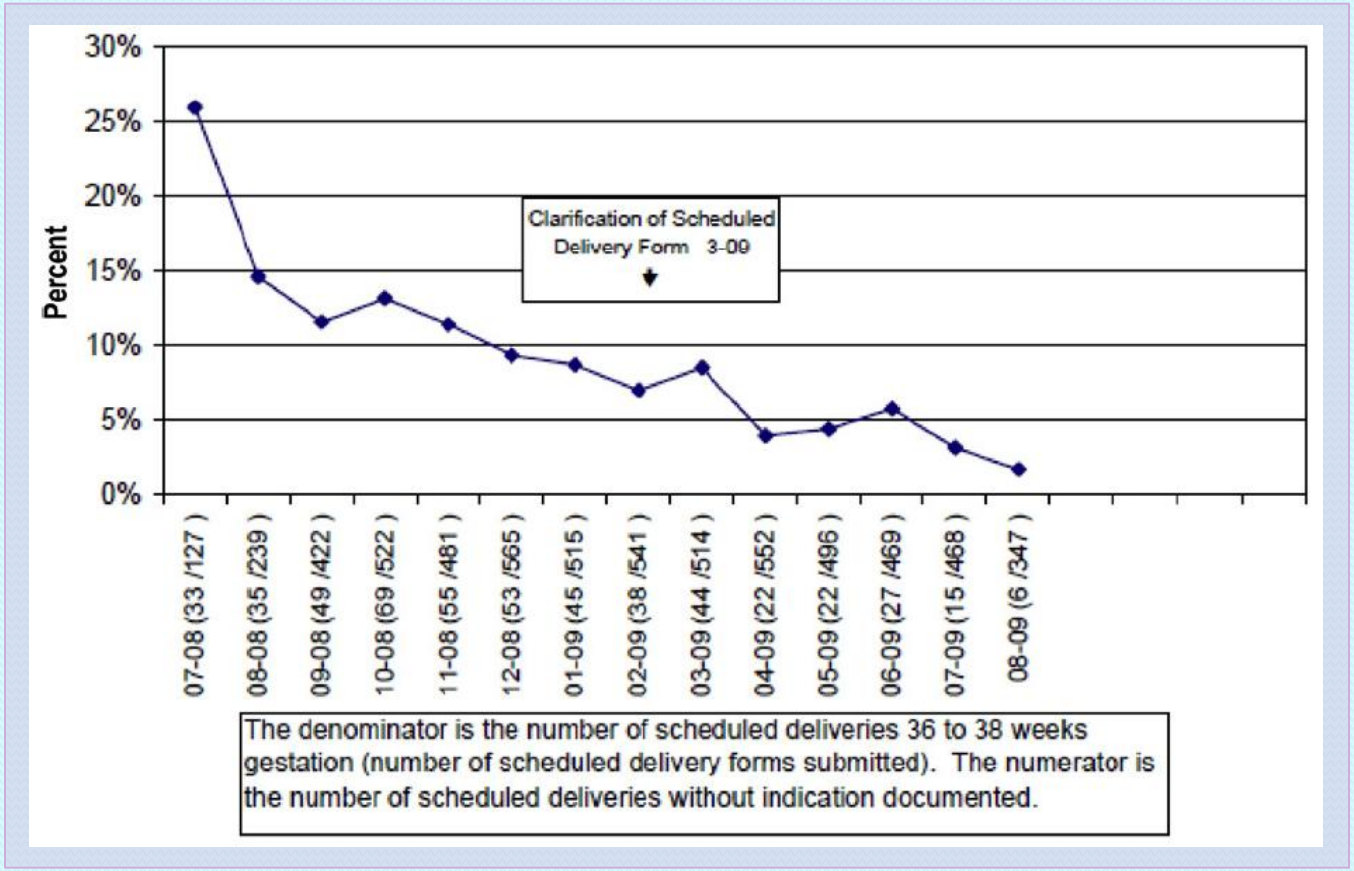
Empower nurses /schedulers to require dating criteria
Document rationale and risk/benefit for scheduled deliveries at 36.1 to 38.6 weeks gestation
Document discussion with patient about the above
Both patient and MD sign consent statement for scheduled delivery between 36.1 and 38.6 weeks
Physician awareness campaign: what are the reason(s) for scheduled delivery?
Maximize access to Delivery and OR for optimal scheduling
Facilitate scheduling policies that respect ACOG criteria

Prenatal caregivers receive feedback from postnatal caregivers about neonatal outcomes of scheduled deliveries
Ensure complete and accurate handoffs Ob/OB and Ob/Peds
Document discussion with patient about risk/benefits of near-term delivery
Promote need for early dating to practitioners and consumers

Continuous monitoring of data & discussion of this effort in staff/division meetings.
Project outcomes posted on units and websites.
Develop ways to include staff and physician input about communications and handoffs
Connect with organizational initiatives on safety and use existing approaches as possible
Empower nurses /schedulers to require dating criteria

OPQC Ohio Perinatal Quality Collaborative

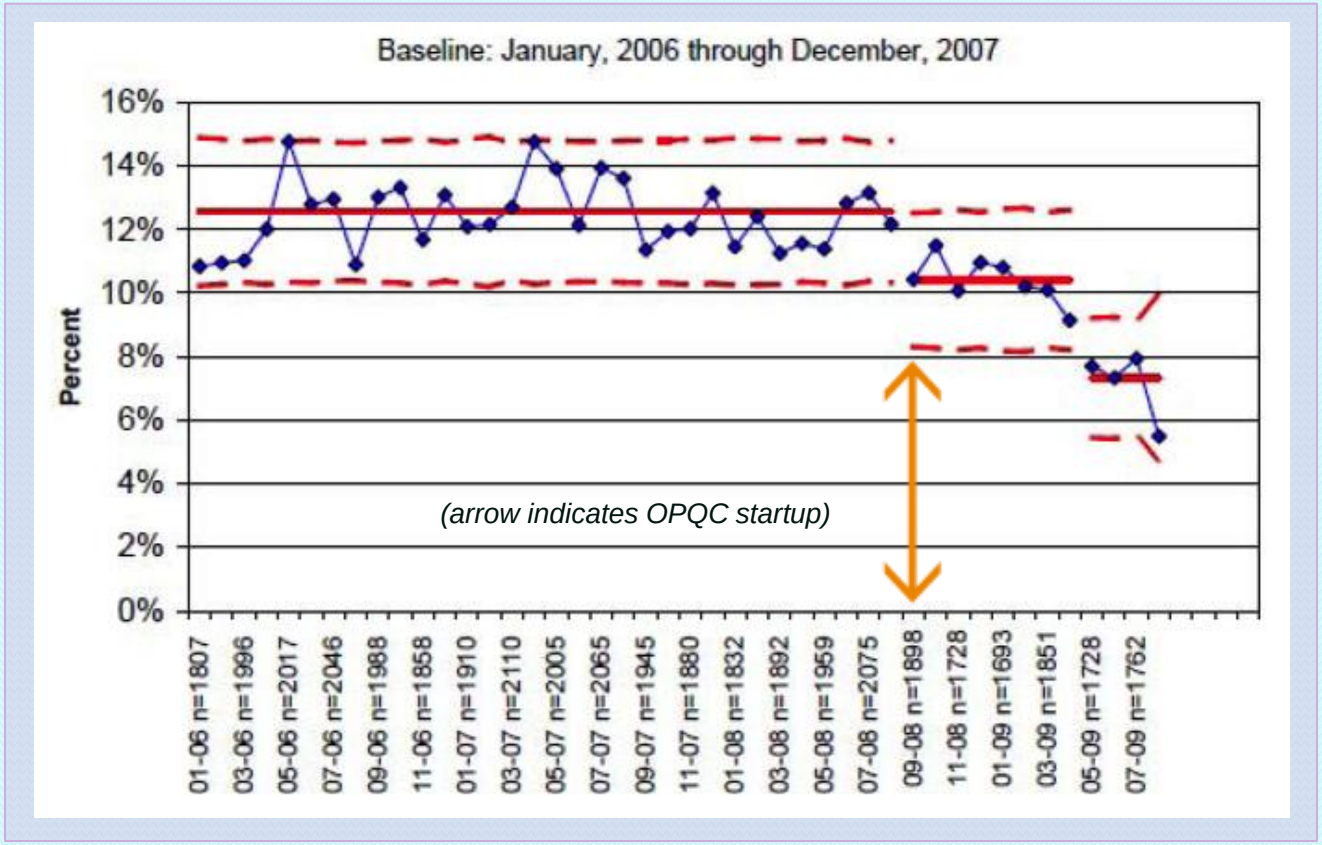
Fewer Births at $36^{0/7}$-$38^{6/7}$ Weeks Without Documented Medical or Obstetrical Indications



Am J Obstet Gynecol 2010; 202:243.e1-243.e8

OPQC Project

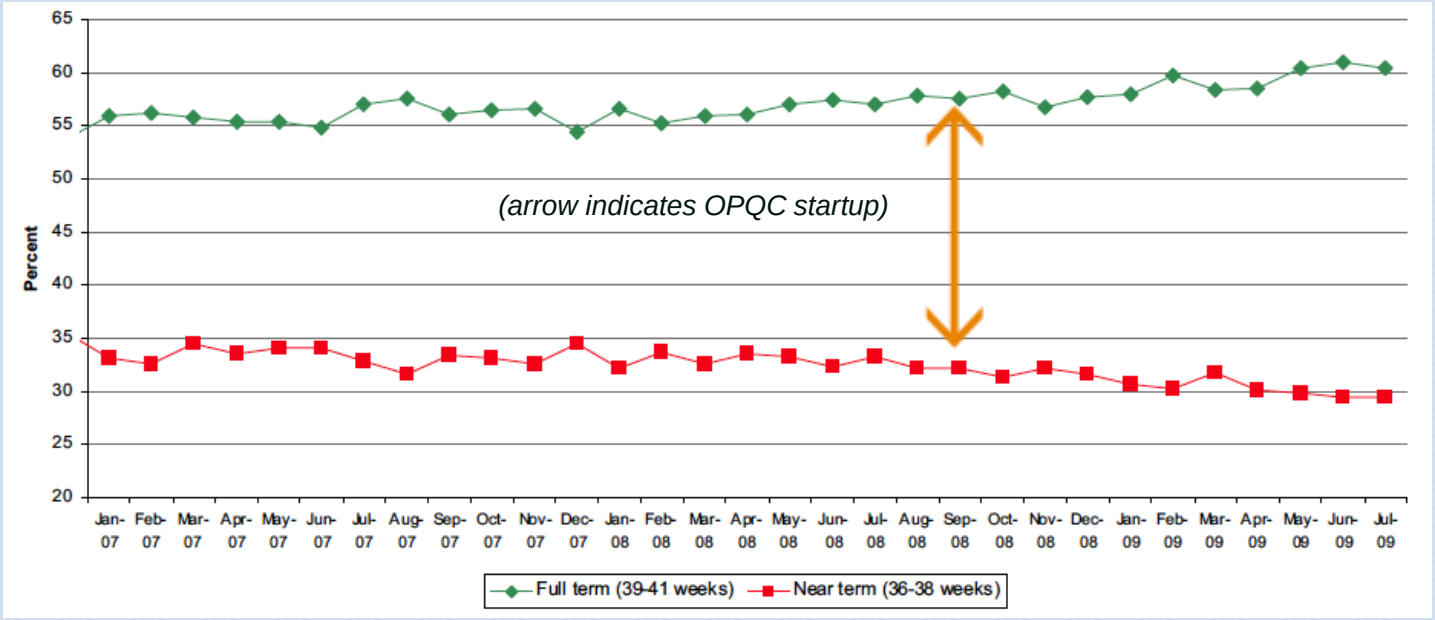
Fewer Births at $36^{0/7}$-$38^{6/7}$ Weeks Induced Without Medical or Obstetric Indication



Am J Obstet Gynecol 2010; 202:243.e1-243.e8

OPQC Project

Fewer Total Births at 36-38 Weeks (and More Births at 39-41 Weeks)



2% decrease in births 36-38 weeks and
2% increase in births 39-41 weeks; Approximately 1,000 births moved to >$39^{0/7}$

OPQC Project

Am J Obstet Gynecol 2010; 202:243.e1-243.e8

Future Projects

- Prematurity related
- Variation in current practice
- Existing practice guideline
- Measurable outcome
- Enthusiasm by participants

- Antenatal Steroids
- Care of P-PROM
- Progesterone
- Late Preterm 34-36
- Regionalization
- Breast Feeding
- MgSO4 prophylaxis
- Smoking
- Substance Abuse

…..a statewide improvement collaborative……

PQCNC Celebrates Success

- On August 31, 20 teams came together in Chapel Hill to celebrate the accomplishments of the 37 hospital teams that worked to achieve a 43% decrease in the rate of elective deliveries <39 weeks between October 2009 and June 2010.
- Hospitals shared strategies they have implemented over the past year to reach their goals of reducing elective deliveries <39 weeks.
- Teams reported that they have noticed less congestion in their L&D units as a result of fewer admissions for elective inductions.

- Hospitals have noted a decrease in NICU admissions and newborn complications.
- Several hospitals discussed the importance of having a peer review mechanism in place to address deliveries performed before 39 weeks without clear medical indication.
- The data collected for this initiative also showed an increase in the presence of evidence in the chart to support medical indications for non-elective early deliveries, and an approximate 12% decrease in scheduled deliveries (both inductions and c-sections) at gestational ages between 36.0 and 38.6 weeks.

2010-11 PQCNC Project- SIVB

- SIVB: Supporting Intended Vaginal Birth, or "Support for Birth" maternal initiative
- Focuses on improving the rate of vaginal births among first-time mothers, women who come to labor and delivery intending to give birth vaginally but who may end up with a c-section, sometimes as a result of the failure to apply evidence-based, best practice care.

Standardizing Criteria for Scheduling Elective Labor Inductions

Abstract

Induction of labor has become routine practice in perinatal units across the United States, with rates reaching a high of 21.2% of births in 2003-2004. This article describes the process our institution used to standardize the criteria for scheduling inductions. Specifically, we aimed to increase the consistency in practice for scheduling and performing elective inductions, including mandating gestational age of 39 completed weeks, ensuring cervical ripeness, and disallowing the use of cervical ripening agents. The nurses' participation, from planning to implementation, was critical in the success of this evidence-based practice change.

Key Words: Induction of labor; Perinatal nursing; Standardization.

Laurel Durham, MPH, RN, Larry Veltman, MD, Peggy Davis, BSN, RN, Linda Ferguson, RNC, Margaret Hacker, BSN, RN, Debra Hooker, RN, Kristine Larison, MBA, RN, Jennifer Pribyl, BSN, RN, Karen Twilleager, BSN, RN, and Gretchen Van Hout, BSN, RN

Durham L, et al. MCN May/June 2008

Goals

- Increase patient flow through the unit
- Decrease the number of long inductions by disallowing elective inductions in women with an unfavorable cervix
- Better predict patient volume
- Staff the unit more appropriately
- Improve nursing satisfaction
- Have a clear definition of what constituted an elective induction
- Increase provider satisfaction by eliminating inappropriate inductions from the schedule, thereby increasing opportunities for suitable candidates to be induced

Conclusions

The program successfully addressed variations in elective induction criteria with a comprehensive interdisciplinary approach

Patient Education to Reduce Elective Inductions

- Elective induction rates of 3337 nulliparous women were evaluated over a 14 month period (1,694 - 7 months before adding content to a prepared childbirth class and 1,643 - 7 months after)
- Prior to changing the course content rates did not differ between the two groups, 35.2% vs 37.2%, p=.37
- After adding the standardized education those attending were significantly less likely to have an elective induction- 29.2% vs 37%, p<.001
- Whether the physician offered an elective induction was also a key factor- 43.2% of those offered had and elective induction vs 9.2% in those not offered an elective induction by a physician
- Patient education in prepared childbirth classes can make a difference in rates of elective inductions

Simpson KR, et al. Patient education to reduce elective inductions. 2010. MCN in Advance, Table 4.

Reasons Women Chose Elective Induction

	n	*(%)*
My physician said my baby was getting too big	219	(49.5)
My physician said I was due now or overdue	98	(22.2)
I wanted relief from pregnancy discomforts	51	(11.7)
I'm not sure why my labor was induced	30	(6.8)
I wanted to have my physician deliver my baby	20	(4.5)
I wanted to time the birth for personal reasons	17	(3.8)
Did not answer	7	(1.6)
TOTAL	442	(100)

Simpson KR, et al. Patient education to reduce elective inductions. 2010. MCN in Advance, Table 4.

ACOG COMMITTEE OPINION

Number 404 • April 2008

Late-Preterm Infants

Committee on Obstetric Practice

This Committee Opinion was developed with the assistance of William A. Engle, MD, Kay M. Tomashek, MD, Carol Wallman, MSN, and the American Academy of Pediatrics Committee on Fetus and Newborn.

ABSTRACT: *Late-preterm infants* (defined as infants born between 34⅐ weeks and 36⅙ weeks of gestation) often are mistakenly believed to be as physiologically and metabolically mature as term infants. However, compared with term infants, late-preterm infants are at higher risk than term infants of developing medical complications, resulting in higher rates of infant mortality, higher rates of morbidity before initial hospital discharge, and higher rates of hospital readmission in the first months of life. Preterm delivery should occur only when an accepted maternal or fetal indication for delivery exists. Collaborative counseling by both obstetric and neonatal clinicians about the outcomes of late-preterm births is warranted unless precluded by emergent conditions.

During the past decade, the proportion of all U.S. births that were *late-preterm births* (defined as birth between 34⅐ weeks and 36⅙ weeks of gestation) increased 16% (1). The rate of all *preterm births* (defined as birth at less than 37 weeks of gestation) in the United States increased from 10.9% in 1990 to

Summary

During the initial birth hospitalization, late-preterm infants are 4 times more likely than term infants to have at least 1 medical condition diagnosed and 3.5 times more likely to have 2 or more conditions diagnosed (6). Late-preterm

ACOG Committee Opinion # 404

Late Preterm Infants April 2008

- Late preterm infants often are mistakenly believed to be as physiologically and metabolically mature as term infants. However, compared with term infants, late–preterm infants are at higher risk than term infants of developing medical complications, resulting in higher rates of infant mortality, higher rates of morbidity before initial hospital discharge, and higher rates of hospital readmission in the first months of life.
- **Preterm delivery should occur only when an accepted maternal or fetal indication for delivery exists.**
- **Collaborative counseling by both obstetric and neonatal clinicians about the outcomes of late–preterm births is warranted unless precluded by emergent conditions.**

Statement developed jointly with AAP Committee on Fetus & Newborn

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 8, 2009 VOL. 360 NO. 2

Timing of Elective Repeat Cesarean Delivery at Term and Neonatal Outcomes

Alan T.N. Tita, M.D., Ph.D., Mark B. Landon, M.D., Catherine Y. Spong, M.D., Yinglei Lai, Ph.D., Kenneth J. Leveno, M.D., Michael W. Varner, M.D., Atef H. Moawad, M.D., Steve N. Caritis, M.D., Paul J. Meis, M.D., Ronald J. Wapner, M.D., Yoram Sorokin, M.D., Menachem Miodovnik, M.D., Marshall Carpenter, M.D., Alan M. Peaceman, M.D., Mary J. O'Sullivan, M.D., Baha M. Sibai, M.D., Oded Langer, M.D., John M. Thorp, M.D., Susan M. Ramin, M.D., and Brian M. Mercer, M.D., for the Eunice Kennedy Shriver NICHD Maternal–Fetal Medicine Units Network*

ABSTRACT

BACKGROUND

Because of increased rates of respiratory complications, elective cesarean delivery is discouraged before 39 weeks of gestation unless there is evidence of fetal lung maturity. We assessed associations between elective cesarean delivery at term (37 weeks of gestation or longer) but before 39 weeks of gestation and neonatal outcomes.

METHODS

We studied a cohort of consecutive patients undergoing repeat cesarean sections performed at 19 centers of the Eunice Kennedy Shriver National Institute of Child Health and Human Development Maternal–Fetal Medicine Units Network from 1999 through 2002. Women with viable singleton pregnancies delivered electively (i.e., before the onset of labor and without any recognized indications for delivery before 39 weeks of gestation) were included. The primary outcome was the composite of neonatal death and any of several adverse events, including respiratory complications, treated hypoglycemia, newborn sepsis, and admission to the neonatal intensive care unit (ICU).

RESULTS

Of 24,077 repeat cesarean deliveries at term, 13,258 were performed electively; of these, 35.8% were performed before 39 completed weeks of gestation (6.3% at 37 weeks and 29.5% at 38 weeks) and 49.1% at 39 weeks of gestation. One neonatal death occurred. As compared with births at 39 weeks, births at 37 weeks and at 38 weeks were associated with an increased risk of the primary outcome (adjusted odds ratio for births at 37 weeks, 2.1; 95% confidence interval [CI], 1.7 to 2.5; adjusted odds ratio for births at 38 weeks, 1.5; 95% CI, 1.3 to 1.7; P for trend <0.001). The rates of adverse respiratory outcomes, mechanical ventilation, newborn sepsis, hypoglycemia, admission to the neonatal ICU, and hospitalization for 5 days or more were increased by a factor of 1.8 to 4.2 for births at 37 weeks and 1.3 to 2.1 for births at 38 weeks.

CONCLUSIONS

Elective repeat cesarean delivery before 39 weeks of gestation is common and is associated with respiratory and other adverse neonatal outcomes.

From the University of Alabama at Birmingham, Birmingham (A.T.N.T.); Ohio State University, Columbus (M.B.L.); Eunice Kennedy Shriver National Institute of Child Health and Human Development, Bethesda, MD (C.Y.S.); George Washington University Biostatistics Center, Washington, DC (Y.L.); the University of Texas Southwestern Medical Center, Dallas (K.J.L.); University of Utah, Salt Lake City (M.W.V.); University of Chicago, Chicago (A.H.M.); University of Pittsburgh, Pittsburgh (S.N.C.); Wake Forest University School of Medicine, Winston-Salem, NC (P.J.M.); Thomas Jefferson University, Philadelphia (R.J.W.); Wayne State University, Detroit (Y.S.); University of Cincinnati, Cincinnati, and Columbia University, New York (M.M.); Brown University, Providence, RI (M.C.); Northwestern University, Chicago (A.M.P.); University of Miami, Miami (M.J.O.); University of Tennessee, Memphis (B.M.S.); University of Texas Health Science Center, San Antonio (O.L.); the University of North Carolina, Chapel Hill (J.M.T.); University of Texas Health Science Center, Houston (S.M.R.); and Case Western Reserve University, Cleveland (B.M.M.). Address reprint requests to Dr. Tita at the Department of Obstetrics and Gynecology, Division of Maternal–Fetal Medicine, University of Alabama at Birmingham, 619 19th St. South, Birmingham, AL 35249, or at alan.tita@obgyn.uab.edu.

*The other members of the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Maternal–Fetal Medicine Units Network are listed in the Appendix.

N Engl J Med 2009;360:111-20.

Elective cesarean delivery before 39 weeks is common and associated with respiratory and other adverse neonatal outcomes.

Early term- 37-38 weeks

ACOG PRACTICE BULLETIN

CLINICAL MANAGEMENT GUIDELINES FOR OBSTETRICIAN–GYNECOLOGISTS

NUMBER 107, AUGUST 2009

Replaces Practice Bulletin Number 10, November 1999; Committee Opinion Number 228, November 1999; Committee Opinion Number 248, December 2000; Committee Opinion Number 283, May 2003

Induction of Labor

This Practice Bulletin was developed by the ACOG Committee on Practice Bulletins—Obstetrics with the assistance of Mildred Ramirez, MD, and Susan Ramin, MD. The information is designed to aid practitioners in making decisions about appropriate obstetric and gynecologic care. These guidelines should not be construed as dictating an exclusive course of treatment or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to the institution or type of practice.

More than 22% of all gravid women undergo induction of labor in the United States, and the overall rate of induction of labor in the United States has more than doubled since 1990 to 225 per 1,000 live births in 2006 (1). The goal of induction of labor is to achieve vaginal delivery by stimulating uterine contractions before the spontaneous onset of labor. Generally, induction of labor has merit as a therapeutic option when the benefits of expeditious delivery outweigh the risks of continuing the pregnancy. The benefits of labor induction must be weighed against the potential maternal and fetal risks associated with this procedure (2). The purpose of this document is to review current methods for cervical ripening and induction of labor and to summarize the effectiveness of these approaches based on appropriately conducted outcomes-based research. These practice guidelines classify the indications for and contraindications to induction of labor, describe the various agents used for cervical ripening, cite methods used to induce labor, and outline the requirements for the safe clinical use of the various methods of inducing labor.

ACOG Practice Bulletin # 107
Induction of Labor August 2009

Labor also may be induced for logistic reasons, for example, risk of rapid labor, distance from hospital, or psychosocial indications. In such circumstances, at least one of the gestational age criteria in the box should be met, or fetal lung maturity should be established. A mature fetal lung test result before 39 weeks of gestation, in the absence of appropriate clinical circumstances, is not an indication for delivery.

Healthy Babies ARE WORTH THE WAIT™

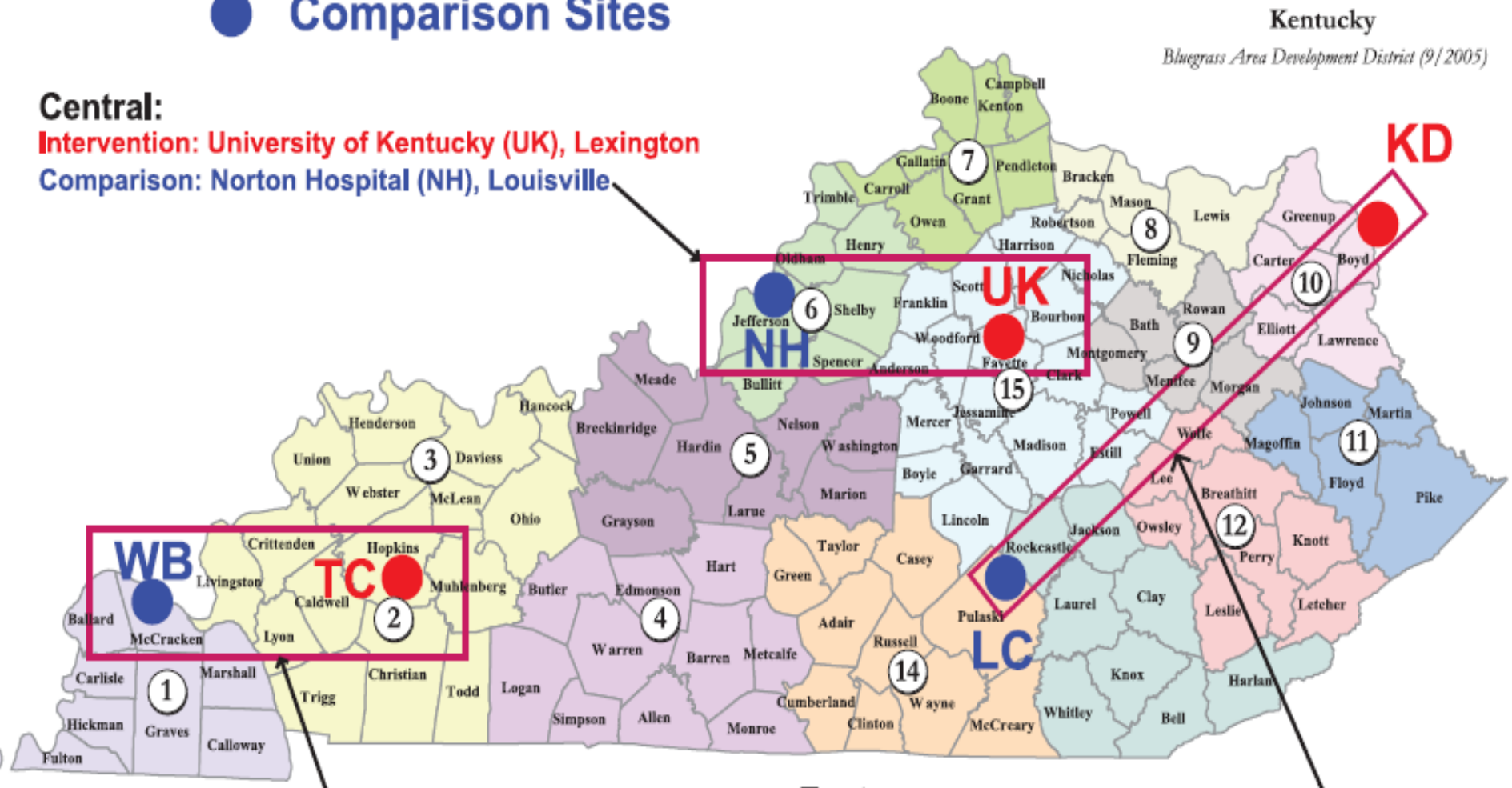
A Prematurity Prevention Partnership

- Partnership among March of Dimes, Johnson & Johnson Pediatric Institute, and Kentucky Department for Public Health
- 3 year mixed ecological, “real world” design
- Sites: 3 intervention and 3 comparison sites in eastern, central and western Kentucky
- Goal: 15% reduction in the rate of singleton preterm births in targeted sites in Kentucky
- Targets preventing “preventable” preterm birth with a focus on late preterm birth prevention and awareness
- Power analysis indicated a needed sample size ~12,000 live births

Healthy Babies are Worth the Wait SM: Hospital Sites

● Intervention Sites

● Comparison Sites



Central:

Intervention: University of Kentucky (UK), Lexington

Comparison: Norton Hospital (NH), Louisville

West:

Intervention: Trover Clinic (TC), Madisonville RMC

Comparison: Western Baptist Hospital (WB), Paducah

East:

Intervention: King's Daughters (KD), Ashland, KY

Comparison: Lake Cumberland RH (LC), Somerset, KY

Healthy Babies are Worth the Wait Interventions

- "Bundled" Evidence-Based Interventions
- Linked elements of clinical care, public health and consumer education:

- Consumer Awareness and Education
  - Health literacy in context of prenatal care
  - Community outreach
- Professional Continuing Education
  - Grand Rounds & Training
- Public Health Intervention
  - Augmenting existing services for case management, screening & referral
- Clinical Intervention in Prenatal Period
  - Standard clinical guidelines (folic acid, smoking cessation, progesterone)
  - Centering pregnancy
  - Patient safety protocols

Healthy Babies
ARE WORTH THE WAIT®

Learn About Prematurity/Preterm Birth | Make a Difference in Your Community | About Our Initiative | For Health Care Professionals | For the Press

HEALTH TIP OF THE MONTH

Preterm labor can happen to any pregnant woman. Ask your healthcare provider about the signs and symptoms of going into labor too soon and about what you can do to reduce your risk.

Welcome to the official website of

Healthy Babies Are Worth the Wait

Our goal is to reduce the high rates of premature birth in Kentucky.

Prematurity is the number one cause of newborn infant death. In the U.S., about 1 in 8 babies are born prematurely (before 37 weeks), and in Kentucky 1 out of 7 babies are delivered early. Premature babies are more likely to have serious life-long problems than babies born full term. Even babies born just a few weeks early or *late preterm* (between 34 and 37 weeks) can develop serious problems, as their brains are not fully developed.

WHAT'S NEW?

www.prematurityprevention.org

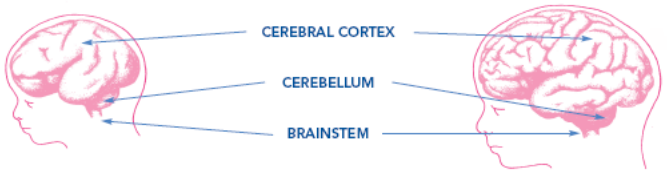
Every Week Counts

New information about your pregnancy including the last few weeks

Healthy Babies are Worth the Wait℠

Brain Growth Matters

The brain of a 35 week-old baby is smaller and much less developed than the brain of a baby at 40 weeks.



35 WEEK BRAIN	BRAIN	40 WEEK BRAIN
• Smooth, less developed; fewer circuits and connections	• **CEREBRAL CORTEX:** site of thinking, reason, learning, motor control, language	• More developed, more circuits and connections
• Small, only about 2/3 of the size it will be at term	• **CEREBELLUM:** where the brain controls balance & coordination, social functioning, hand skills	• Grows and develops to almost double the size from 34 weeks
• Underdeveloped shows up as babies who have apnea – forget to breathe at times	• **BRAINSTEM:** lowest part of the brain where automatic actions of the body are controlled, like breathing, temperature, swallowing	• More developed – babies born at 40 weeks rarely forget to breathe.

Healthy Babies ARE WORTH THE WAIT℠

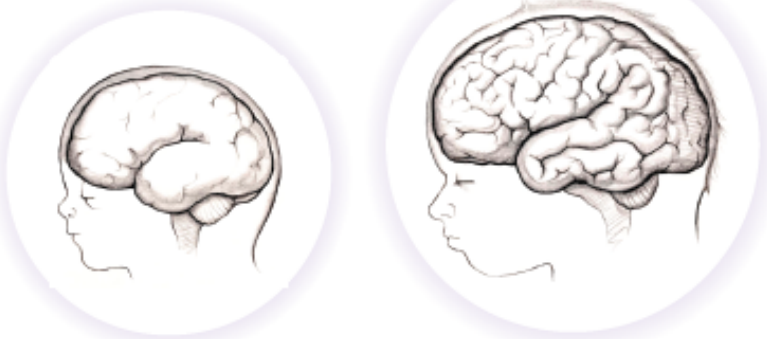
Facts About the Importance of Going to Full Term

- At 35 weeks of pregnancy, your baby's brain weighs only 2/3 of what it will weigh at term, which is about 40 weeks.
- During your last few weeks of pregnancy, your baby's brain grows a lot and adds new connections that are important for thinking, muscle control, talking, and learning.
- New research also shows that babies born just a few weeks early may have learning and behavior problems.
- During the last few weeks of pregnancy, the part of the brain that controls balance, coordination, and social functioning grows and matures and almost doubles in size.
- Babies born just a few weeks early are also more likely to have apnea (they sometimes "forget to breathe") and they are more likely to die of SIDS ("Sudden Infant Death Syndrome").
- Babies born early are much more likely to have problems feeding since the sucking, swallowing, and breathing coordination is not yet well developed.

For all of these and many other reasons, unless you or your baby have problems, it's best for your baby to be born around 40 weeks.

If your pregnancy is healthy, it's best if your baby is born at 40 weeks.

A baby's brain at 35 weeks weighs only two-thirds of what it will weigh at 40 weeks.



35 weeks

40 weeks

march of dimes
pregnancy & newborn health education center

marchofdimes.com

- In the last six weeks of pregnancy, your baby's brain adds connections needed for balance, coordination, learning and social functioning. During this time, the size of your baby's brain almost doubles.
- Babies born early have more learning and behavior problems in childhood than babies born at 40 weeks.
- Babies born early are more likely to have feeding problems because they can't coordinate sucking, swallowing and breathing as well as full-term babies.
- Babies born early are likely to have breathing problems, like apnea. Apnea is when a baby stops breathing.
- Babies born early are more likely to die of sudden infant death syndrome (SIDS). SIDS is when a baby dies suddenly and unexpectedly, often during sleep.

To order our catalog or multiple copies of our materials, call 1-800-367-6630.
#37-2229-07 Late Preterm Brain Development Card 1/08

If your pregnancy is healthy, it's best if your baby is born at 40 weeks.

A baby's brain at 35 weeks weighs only two-thirds of what it will weigh at 40 weeks.

- In the last six weeks of pregnancy, your baby's brain adds connections needed for balance, coordination, learning and social functioning. During this time, the size of your baby's brain almost doubles.
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Source: March of Dimes Foundation

The Toledo Hospital offers comprehensive pregnancy and parenting education through our Preparation for Parenthood department. For information, please call 419-291-5666.

The Toledo Hospital

Member of ProMedica Health System

HBWW Consumer Surveys

- HBWW conducted various surveys mainly at baseline (2007) and follow-up (2009) to collect data for program evaluation and analysis
- Consumer surveys were designed to capture KAB related to pregnancy and childbirth, and specifically to preterm birth (PTB), late PTB, and modifiable risk and protective factors for PTB (smoking, alcohol use, folic acid, progesterone to prevent recurrent PTB, elective inductions, and elective cesarean delivery
  - limitations with these voluntary, anonymous surveys are acknowledged
- A total of 1,066 baseline consumer surveys and 1,122 follow-up consumer surveys were included in the summative analyses

Consumer Survey: Exposure to HBWW

Consumers' HBWW Exposure

	Follow-up Survey, N=1,122		
	IS (N=598)	CS (N=524)	IS vs. CS (p-value)
(1) Heard of HBWW	34.5% *(Missing: 6.0%)*	7.9% *(Missing: 5.3%)*	$p < 0.01$*
(2) Seen brain card	22.9% *(Missing: 3.7%)*	12.7% *(Missing: 5.0%)*	$p < 0.01$*
(3) Received at least 1 of 6 indicated items w/ HBWW or HBWW website on it[1]	47.2% *(Missing: 23.8%)*	8.4% *(Missing: 24.8%)*	$p < 0.01$*
(4) Ever used HBWW website	2.9% *(Missing: 6.5%)*	0.8% *(Missing: 7.4%)*	N/A[2]

Consumer Survey: Selected Non-Behavioral Outcomes*

	Baseline (N=1,066)		Follow-up (N=1,122)		Direction of change (pre to post)
	Intervention (N=765)	**Comparison (N=301)**	**Intervention (N=598)**	**Comparison (N=524)**	
How serious a prob. PTB is in community	Serious 37.9% Not serious 7.3% Not sure 54.7%	Serious 35.7% Not serious 8.1% Not sure 56.2%	Serious 49.3% Not serious 4.9% Not sure 45.7%	Serious 42.5% Not serious 9.3% Not sure 48.3%	*Serious:* Inter: +30.1% Comp: +19.0%
	Difference I vs. C not significant		*Difference I vs. C significant*		

* Missing values were ≤ 5.0% and were excluded from the analyses. Significance was set at p ≤ .05.

Consumer Survey: Selected Service Related Outcomes

Consumer Survey Discussion of Services, Use of Services, and Need for Services in Current Pregnancy

	Follow-up Survey (N=1,122)		
	IS (N=598)	**CS (N=524)**	**IS vs. CS (p-value)**
(1) # PNC visits at time completed survey	**Mean 5.9, SD 4.5** ***(Missing: 17.9%)***	**Mean 6.5, SD 4.5** ***(Missing: 16.4%)***	p = 0.04*
(2) Provider talked about KY Quitline	**17.9%** ***(Missing: 10.5%)***	**10.1%** ***(Missing: 9.2%)***	p < 0.01*
(3) Provider talked about HANDS	**30.2%** ***(Missing: 8.2%)***	**14.6%** ***(Missing: 8.4%)***	p < 0.01*
(4) Provider talked about DV services	**18.4%** ***(Missing: 9.9%)***	**9.3%** ***(Missing: 9.7%)***	p < 0.01*
(5) Provider talked about dental services	**29.5%** ***(Missing: 9.9%)***	**12.9%** ***(Missing: 9.7%)***	p < 0.01*

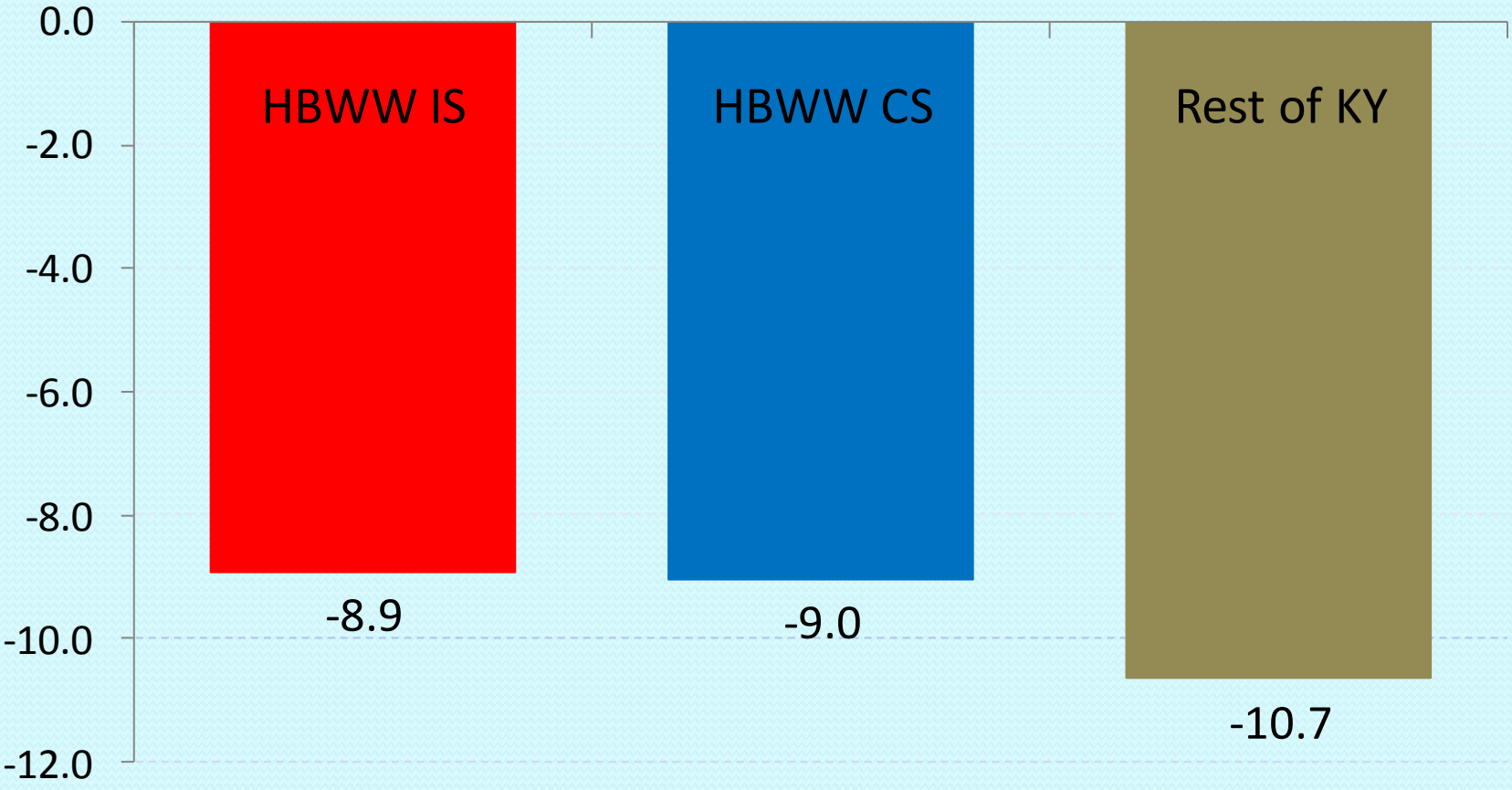
Follow-Up Provider Survey: HBWW Exposure, All Providers*

	All providers, N=192	
	Intervention (N=97)	Comparison (N=95)
Heard of HBWW	**Yes 91.4%**	**Yes 43.5%**
	Difference I vs. C significant	
Used HBWW materials (at least 1 of 8)**	**Yes 69.9%**	**Yes 11.3%**
	Difference I vs. C significant	

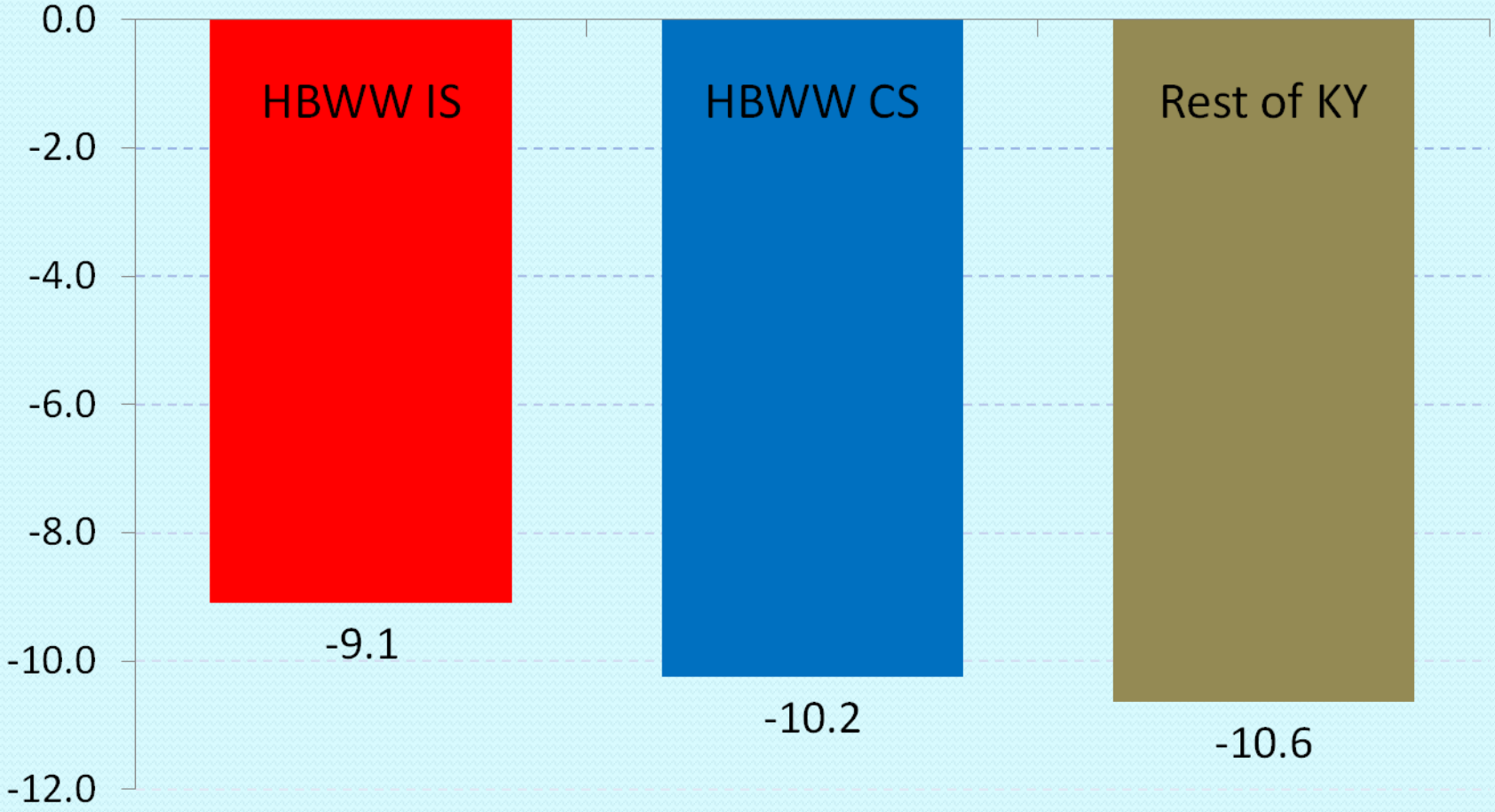
* Miissing values were excluded from the analyses. Unless otherwise noted, missing values were < 5.0%. Significance was set at p ≤ .05.

** Missing values for I and for C exceeded 10.0%, but including vs. excluding them did not affect direction or statistical significance of findings.

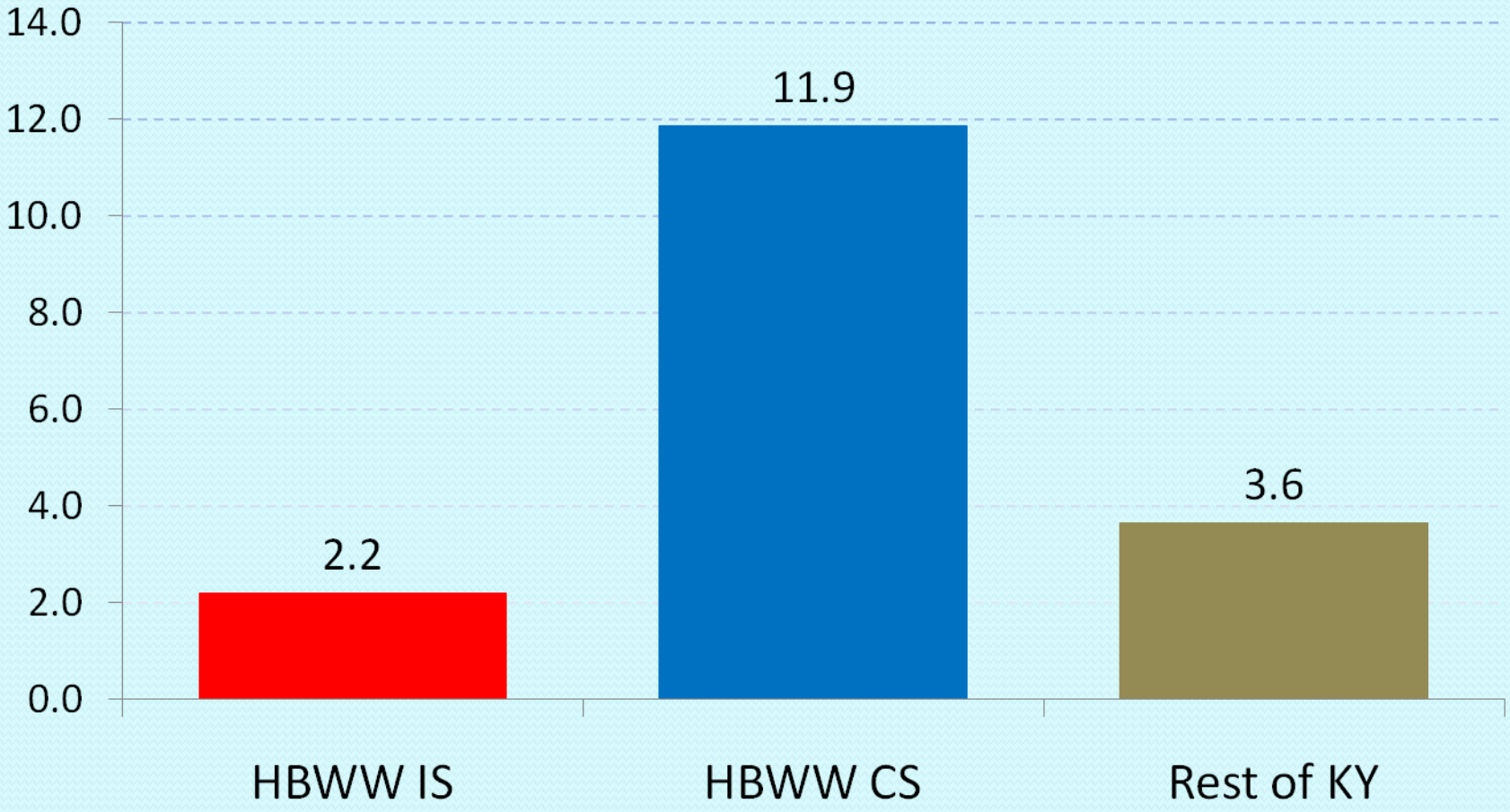
Percent Change in Preterm Rates Baseline to Jul-Dec 2009 HBWW Intervention and Comparison Sites, and Rest of KY



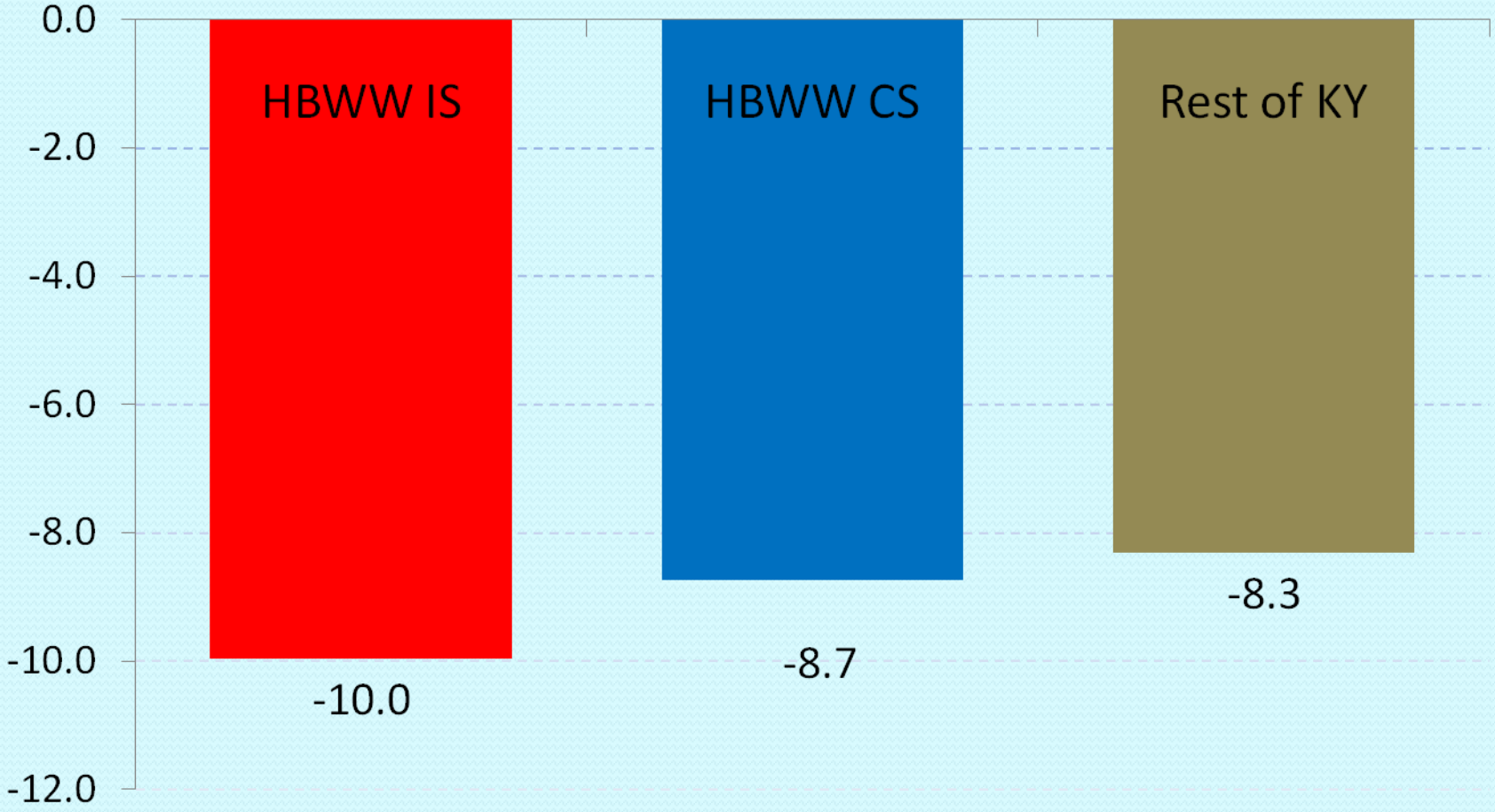
Percent Change Late Preterm Rates Baseline to Jul-Dec 2009 HBWW Intervention and Comparison Sites, and Rest of KY



Percent Change in C-Section Rates Baselineto Jul-Dec 2009 HBWW Intervention and Comparison Sites, and Rest of KY



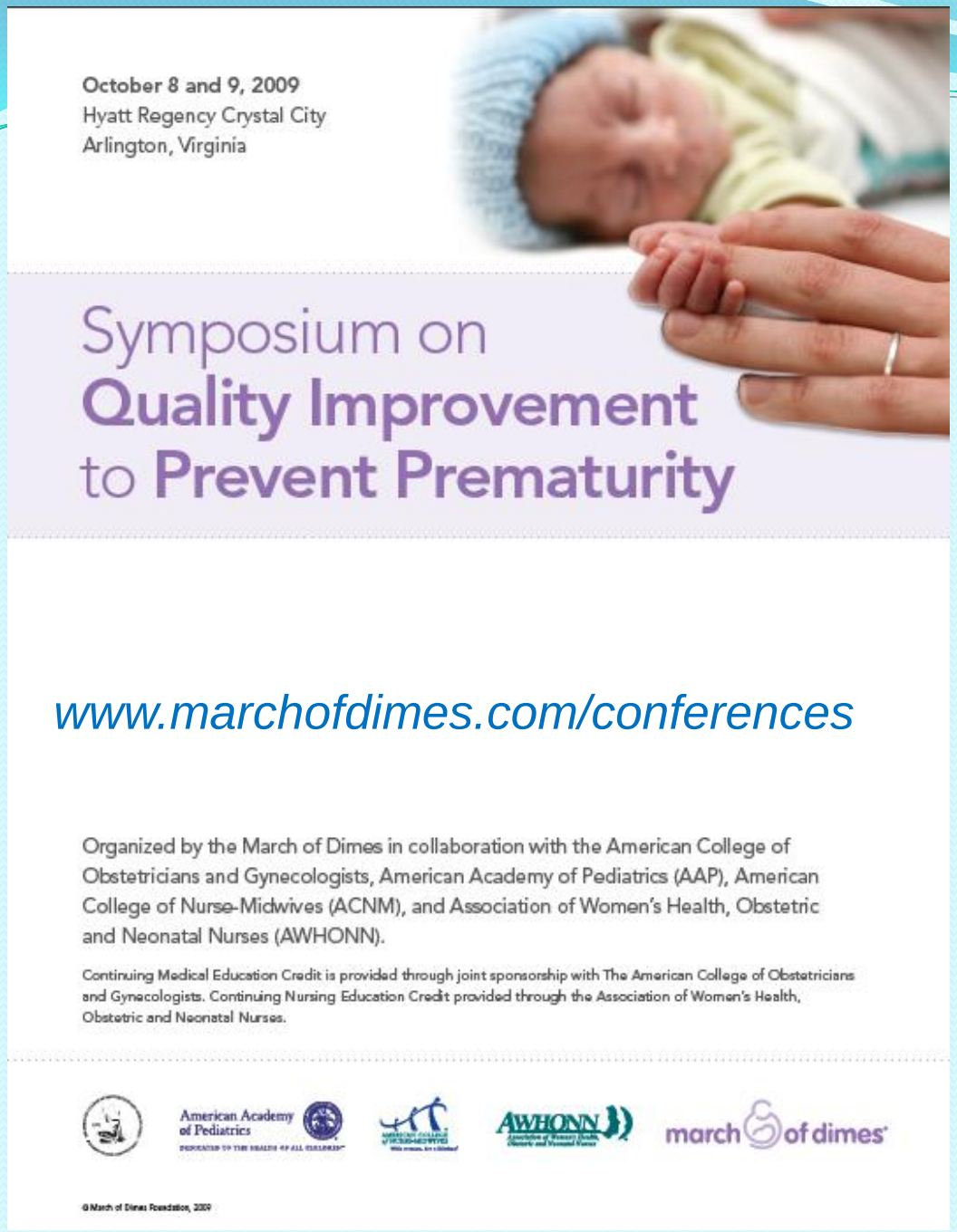
Percent Change in Smoking Rates Baseline to Jul-Dec 2009 HBWW Intervention and Comparison Sites, and Rest of KY



Percent Change in Preterm Birth & Late Preterm Birth Rates for 2004-2006 & 2007-2008 in US, KY and Contiguous States

	Preterm Birth Rates						Late Preterm Birth Rates					
	2004	2006	% Change 2004-6	2007	2008	% Change 2007-8	2004	2006	% Change 2004-6	2007	2008	% Change 2007-8
US	12.5	12.8	2.4	12.7	12.3	-3.1	8.9	9.1	2.2	9	8.8	-2.2
KY	14.4	15.1	4.9	15.2	14	-7.9	10.2	10.9	6.9	11	10.2	-7.3
TN	14.5	14.8	2.1	14.2	13.5	-4.9	10.2	10.3	1	10	9.7	-3
VA	12.1	12	-0.8	12.1	11.3	-6.6	8.7	8.6	-1.1	8.6	8.1	-5.8
WV	14	14	0	13.9	13.7	-1.4	10.3	10.3	0	9.9	10	1
OH	12.5	13.3	6.4	13.2	12.6	-4.5	8.9	9.4	5.6	9.2	8.7	-5.4
IN	13.2	13.2	0	12.9	12.4	-3.9	9.4	9.5	1.1	9.3	8.9	-4.3
IL	13.1	13.3	1.5	13.1	12.7	-3.1	9.1	9.3	2.2	9.1	8.9	-2.2

Source: NCHS, 2004 – 2006 final birth data, 2007 – 2008 preliminary birth data



Towards Improving the Outcomes of Pregnancy III

Winter 2010

march of dimes

fight for preemies

learn do give

ABOUT PREMATURITY

FOR WOMEN

FOR FAMILIES

in the NICU

at home

special topics

FOR PROFESSIONALS

For Professionals: Elimination of Non-medically Indicated (Elective) Deliveries Before 39 Weeks Gestational Age

In 2010, the Joint Commission established a new perinatal care core measure set that includes the number of elective deliveries (both vaginal and cesarean) performed at ≥ 37 and < 39 weeks of gestation completed. In order to support hospitals in eliminating non-medically indicated deliveries before 39 weeks, March of Dimes, California Maternal Quality Care Collaborative (CMQCC), and the California Department of Health, Maternal Child and Adolescent Health Division collaborated on the development of a quality improvement toolkit. The new toolkit, entitled Elimination of Non-medically Indicated (Elective) Deliveries Before 39 Weeks Gestational Age; Quality Improvement Toolkit includes:

543,000

babies are born too soon each year.

you can help one

create a virtual band

find a band

www.marchofdimes.com/prematurity/index_professionals_66663.asp

A California Toolkit
to Transform Maternity Care

Elimination of Non-medically Indicated (Elective) Deliveries Before 39 Weeks Gestational Age

THIS COLLABORATIVE PROJECT WAS DEVELOPED BY:

March of Dimes

California Maternal Quality Care Collaborative

Maternal, Child and Adolescent Health Division; Center for Family Health
California Department of Public Health

CMQCC California Maternal Quality Care Collaborative

march of dimes

California Department of Public Health

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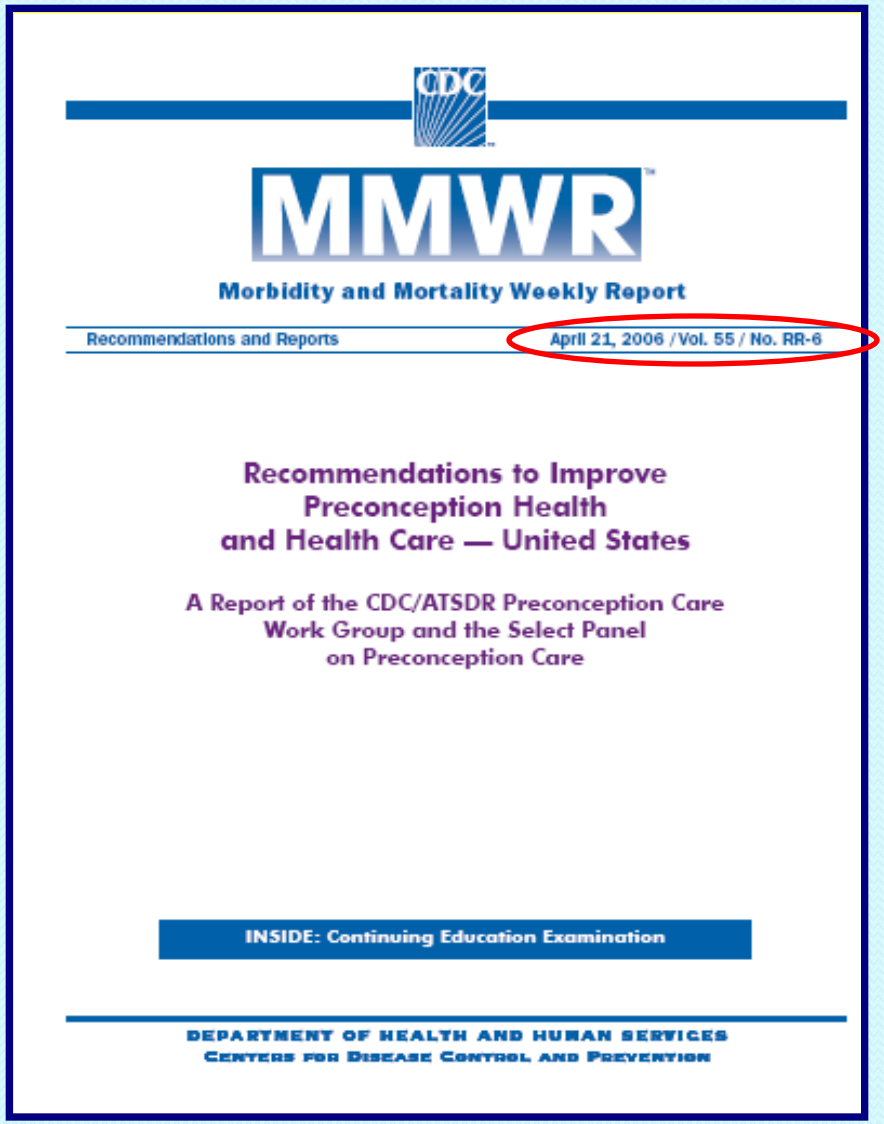
Pre/Interconception Care to Decrease Late Preterm Birth

- The preconception movement is based on the realization that:
  - Prenatal care starts too late to prevent many of these poor pregnancy outcomes
  - Women who have higher levels of health before pregnancy have healthier reproductive outcomes
- In obstetrics. . .
  many of outcomes or their determinants are present before we ever meet our patients

Recommendations to Improve Preconception Health and Health Care



- **Consumer**
  - Individual responsibility across the life span
  - Consumer awareness
- **Clinical**
  - Preventive visits
  - Interventions for identified risks
  - Interconception care
  - Prepregnancy checkup
- **Financing**
  - Health insurance coverage for women with low incomes
- **Public health programs and strategies**
  - Integrate into existing programs and services
- **Research**
  - Surveillance of impact
  - Increase the evidence base

National Institutes of Health
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Preconception Care

What is prenatal care/preconception care?

Prenatal care is the care woman gets before pregnancy and before her baby is born. Getting early and regular prenatal care is important for both the mother and the developing baby.

Prenatal care includes health care, along with education and counseling about how to handle different aspects of pregnancy. A health care provider may discuss many issues, such as nutrition and physical activity, what to expect during the birth process, and basic skills for caring for an infant.

In addition, health care providers are now recommending a woman see a health care provider for **preconception care**, before she is even trying to get pregnant.

What can a woman do to promote a healthy pregnancy?

Many health care providers recommend that a woman who is thinking about becoming pregnant see a health care provider to ensure she is in good preconception health. There are steps a woman can take to reduce the risk of certain problems during pregnancy:

1. Folic acid – The U.S. Public Health Service recommends that women of childbearing age get at least 400 micrograms of folic acid every day, through food and/or supplements. Many health care providers recommend

For More Information:

Clinical Trials
- NICHD Related Clinical Trials
- All Related Clinical Trials

News Releases
- Public Comment: DRAFT Pregnancy and Perinatology (PP) Branch Report to Council

All Related News

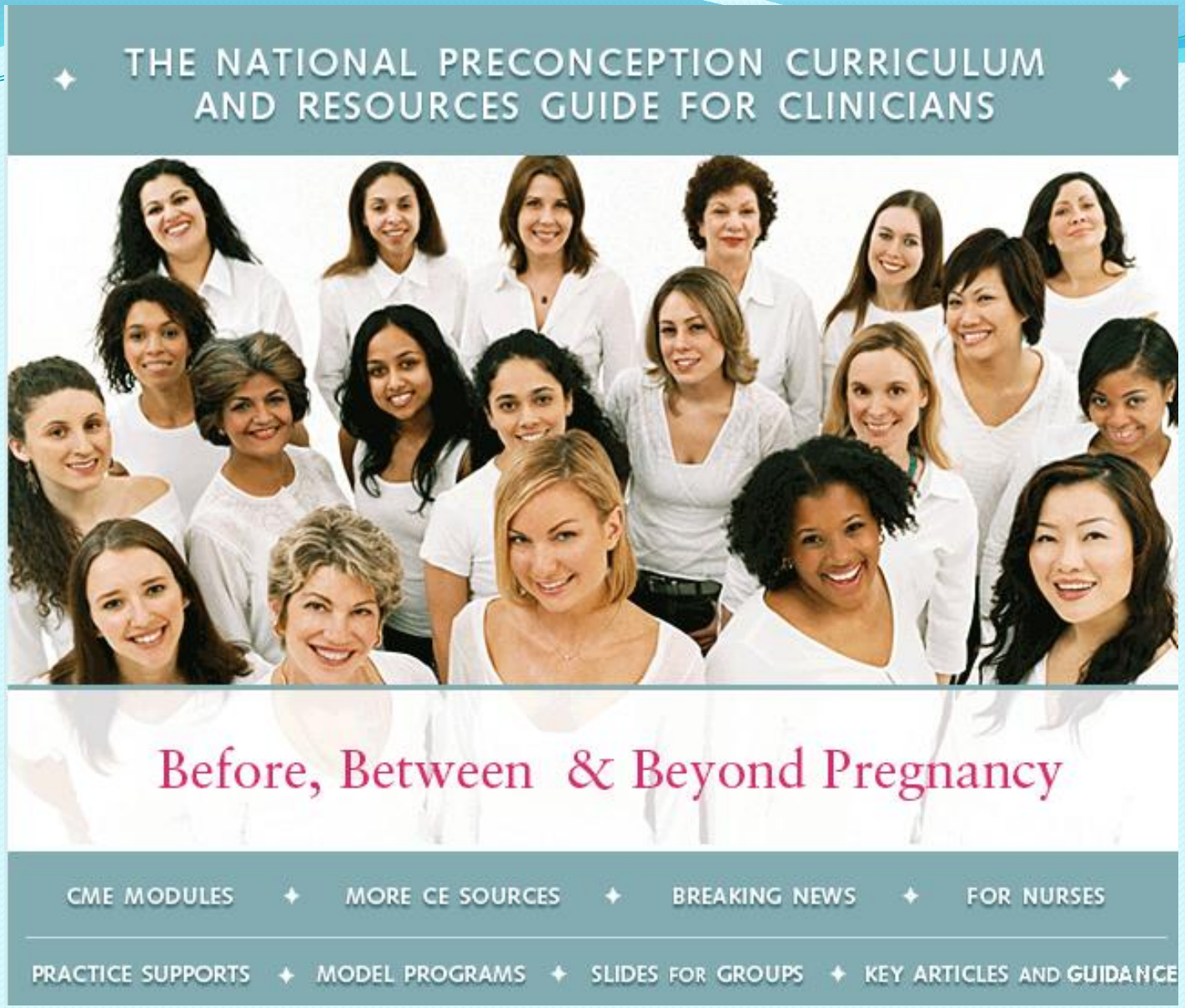
Publications/Materials
- The National Children's Study and Your Community: Partners in Our Children's Health
- The National Children's Study Communications Strategy

All Related Publications

Web Sites
- March of Dimes - Prenatal Care
- Medline Plus - Prenatal Care
- Prenatal care

Contact Information:
NICHD Information Resource Center
Address:
P.O. Box 3006

www.nichd.nih.gov/health/topics/preconception_care.cfm



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Preconception Peer Educators (PPE) Program

Overview

Let's face it! Infant mortality rates among African American babies are twice as high as those of the general population. But many of the causes of infant mortality are preventable and *a healthy baby begins with you*.

In May 2007, the Office of Minority Health (OMH), of the Department of Health and Human Services launched *A Healthy Baby Begins with You* – a national campaign to raise awareness about infant mortality with an emphasis on the African American community – as one of our efforts to end health disparities among racial and ethnic minorities.

Links

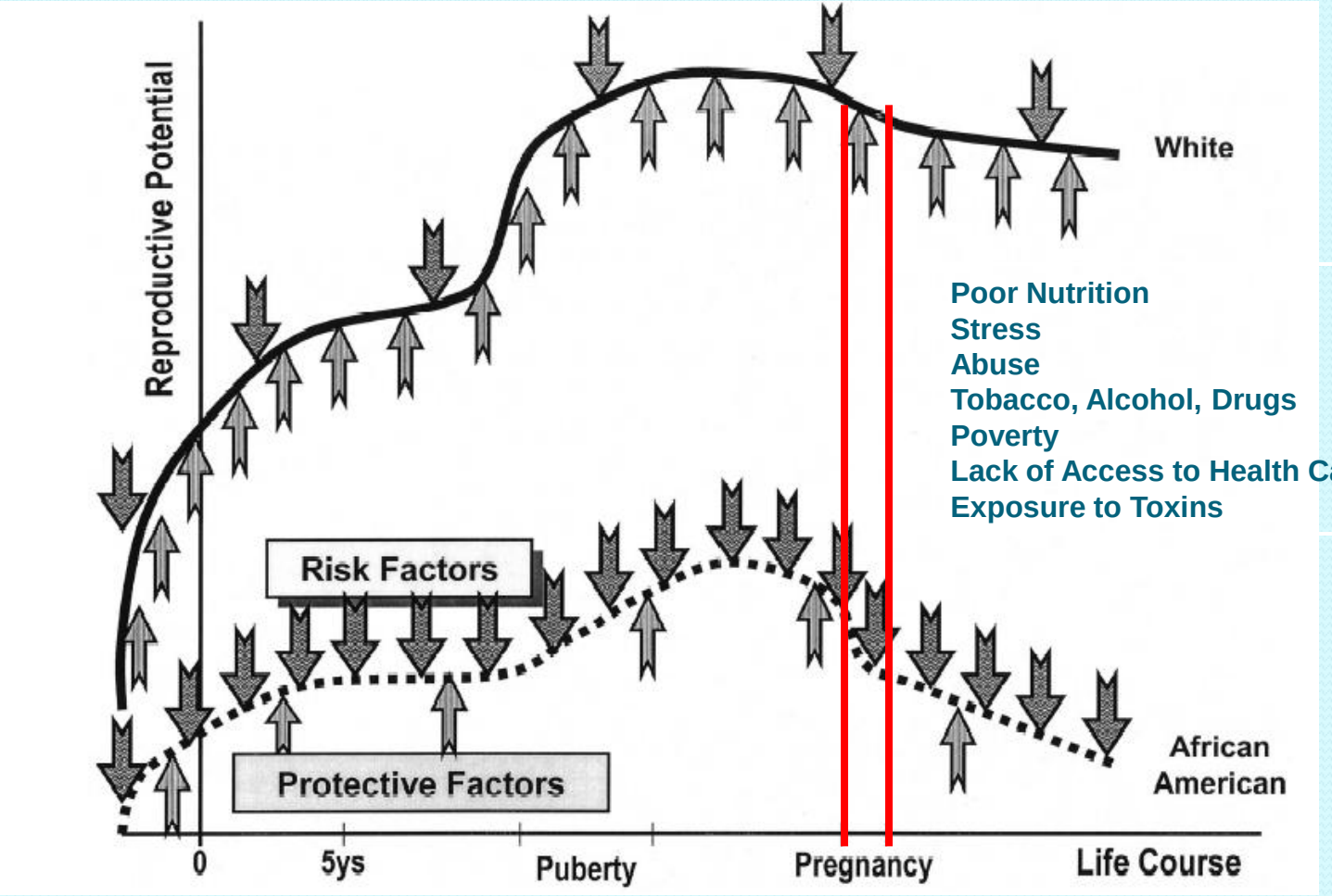
- Infant Mortality Disparities Fact Sheets
- Infant Mortality Hard Facts
- Professional Resources
- Contact Us
- Local PPE Trainings

Campaign Goals

I. Extend and continue broad infant mortality awareness campaign; add preconception and inter-conception health messages.
II. Develop activities targeted to the 18+ population.
   a. Reach the college-age population with targeted health messages emphasizing preconception health and healthcare.
   b. Train minority college students – blacks in particular – as peer educators and health ambassadors.
   c. Increase OMH involvement with colleges and universities, in particular minority serving institutions such as HBCUs.
III. Strengthen OMH leadership at the local level through the establishment of working partnerships with Healthy Start Programs, State/City Health Departments, State OMHs and CBOs.

http://minorityhealth.hhs.gov

Life Course Perspective



Lu MC, Halfon N. Racial and ethnic disparities in birth outcomes: a life-course perspective.Matern Child Health J. 2003;7:13-30.

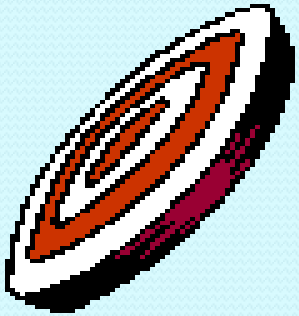
Prevent the Preventable

- Ø Unintended pregnancies
- Ø Folic acid deficiency
- Ø Alcohol
- Ø Tobacco
- Ø Illicit drugs
- Ø Infections (UTIs, STIs, periodontal disease)
- Ø Extremes of weight
- Ø Some medications (Rx, OTC, home remedies)
- Ø Environmental toxins
- Ø Known genetic/familial risks
- Ø Unnecessary interventions resulting in preterm birth
- Promote appropriate level designation and regionalization

What Can You do to Help Prevent Preterm Birth?

- Assume a nursing leadership role
- Read the Durham, Oshiro, and Simpson articles as well as other literature on the topic
- Design and implement a quality/safety project
- Develop a team/interdisciplinary approach
- Get risk management involved
- Get buy-in from the chief of OB and nurse management
- Get involved in your state perinatal collaboratives and the March of Dimes
- YOU CAN MAKE IT HAPPEN!

Adapted form Margaret Comerford Freda, EdD, RN, CHES, FAAN



Remember:

Your power as a nurse lies in your knowledge and your desire to keep your patients safe

Courtesy of Margaret Comerford Freda, EdD, RN, CHES, FAAN

support stronger, healthier babies

…born in a nation and state that makes the grade and gets an **“A”** for preventing **late** and **all** preterm birth