Preterm Birth in Kentucky: A Public Health Challenge

Ruth Ann Shepherd, MD, FAAP
Kentucky Department of Public Health

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The speakers and planning committee members have disclosed no conflict of interest.

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Program/Speaker Introductions

Evelyn Delgado, DSHS Assistant Commissioner is pleased to introduce today's DSHS Grand Rounds speaker.

Preterm Birth in Kentucky:
A Public Health Challenge

Speaker:

Ruth Ann Shepherd, MD, FAAP

Director, Maternal and Child Health
Kentucky Department of Public Health
Cabinet for Health and Family Services

Learning Objectives

1. List three factors that were assessed to determine the cause in the rise of Kentucky's preterm birth rate.

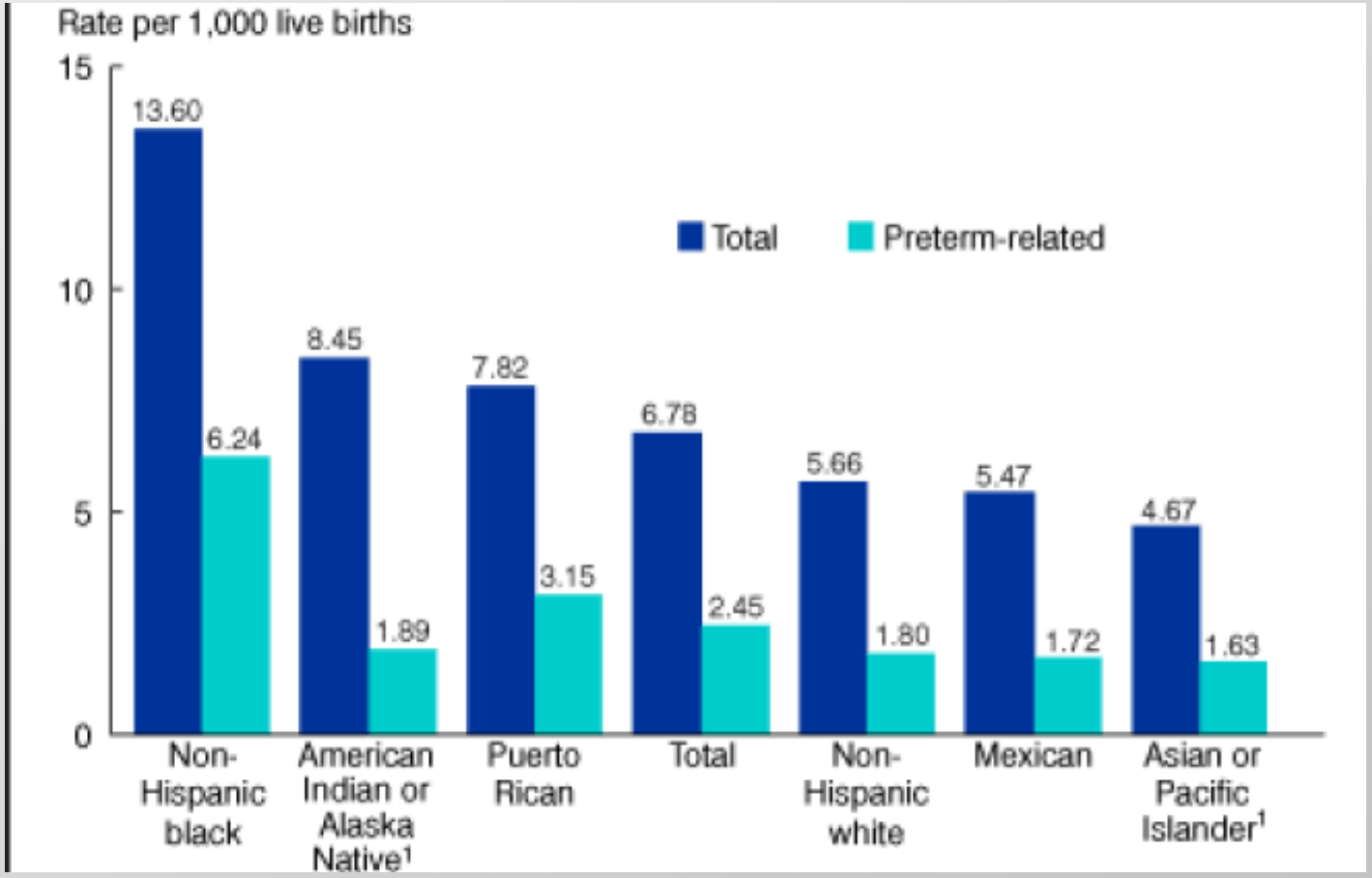
2. Recognize that infants born late preterm (34-36 weeks gestation) are at higher risk for morbidity and mortality and contribute substantially to the overall increase in preterm births in Kentucky and the nation.

3. Describe the components of the national demonstration project that have potential to reduce rates of preterm birth.

Why Preterm Birth?

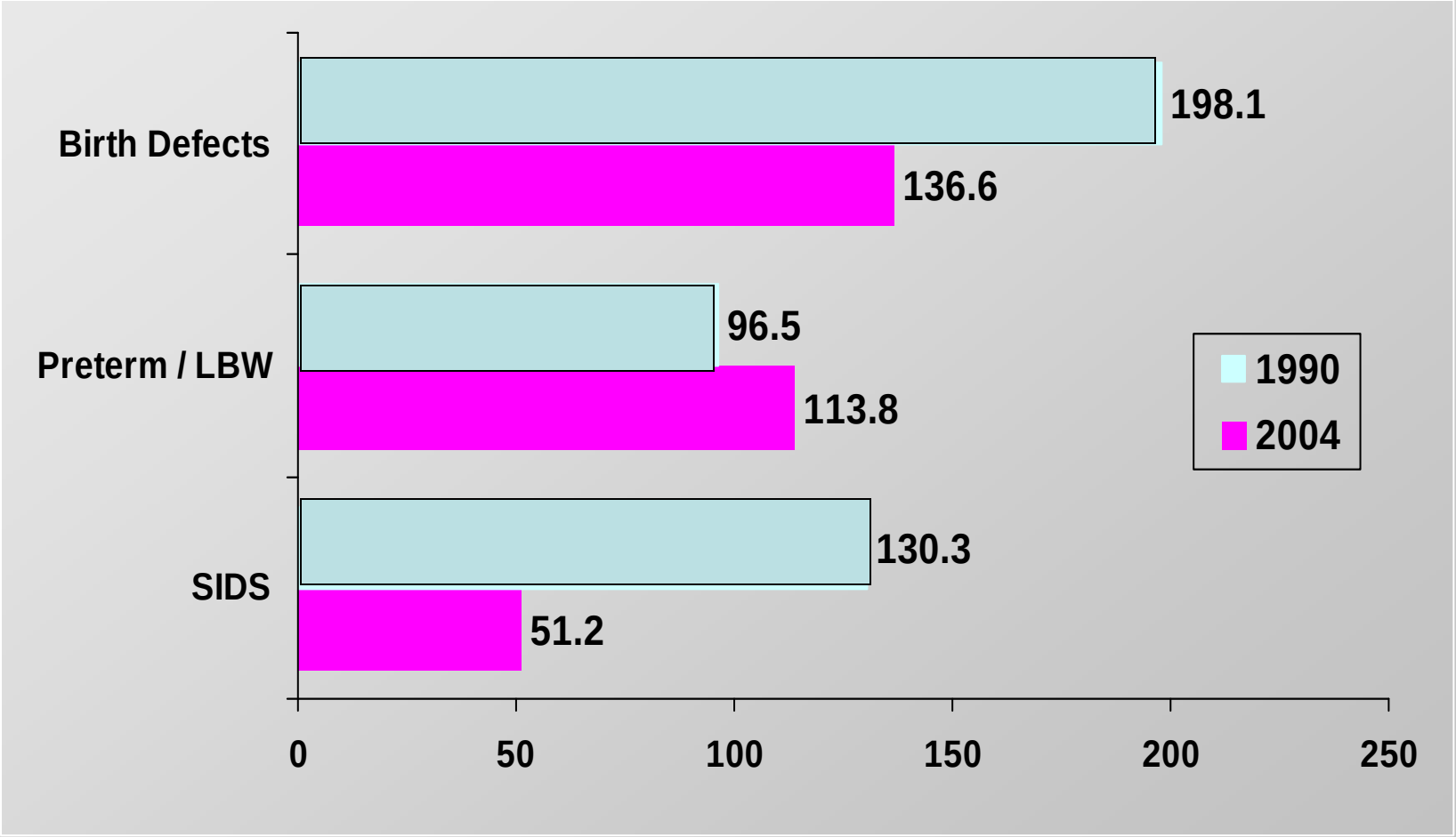
- Preterm Birth is the number one cause of neonatal mortality.
- Preterm birth is responsible for over 1/3 of all infant mortality.
- One in four preterm infants may have long-term neurodevelopmental problems
  - half of all neurodevelopmental conditions.
- It is associated with higher rates of chronic illness and disability in adults.

Infant Mortality Rates: Total and Preterm-Related by Maternal Race/Ethnicity, US 2004



MacDorman MF. Trends in Preterm-Related Infant Mortality by Race and Ethnicity: US, 1999-2004.

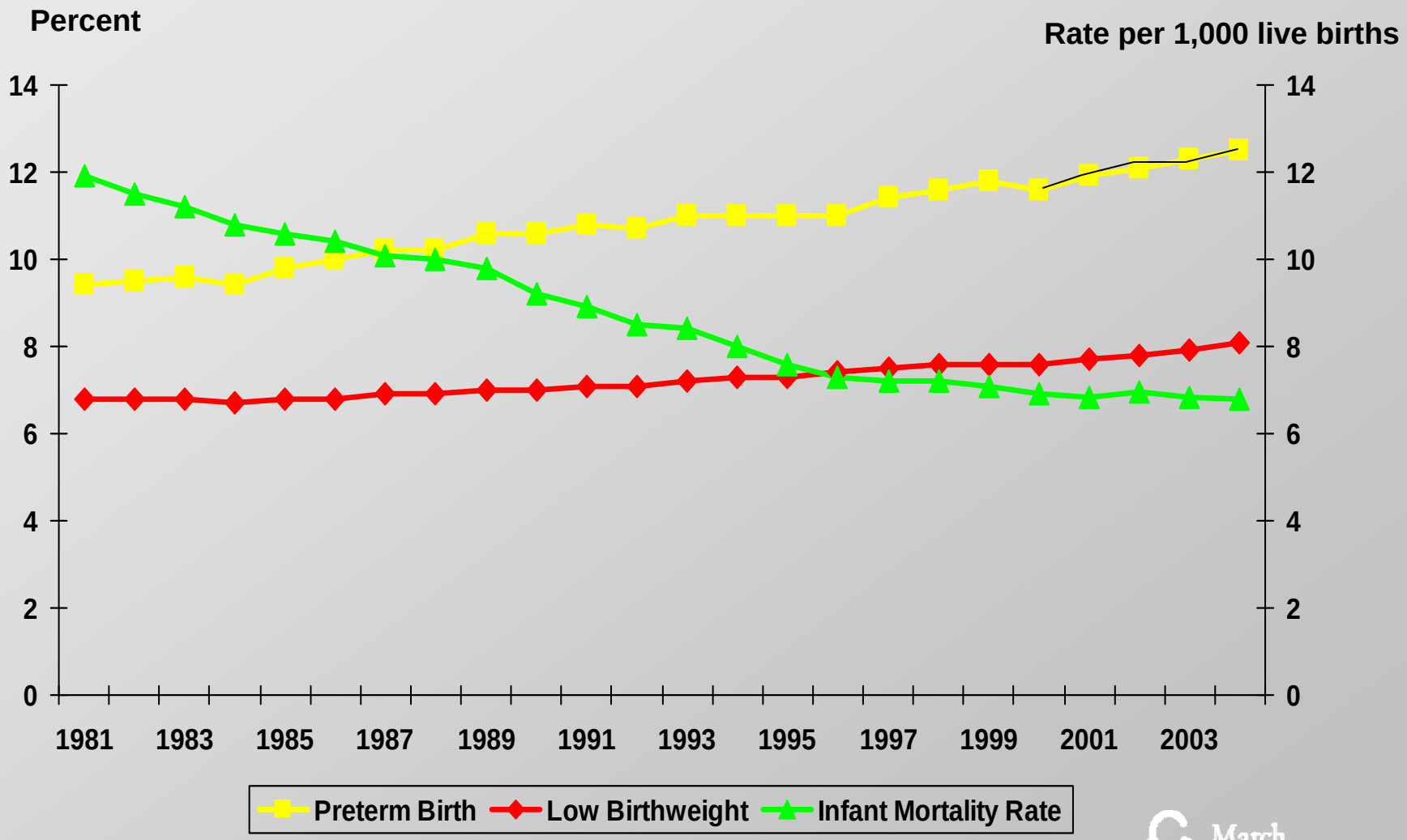
Three Leading Causes of Infant Mortality United States, 1990 and 2004*



Source: National Center for Health Statistics
*preliminary mortality data for 2004
Prepared by March of Dimes Perinatal Data Center, 2007

March of Dimes
Saving babies, together

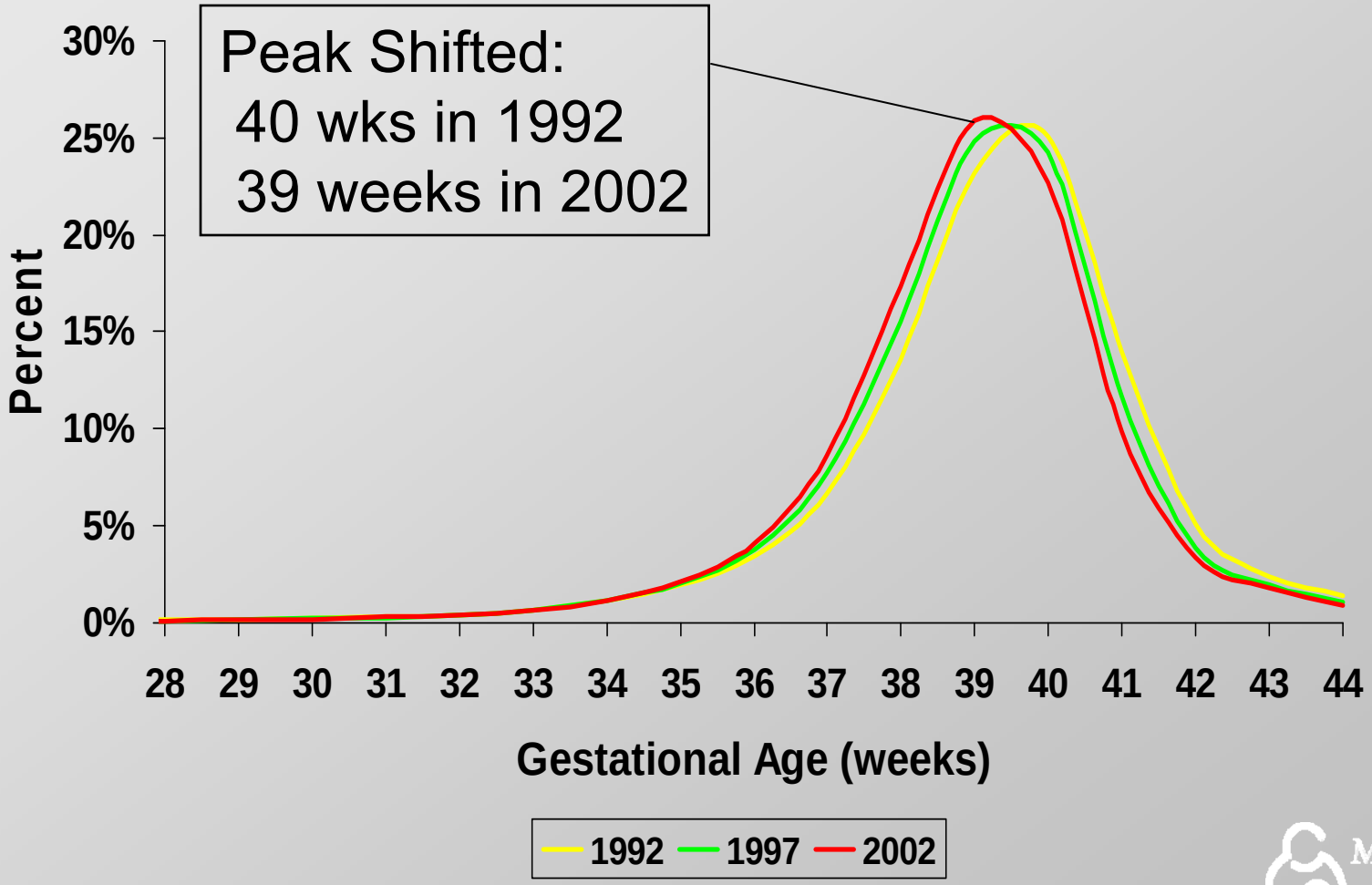
Preterm Births, Low Birthweight and Infant Mortality, United States, 1981 - 2004



Source: National Center for Health Statistics, final natality and mortality data
Prepared by March of Dimes Perinatal Data Center, 2007

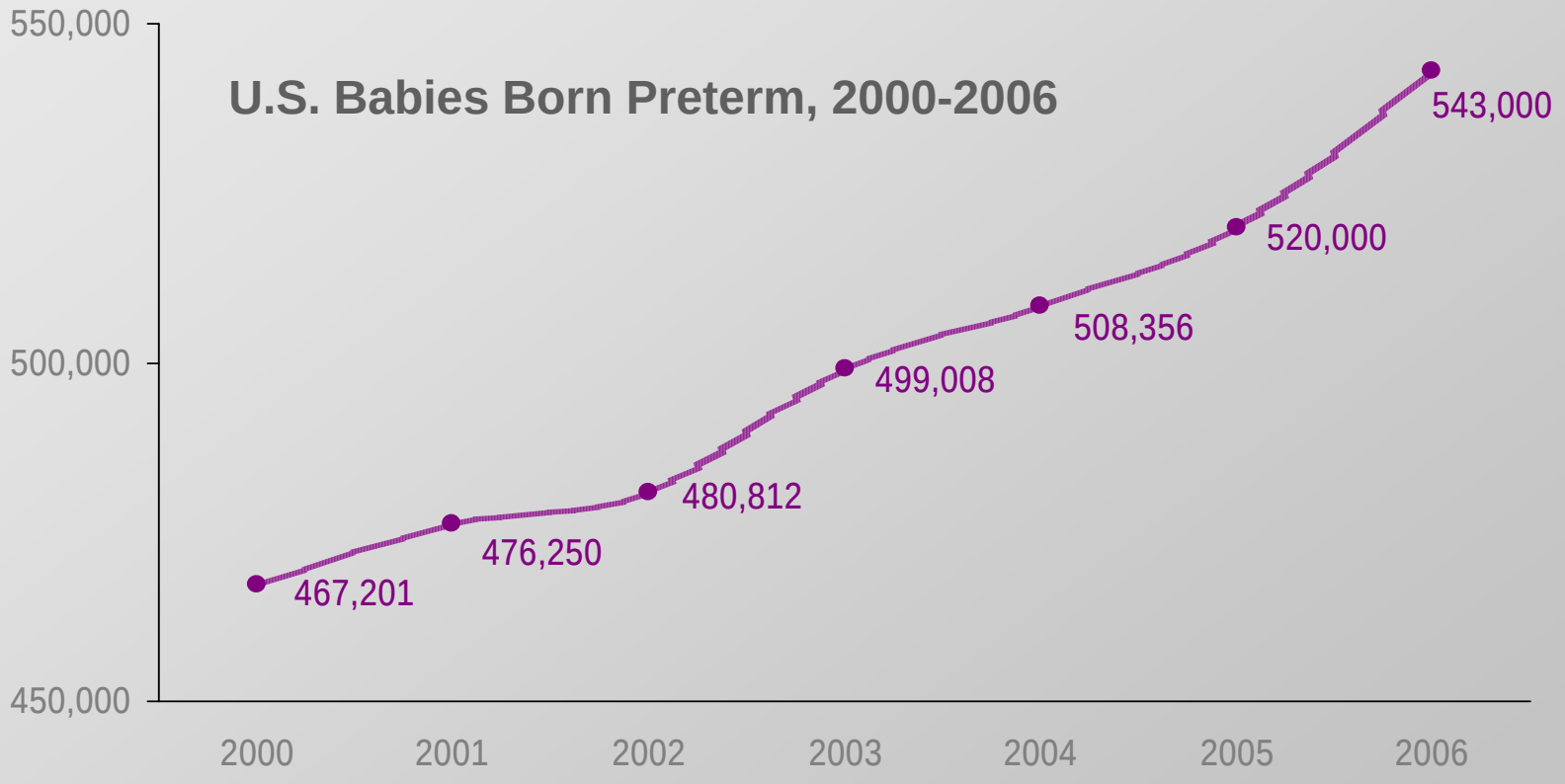
Gestational Age-Specific Distribution
Singleton Live Births, Spontaneous

United States, 1992, 1997, 2002



March of Dimes
Saving babies, together

March of Dimes Prematurity Campaign
Prematurity Rates in U.S.



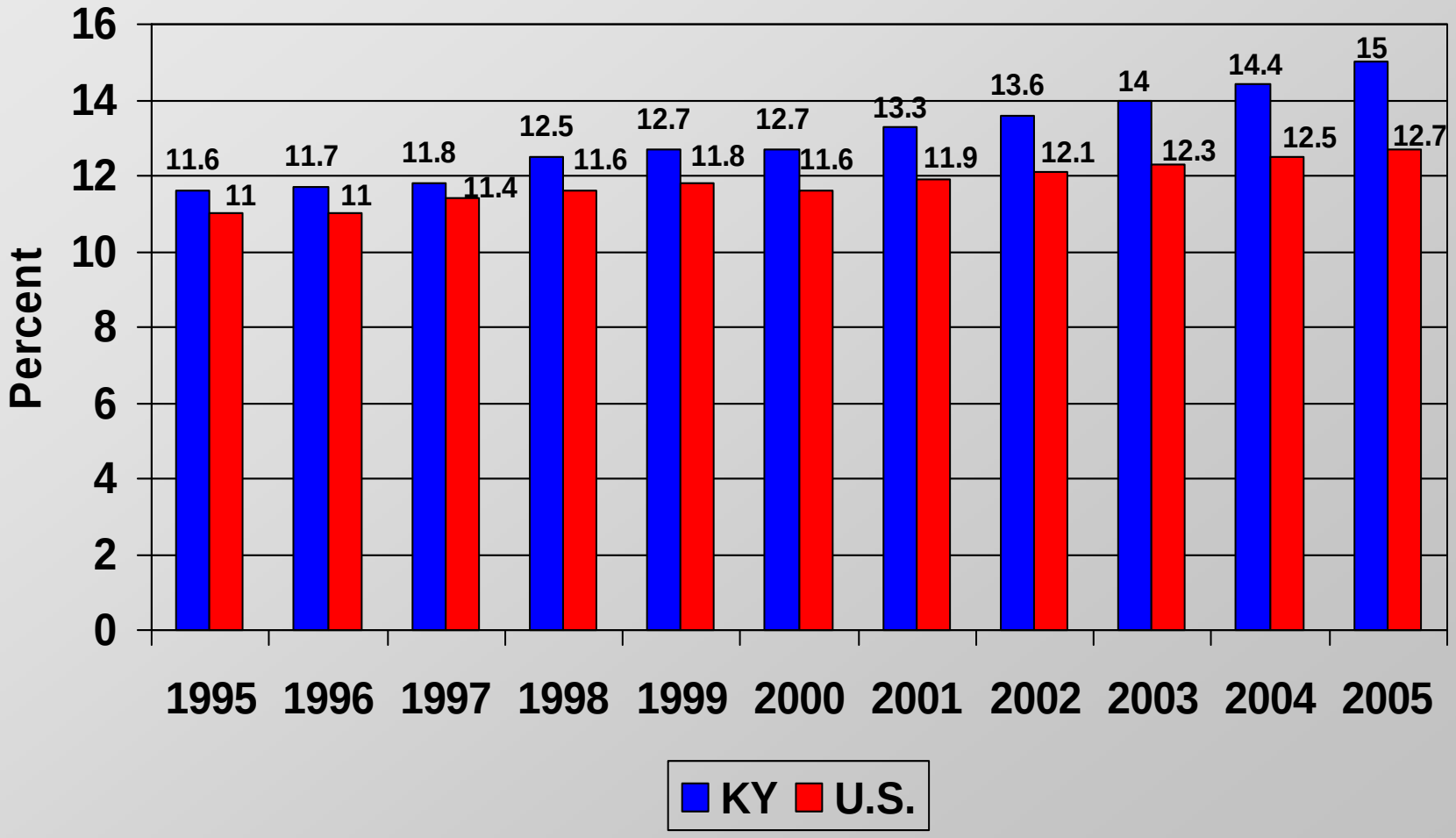
***2006 preliminary birth data provided by the National Center for Health Statistics; Source: National Center for Health Statistics**

Late Preterm and C-Section

- Bettegowda VR, et al. *Clin Perinatol.* 2008;35:309-323. The Relationship between Cesarean Delivery and Gestational Age among US Singleton Births.

- Singleton preterm births 1996-2004
- Preterm births increased by 59,057; of those 54,405 were born by Cesarean (92%)
- No increase in the proportion of preterm births delivered vaginally

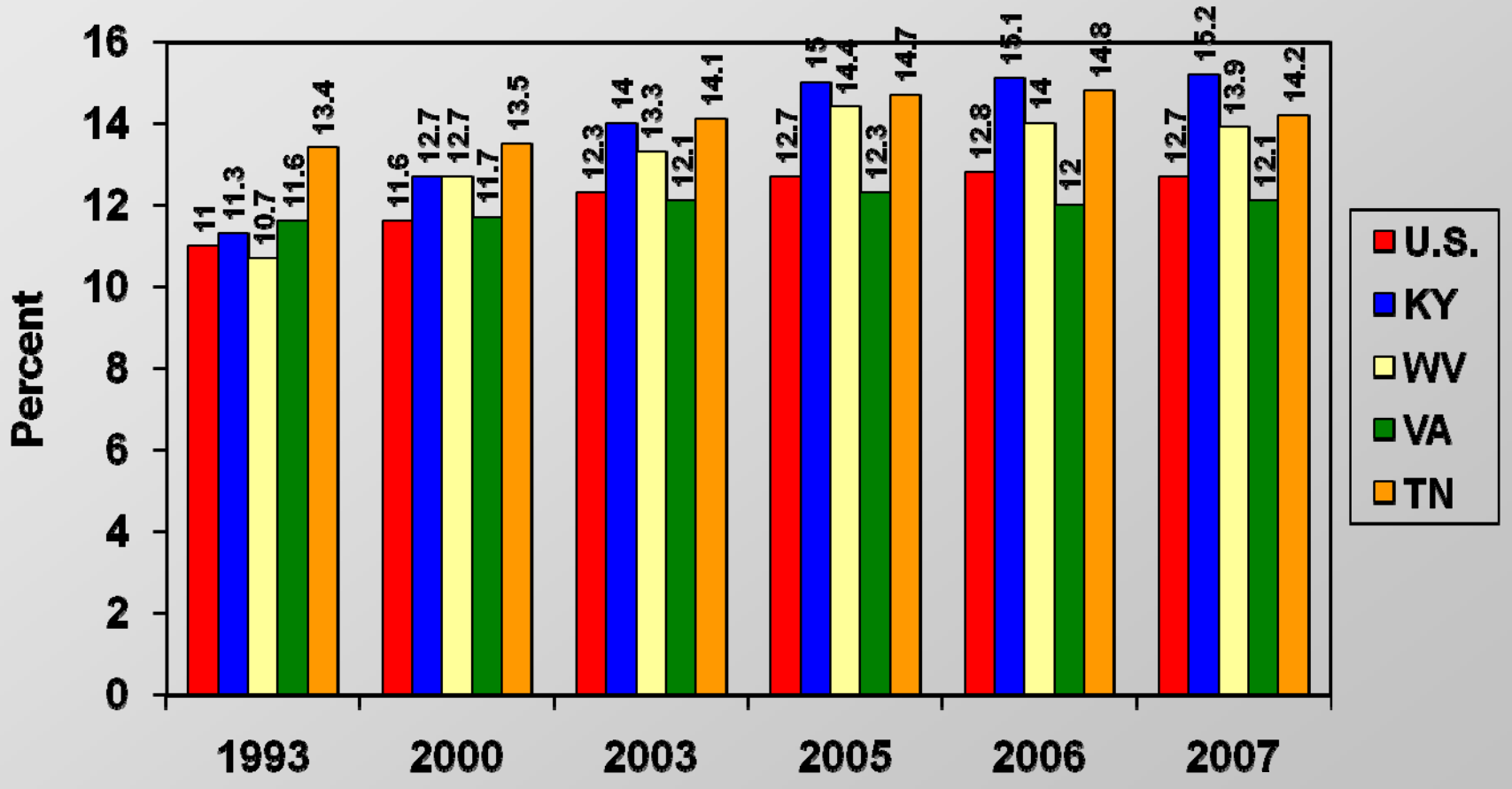
Preterm Births, KY and US



*Preterm birth is defined as any live birth occurring <37 completed weeks gestation

Data Source: March of Dimes Peristats & National Center for Health Statistics

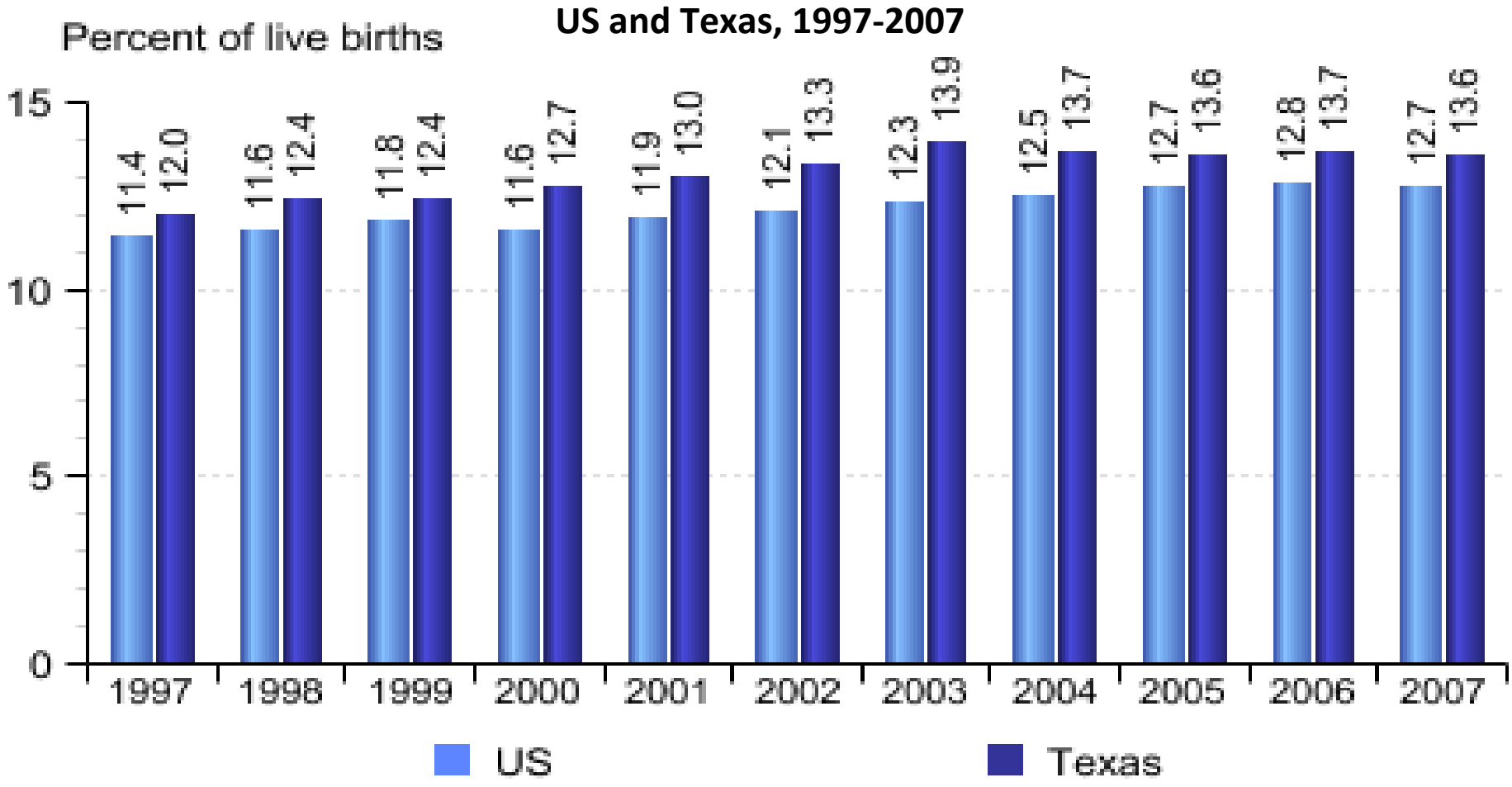
Preterm Birth Rates, KY and Southern States



*Preterm birth is defined as any live birth occurring <37 completed weeks gestation

Data Source: March of Dimes Peristats & National Center for Health Statistics

Preterm Birth, US and Texas



Preterm is less than 37 completed weeks gestation.
Source: National Center for Health Statistics, final natality data. Retrieved October 22, 2010, from www.marchofdimes.com/peristats.

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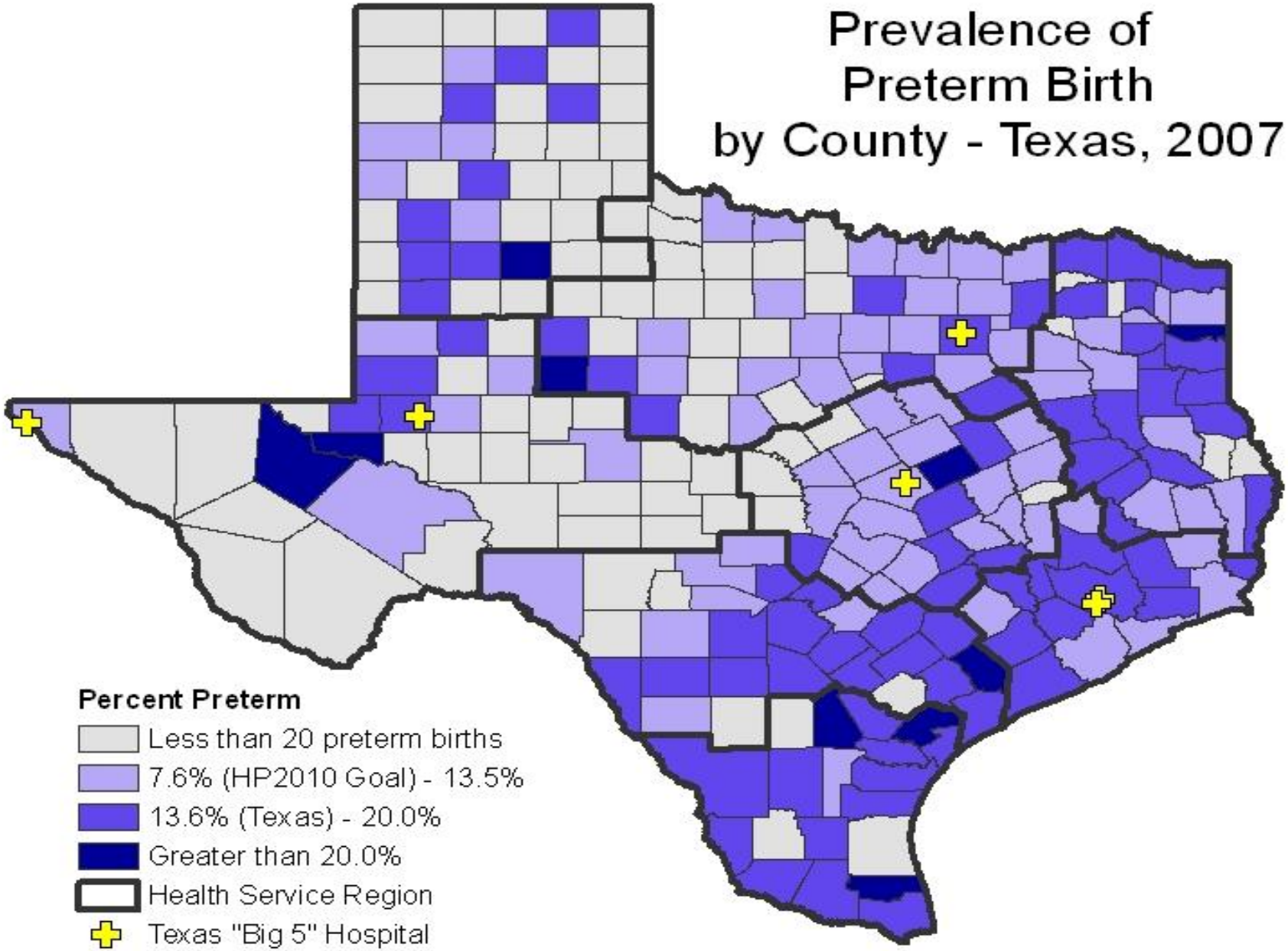
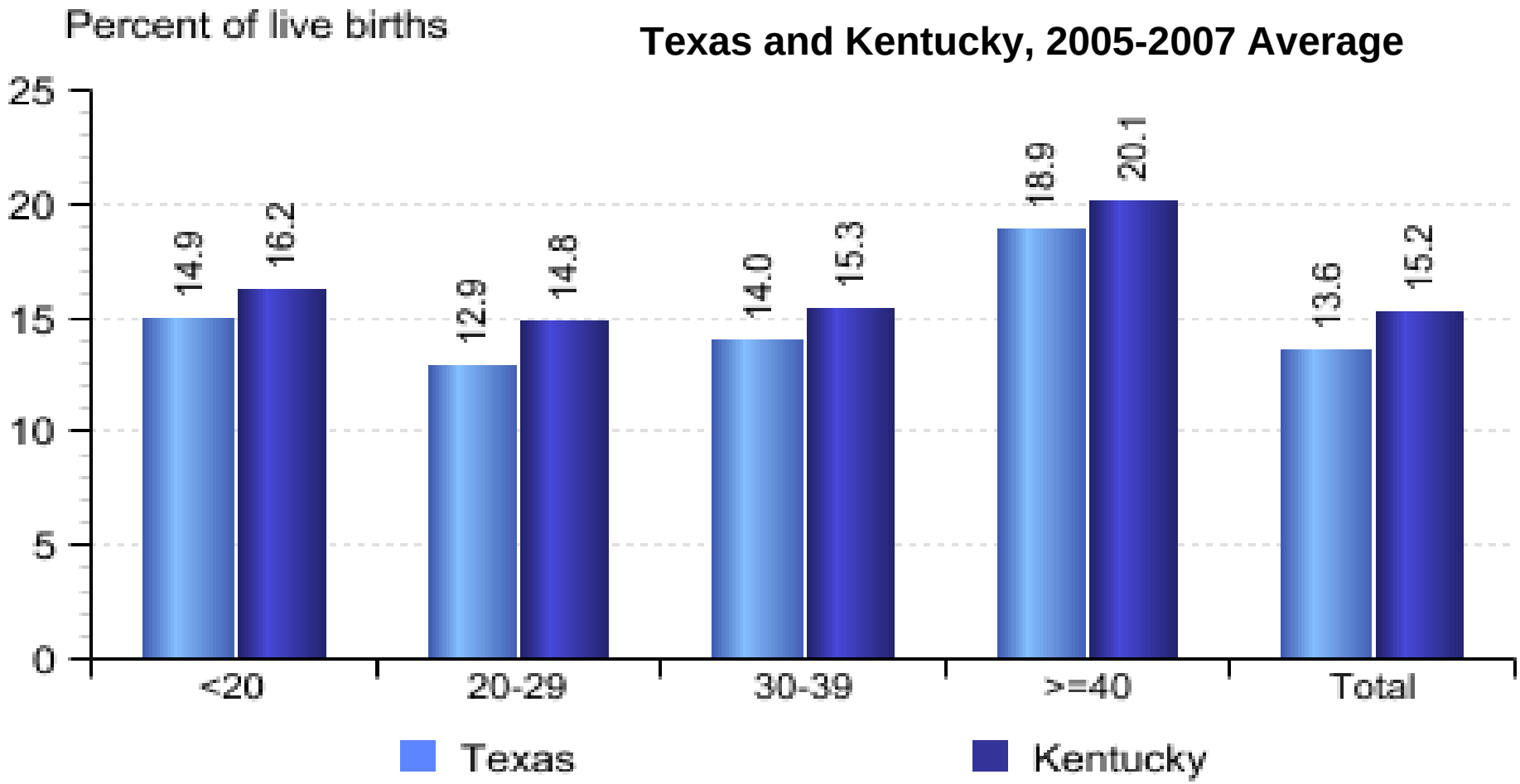


Source: Texas Vital Statistics Natality File, 2007, Texas Department of State Health Services.
Prepared by: DSHS, OPDS, ELS, 11/01/10

Selected Categories of Risk for Preterm Birth

- History of Preterm Birth
- Medical Complications/Pre-existing Conditions
- Unintended Pregnancy
- Maternal Race
- Extremes of Maternal Age
- Multiple Gestations
- C-section Delivery

Preterm by Maternal Age



Preterm is less than 37 completed weeks gestation.
Source: National Center for Health Statistics, final natality data.
Retrieved November 5, 2010, from www.marchofdimes.com/peristats.

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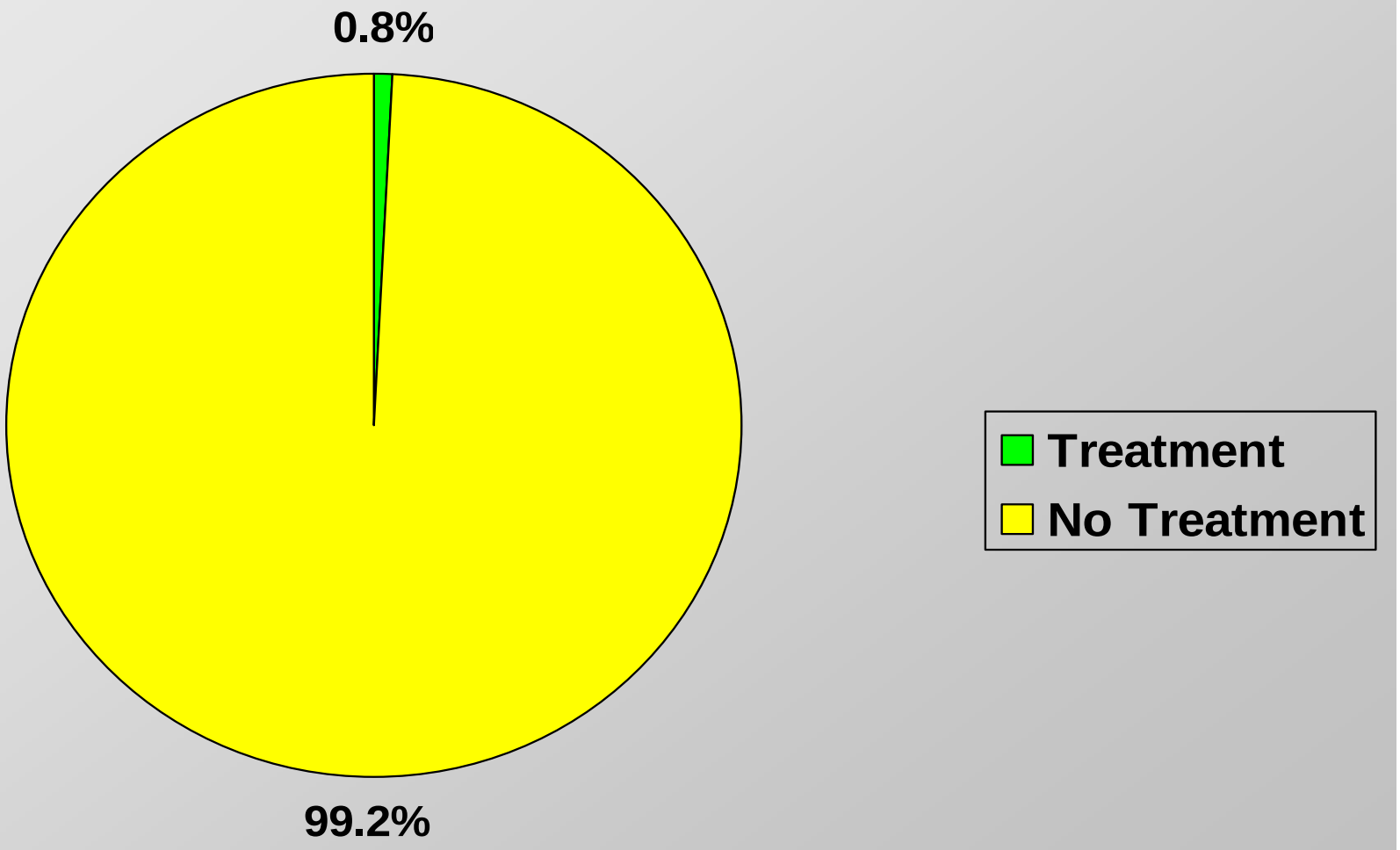
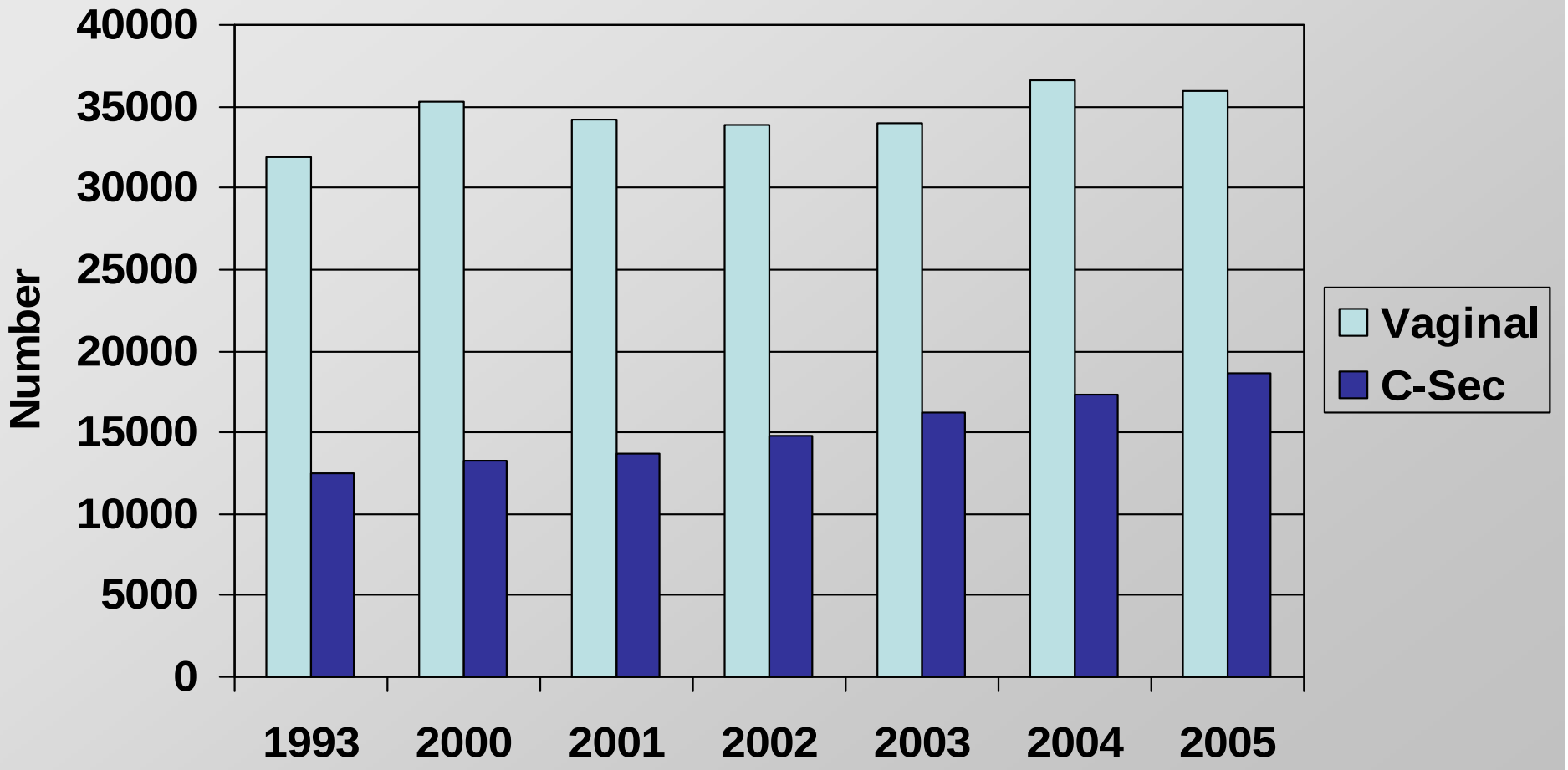
Percent of Live Births Resulting from ART Kentucky, 2005



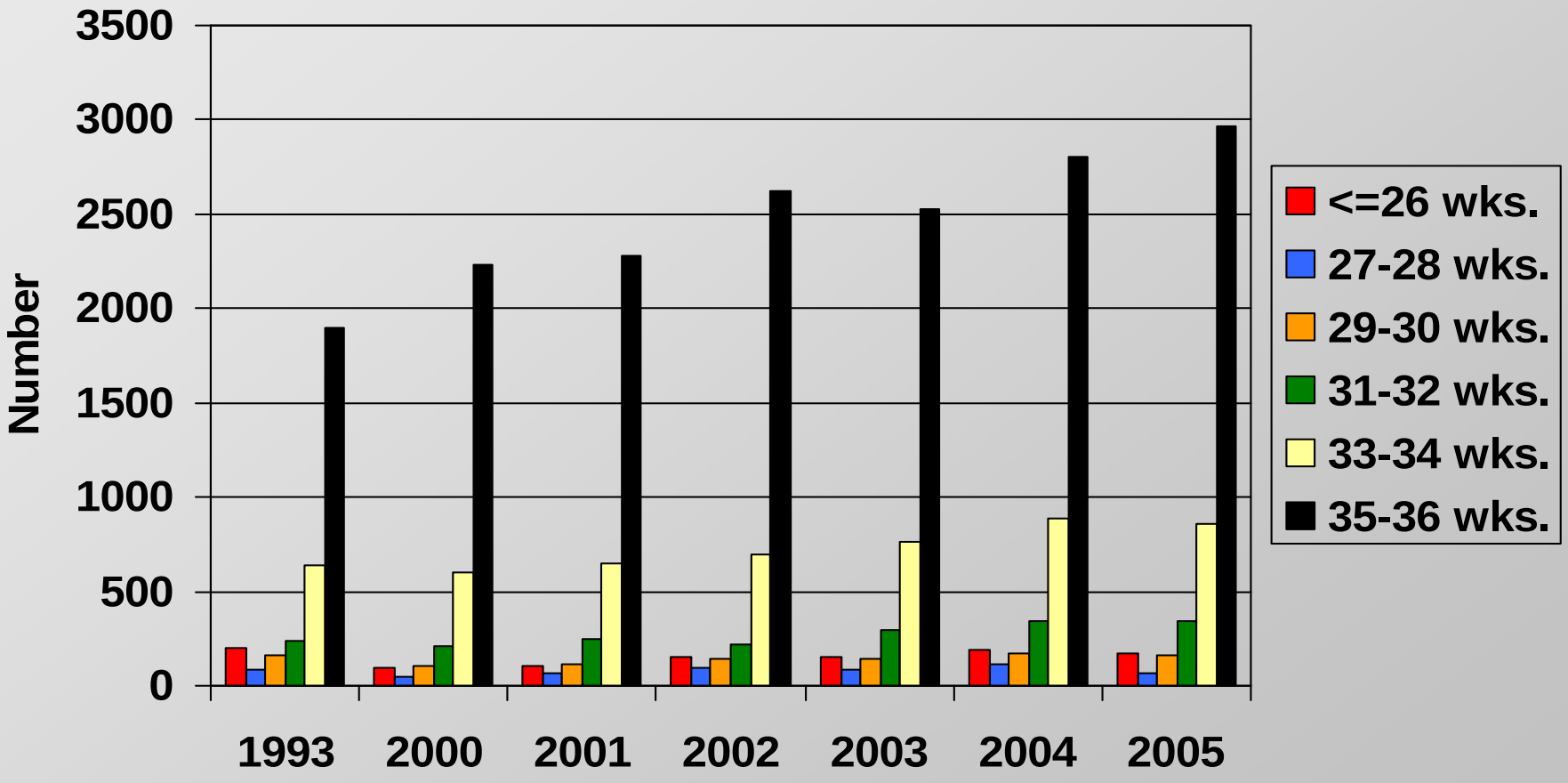
Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 2005

Kentucky Live Births by Mode of Delivery



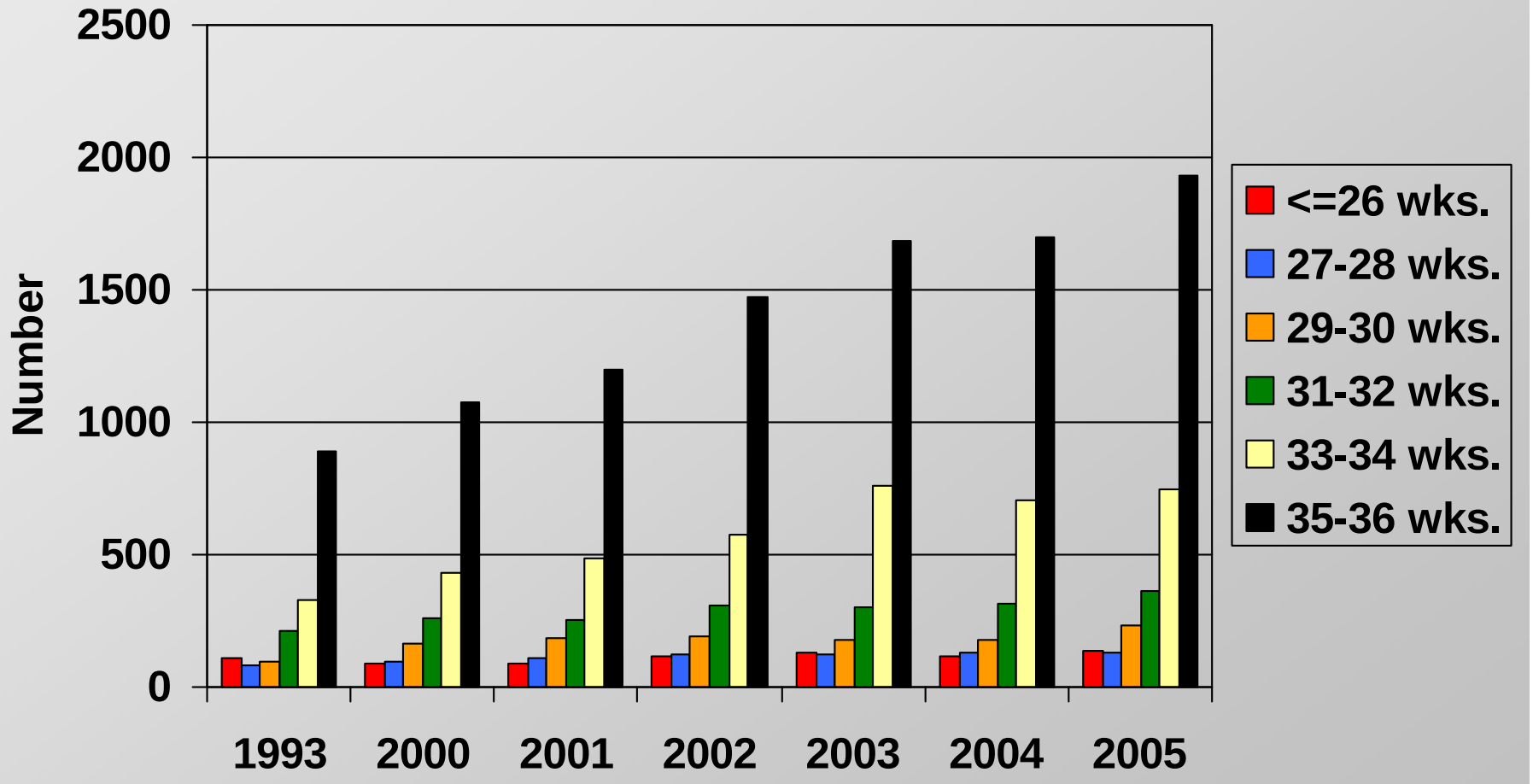
Data Source: Kentucky Vital Statistics Files,
Live Birth Certificate Files, 1993, & 2000-2005

KY Singleton Preterm Births Delivered Vaginally



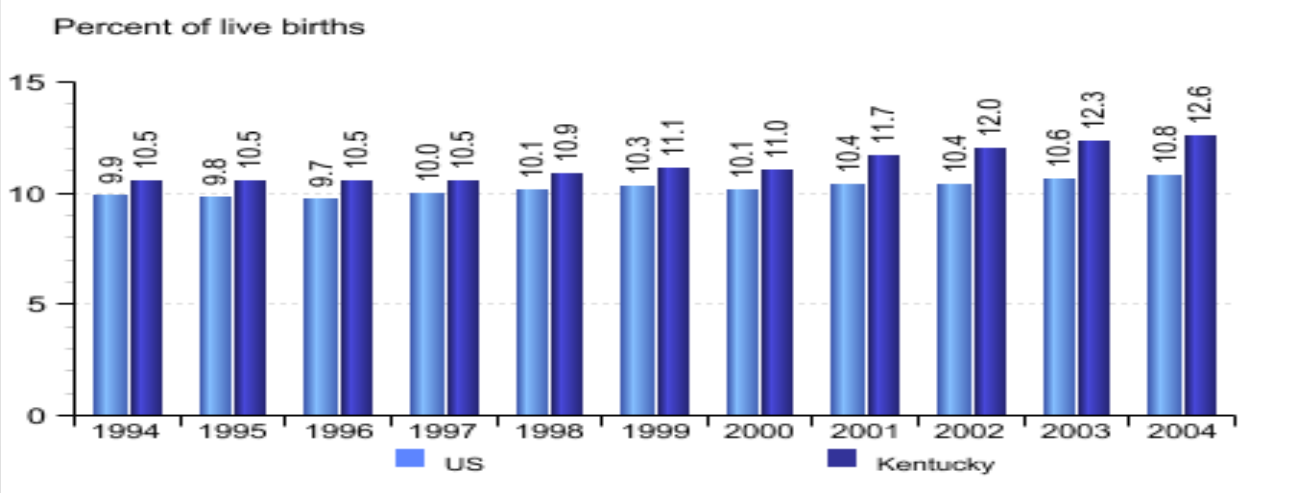
*Preterm birth is defined as any live birth occurring <37 completed weeks gestation
Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 1993, & 2000-2005

KY Singleton Preterm Births by Cesarean Delivery

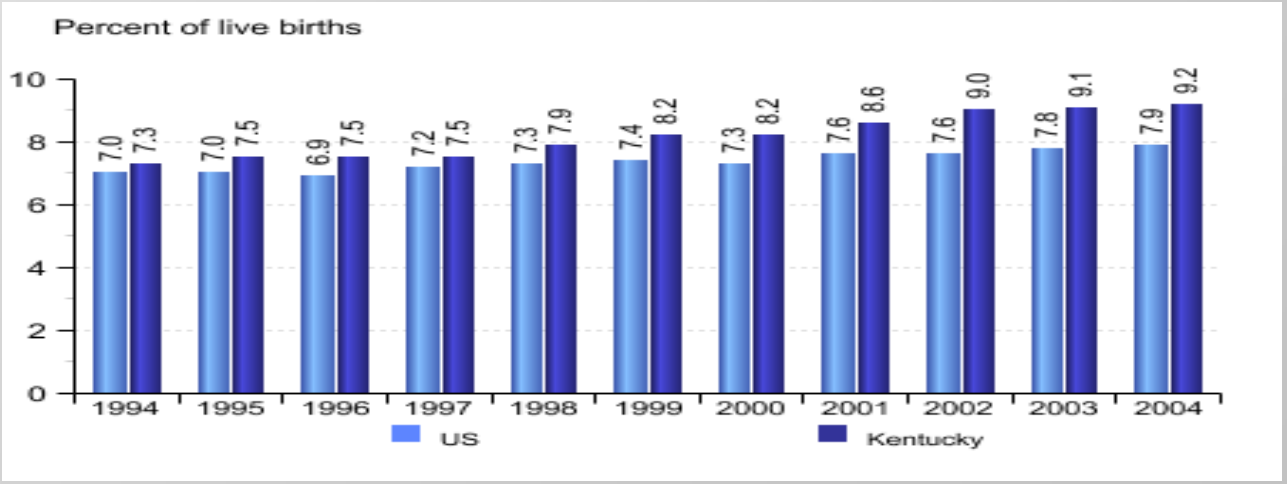


*Preterm birth is defined as any live birth occurring <37 completed weeks gestation
Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 1993, & 2000-2005

Singleton Preterm Birth Rates US and Kentucky, 1994-2004

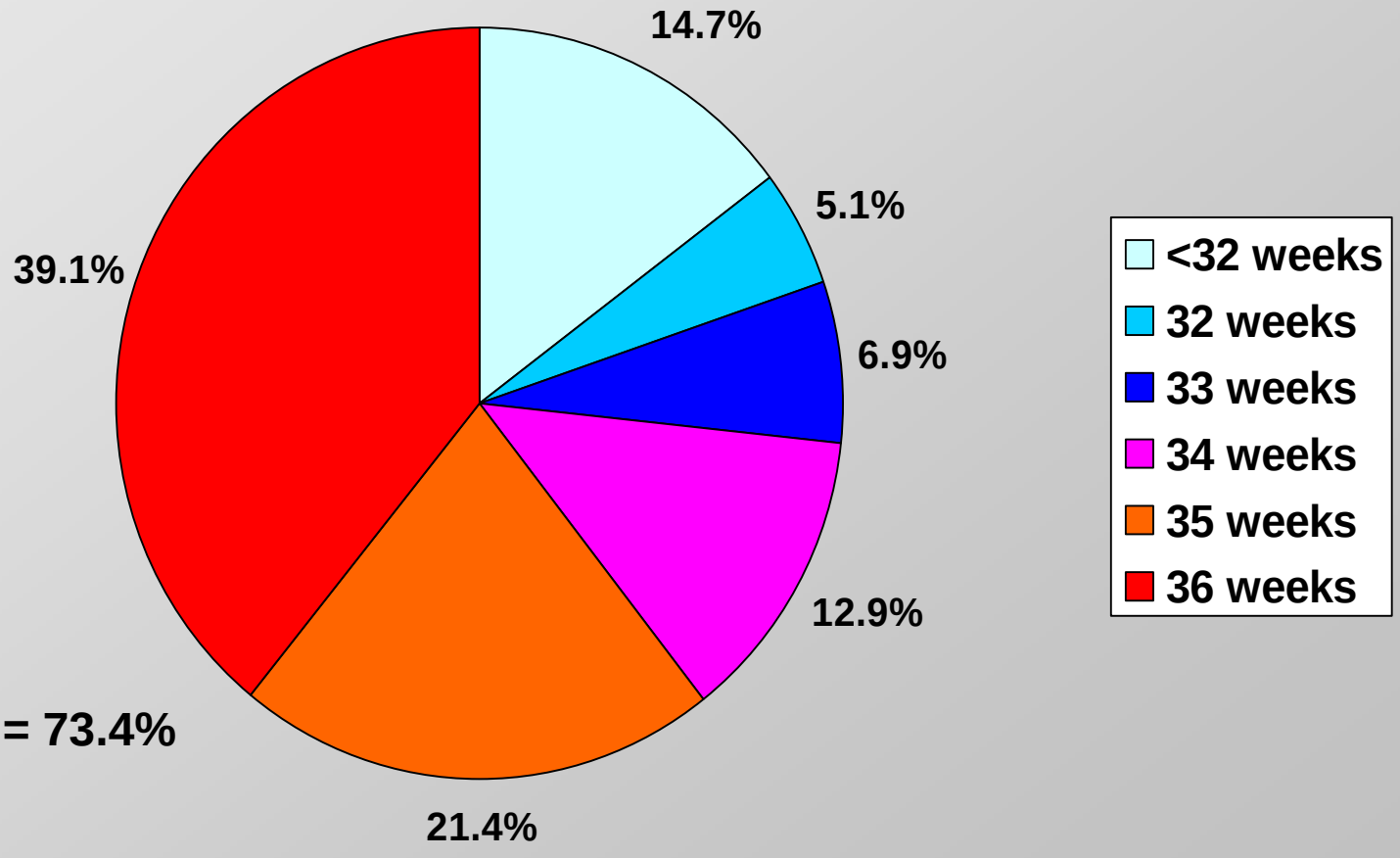


Singleton Preterm Births (<37wk)



Late Preterm Births (34-36 wks)

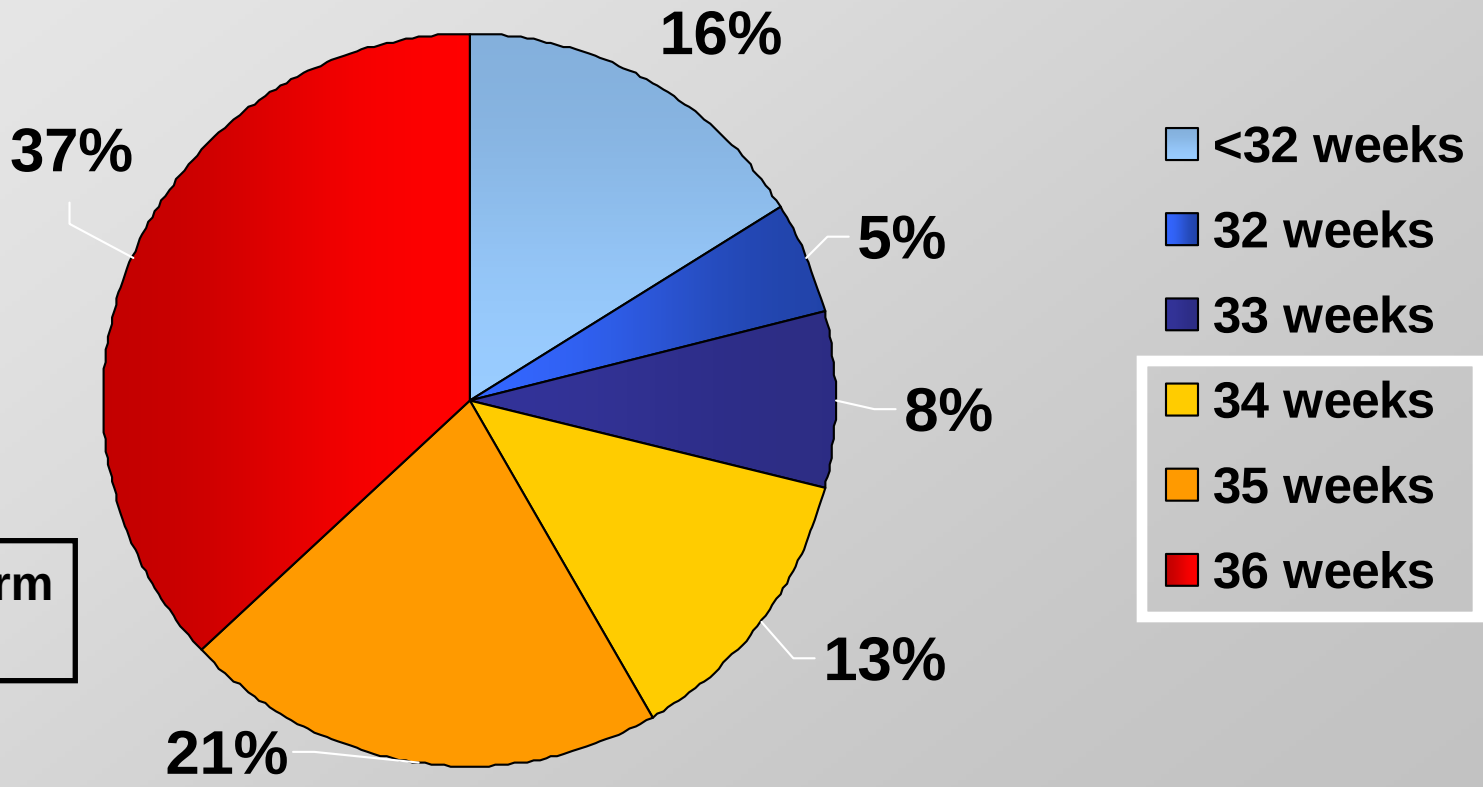
Preterm Births in Kentucky



Late Preterm = 73.4%

Source: Kentucky Vital Statistics Files,
Live Birth Certificate Files, 2005

Preterm Births by Week of Gestation
United States, 2004

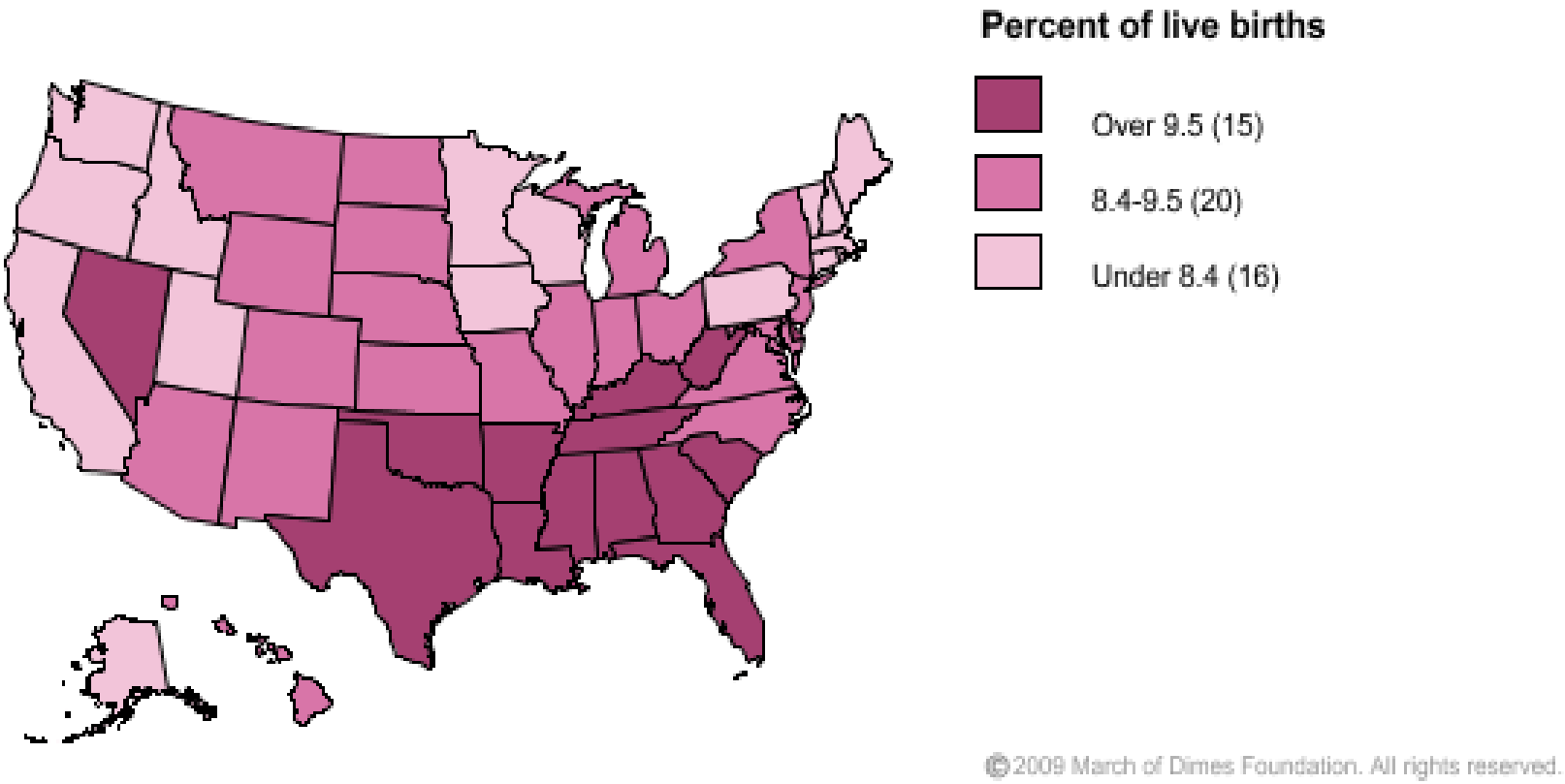


Late preterm 71%

Source: National Center for Health Statistics, 2004 final natality data
Prepared by March of Dimes Perinatal Data Center, 2007

Late Preterm Births

US, 2007

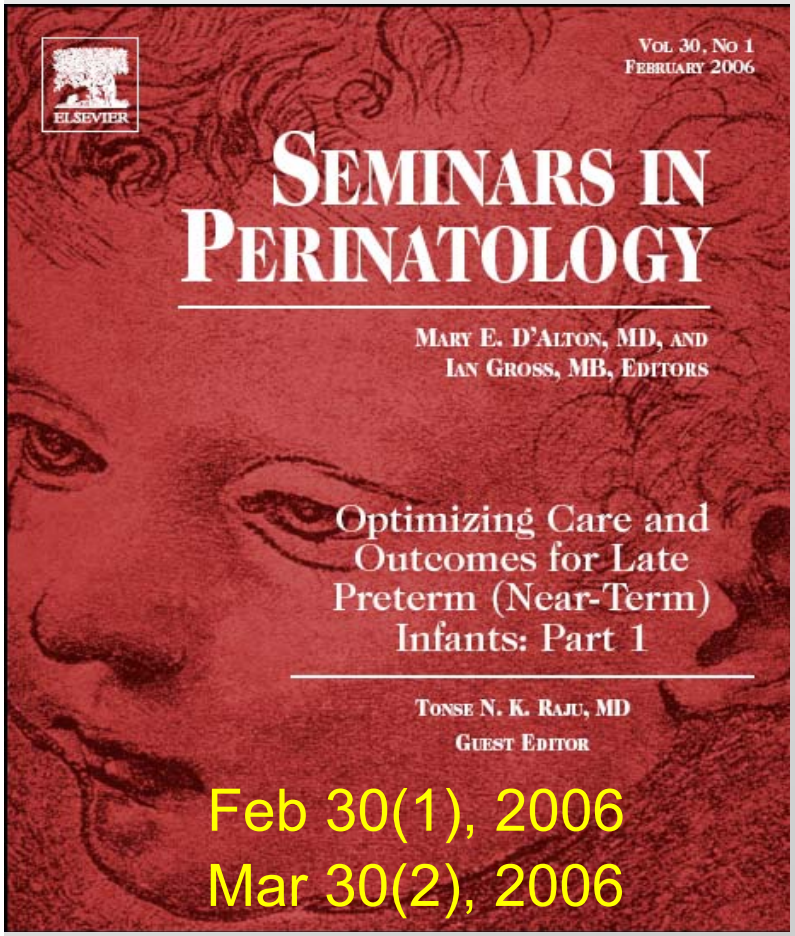


Late preterm is between 34 and 36 weeks gestation.
Source: National Center for Health Statistics, final natality data. Retrieved November 7, 2010, from www.marchofdimes.com/peristats.

Preterm Births

- Term:
  - about 40 weeks
- Preterm birth:
  - <37 completed weeks
- Late preterm (near-term)
  - 34 -36 weeks
- Very preterm:
  - <32 weeks

July 2005 NICHD Invitational Workshop on Near Term/Late Preterm Births (34-36-wks)



SPECIAL ARTICLE

Optimizing Care and Outcome for Late-Preterm (Near-Term) Infants: A Summary of the Workshop Sponsored by the National Institute of Child Health and Human Development

Tonse N. K. Raju, MD[a], Rosemary D. Higgins, MD[a], Ann R. Stark, MD[b], Kenneth J. Leveno, MD[c]

[a]National Institute of Child Health and Human Development, National Institutes of Health, Bethesda, Maryland; [b]Division of Neonatology, Department of Pediatrics, Baylor College of Medicine, Houston, Texas; and [c]Department of Obstetrics and Gynecology, University of Texas Southwestern Medical Center, Dallas, Texas

The authors have indicated they have no financial relationships relevant to this article to disclose.

Peds, 118(3):1207-14, 2006

Clinics in Perinatology, Dec 2006
Editors: Lucky Jain, Tonse Raju

The "Late Preterm" Infant

- Preterm: any neonate whose birth occurs thru the end of the last day of the 36th week (259th day) following the onset of the last menstrual period.
  - ***"Late Preterm": any neonate whose birth occurs beginning the first day of the 34th week (239th day) through the end of the last day of the 36th week (259th day) following the onset of the last menstrual period.***

- Term: any neonate whose birth occurs from the beginning of the first day (260th day) of the 38th week through the end of the last day of the 42nd week (294th day) following the onset of the last menstrual period.

- Post-term: any neonate whose birth occurs from the beginning of the first day (295th day) of the 43rd week following the onset of the last menstrual period.

Engle WE. *Semin Perinatol* 2006;30:2-6.

Morbidities Associated with Late PTB

Trying to separate causes and effects

- Increased immediate morbidities:
  - Respiratory distress
  - Jaundice
  - Feeding difficulties
  - Hypoglycemia
  - Temperature instability
  - Sepsis
- Increased NICU use (and re-admissions)
- Increased cost
- Long term outcome - *???*

Respiratory Morbidity in Late Preterm

- Late preterm babies are 7 times more likely to have respiratory distress than term infants
  - 28.9% vs 4.2%
  (OR 7.14, CI 2.9-37.8)

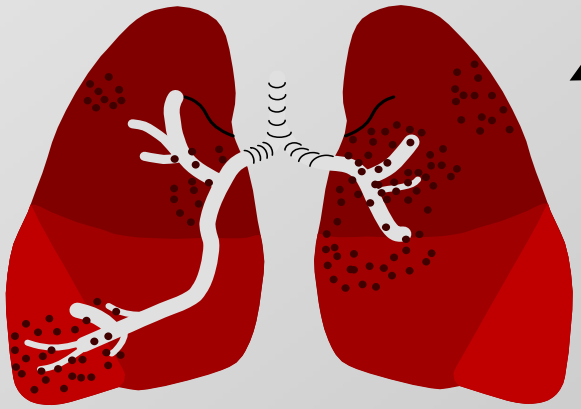
Wang ML. *Pediatrics* 2004;114:372-6.

Lung Transition to Life Outside the Womb

Onset of labor triggers decrease of fetal lung fluid secretion

Mechanical Forces "Vaginal Squeeze"

?



?

ENaC activation specificity, number

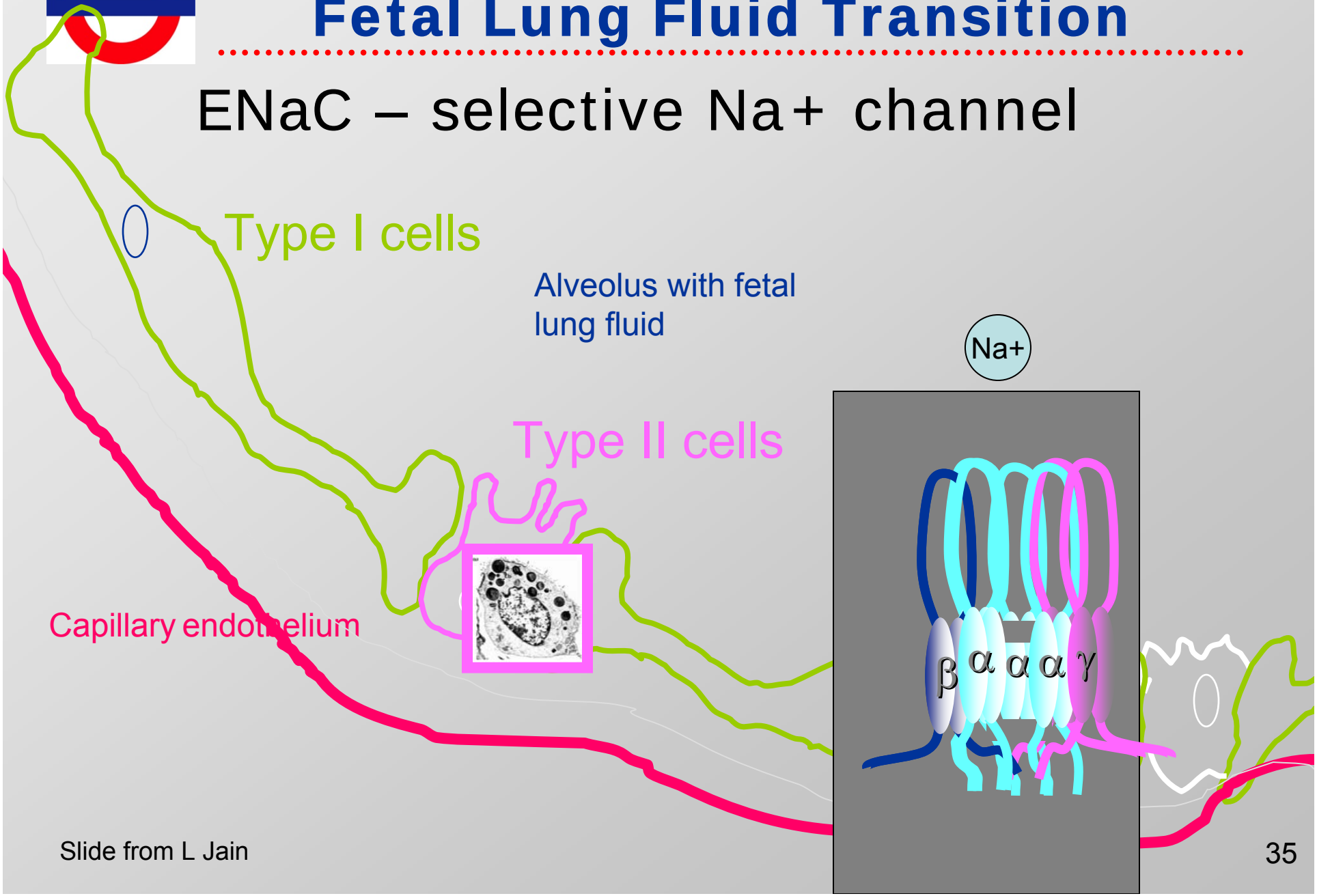
Transition from Fluid-filled to Air-filled Lung

Surfactant to coat alveoli

Steroids before birth enhance maturation

Fetal Lung Fluid Transition

ENaC – selective Na+ channel



Slide from L Jain

Respiratory Morbidity and C-section without Labor

- Respiratory morbidity in C/S without labor is 26% vs C/S with labor, 9% (Cohen, 1985)

- Respiratory morbidity was 14x higher in C/S without labor at 37 weeks than at term (Morrison, 1995)

- In C/S without labor, babies born at 37-38 weeks have 120X higher need for mechanical ventilation than babies born by C/S without labor at 39-41 weeks (Madar, *Acta Pediatr*, 1999)

- Delivery before 39 weeks even with documented fetal lung maturity has increased neonatal morbidity (Bates, *Am J Ob Gyn* 2009;201(6):S17.)

Respiratory Morbidity and C-section without Labor

- Elective C-section and rates of NICU admission and clinical respiratory distress.
- Only studied infants >36 weeks or >2500 gm.
- NICU admission 13.1% from elective C-section deliveries compared to 7.3% in a cohort of vaginal deliveries.
- Elective C/S occuring after **38 4/7 weeks** significantly reduced the risk of NICU admission and the risk of respiratory distress.
- A **one day** advancement in gestational age could reduce the risk of respiratory distress by 7%.

Yee W, Amin H, Wood S. *Obstet & Gynecol* 2008;111(4):823-8.

Respiratory Morbidity in Late Preterm Infants

Lackland AFB 1990-1998

- Compared with cephalic vaginal birth, respiratory morbidity occurred at rates four-fold higher after C-section and vaginal breech delivery.
- Risk of respiratory morbidity markedly increased as gestation decreased below 37 weeks.
- Compared to 0.7% of births at 39 weeks, clinically significant respiratory distress was diagnosed in
  - 1.4% at 37 weeks (2X),
  - 3.9% at 36 weeks (5X),
  - 8.5% at 35 weeks (12X), and
  - 22% at 34 weeks (30X).

Yoder BA, Gordon MC, Barth WH. Late Preterm Birth: Does the Changing Obstetric Paradigm Alter the Epidemiology of Respiratory Complications. *Obstet Gynecol* 2008;111(4):814-22.

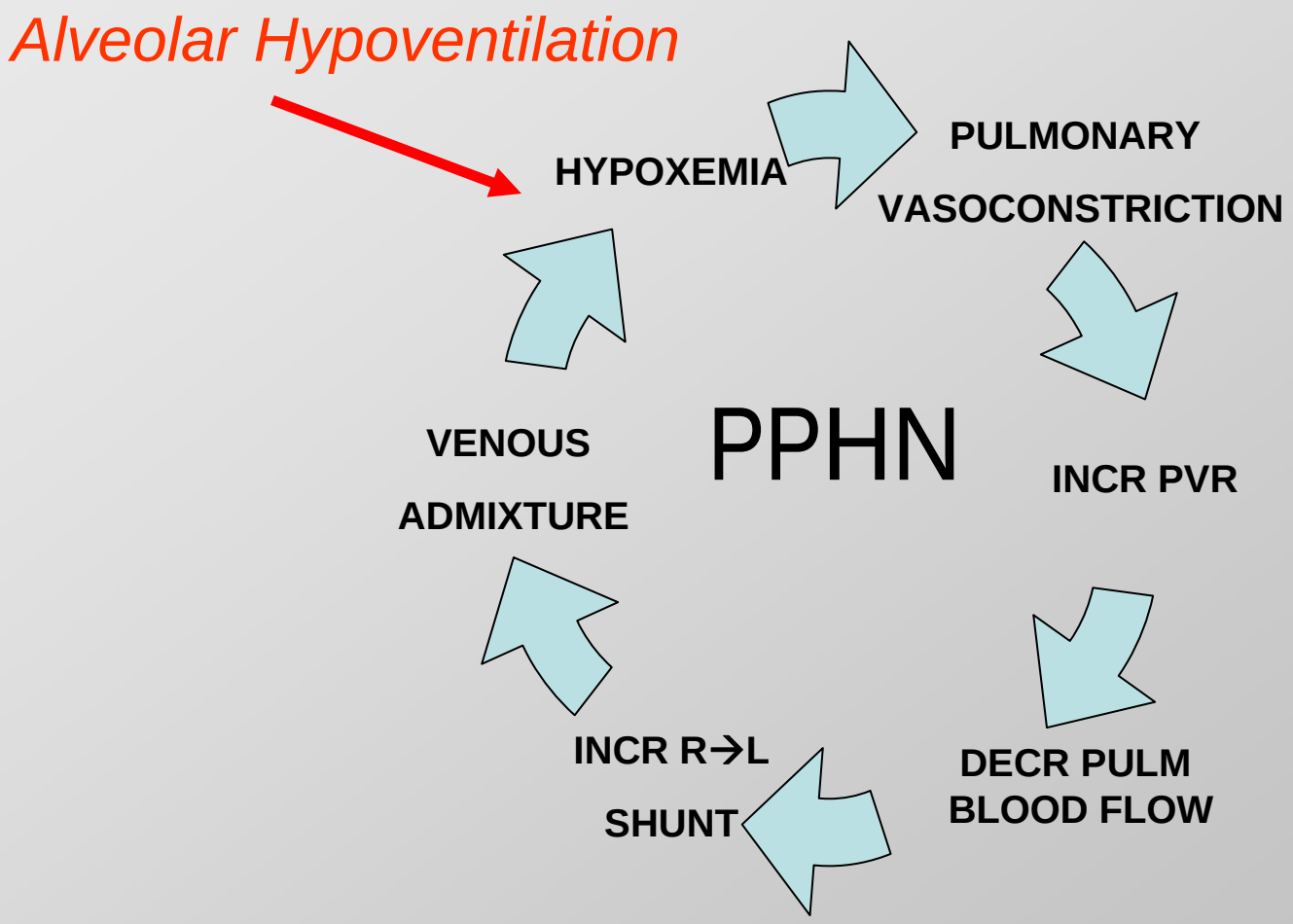
Respiratory Morbidity in Late Preterm Infants

- **Consortium on Safe Labor. *JAMA* 2010;304(4):419-25.**
- **Contemporary cohort, 19,334 LPTB from 19 hospitals across the country, 2002-2008**

Adjusted Odds Ratio from Multivariate Logistic Regression Comparing Morbidities across Gestational Ages

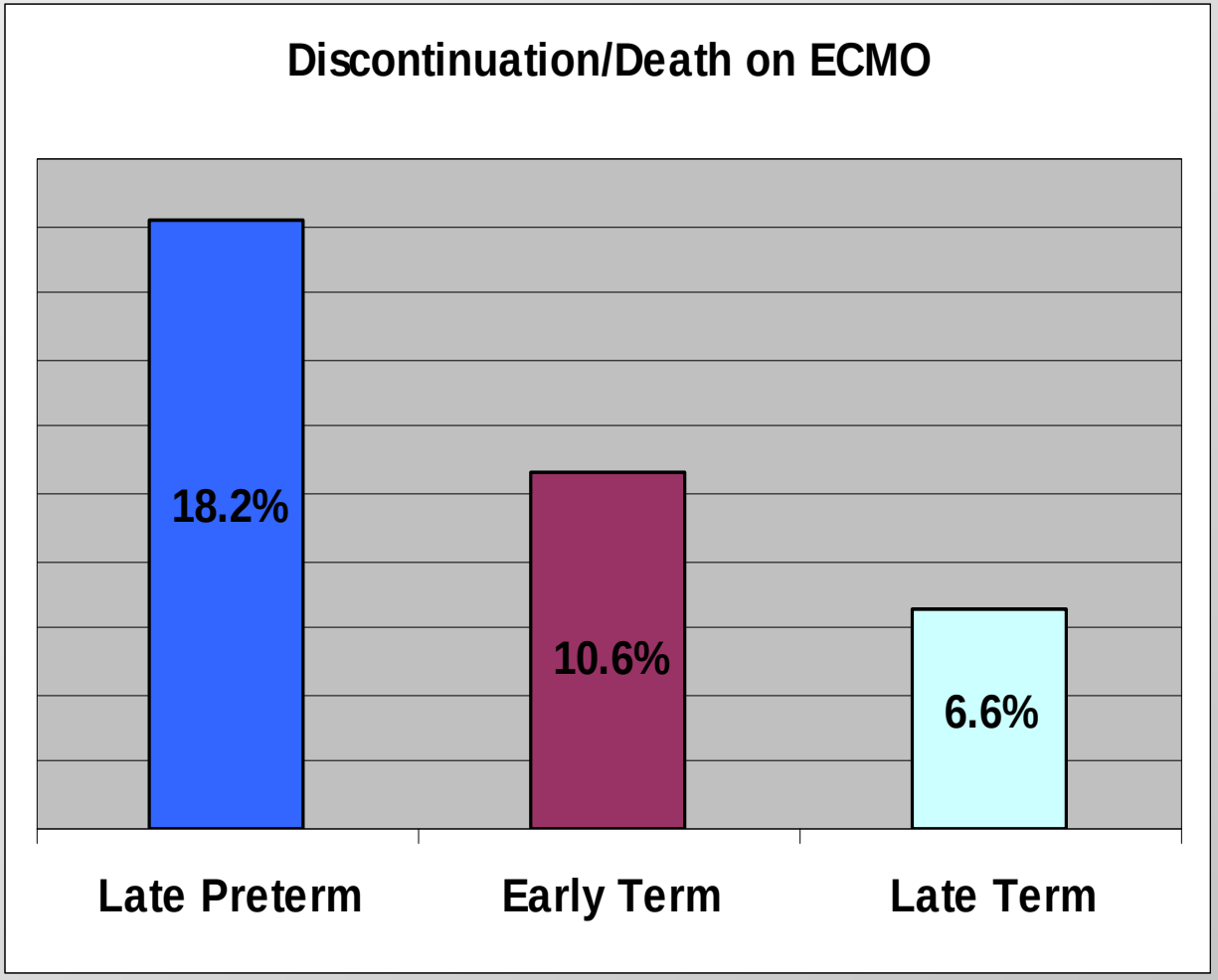
Gest Age	RDS	Vent	HFO
39-40	1=R	1=R	1=R
38	1.1	1.2	0.9
37	3.1	2.8	2.8
36	9.1	7.3	7.1
35	21.1	9.8	12.3
34	40.1	13.9	18.8

Late Preterm Infants: High Risk for PPHN from Abnormal Transition



Goldsmith JP, Karotkin EH. Assisted Ventilation of the Neonate, p.53

ECMO Course



National ECMO Registry, 1990-2000

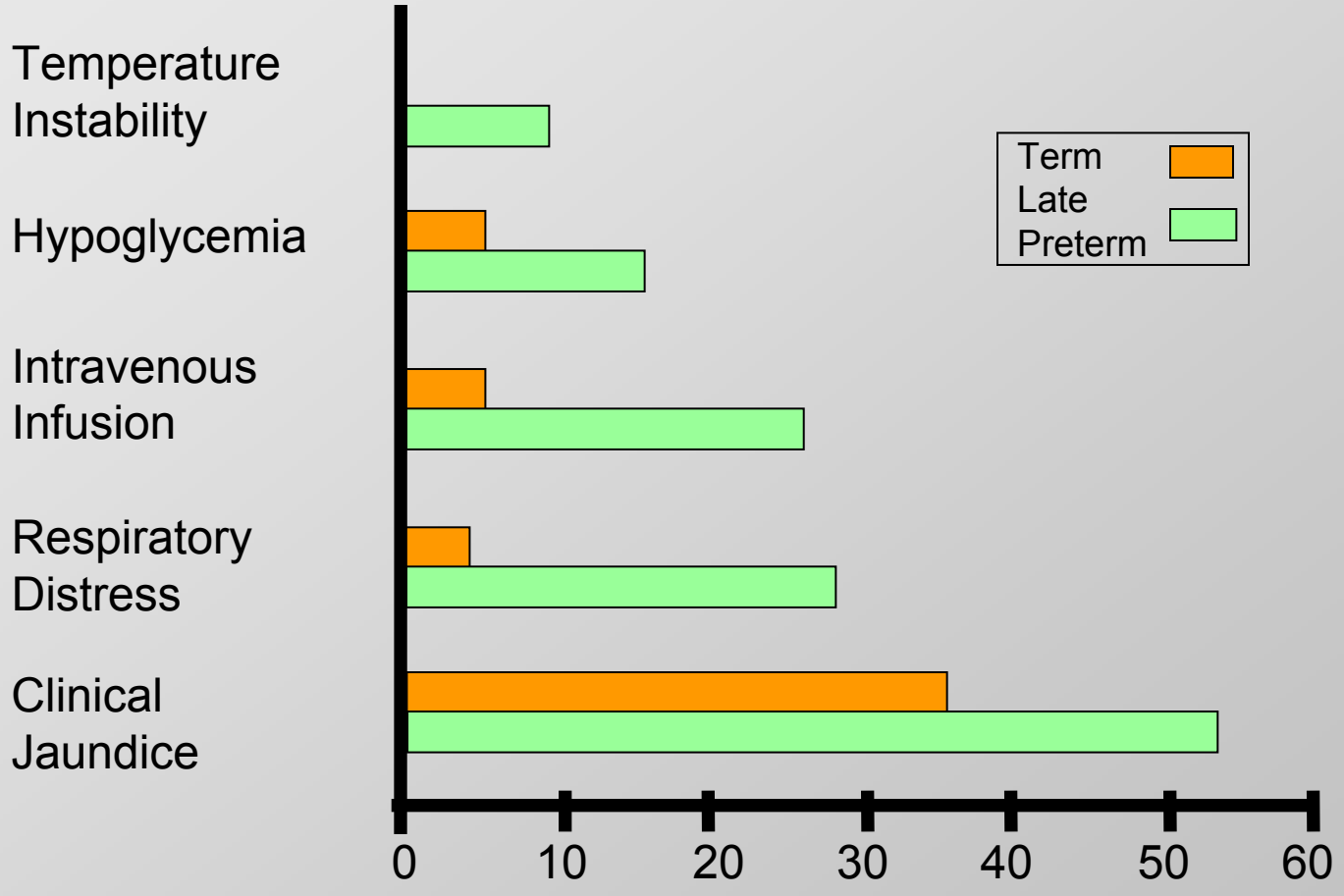
23% of the ECMO babies were born by elective repeat C/S

11% of all ECMO DEATHS were born by elective repeat C/S

L. Jain, 2008

"Transient"Consequences of Late Preterm

Late Preterm Infants Are Still Preterm



Wang M. *Pediatrics.* 2004;114:372-6.

The Late Preterm Morbidity
HYPOGLYCEMIA

Hypoglycemia is 3X more common in late preterm infants than in term.

Glucose is the major metabolic fuel for the brain.

"Transient" hypoglycemia at birth can be associated with neurodevelopmental abnormalities later (decreased cognitive scores, increased incidence developmental delay, sz) and structural changes seen on MRI.

Unlike term infants, **late preterm infants are *incapable*** of mounting an adequate mature counter-regulatory response to hypoglycemia

- Gluconeogenesis, ketogenic responses to mobilize alternate fuels is inadequate
- Glycogen reserves, adipose stores build up only in late gestation
- Astrocytes in the glia are still immature.

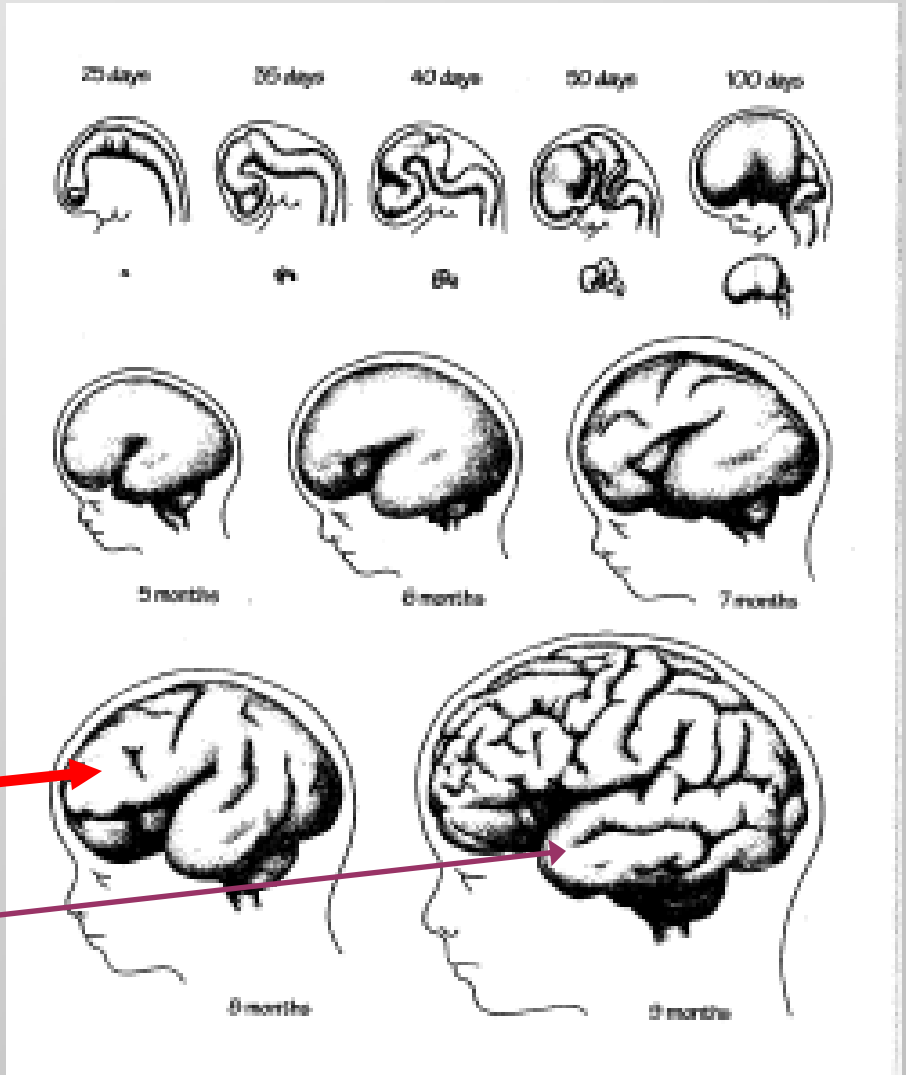
Garg M, Devaskar SU. Glucose Metabolism in the Late Preterm Infant. *Clin Perinatol 2006;*33:853-70.

Development of the Human Brain through Gestation

The brain is the last major organ to develop.

Lower functions mature first, cortex last.

Brain at 35 wks weighs only 2/3 what it will weigh at term.



Cowan WM. *Sci Am* 1979;241:113.

The Late Preterm Infant Brain Development: Brainstem

TERM INFANTS
CNS maturity:

- Rhythmic respiration
- Temperature regulation
- Coordination of suck/swallow/breathe

LATE PRETERM INFANTS
Symptoms of immaturity:

- Apnea
- Poor temperature control
- Feeding problems

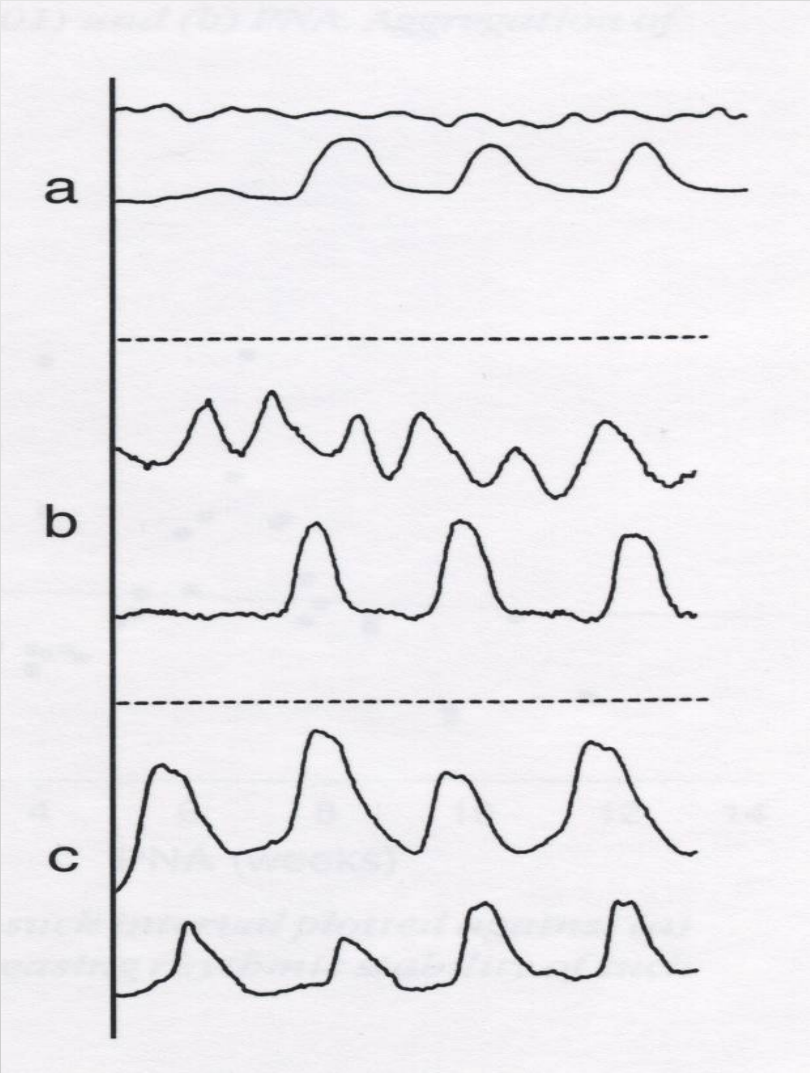
- Darnall RA, Ariagno RL, Kinney HC. The Late Preterm Infant and the Control of Breathing, Sleep, and Brainstem Development: A Review. *Clin Perinatol*. 2006;33:883-914.
- Hunt CE. Ontogeny of Autonomic Regulation in Late Preterm Infants Birth at 34-37 weeks Postmenstrual Age. *Semin Perinatol* 2006;30:73-6.

Brainstem Maturation and Poor Feeding

32 w

33 w

37 w



Suck

Swallow

Suck

Swallow

Suck

Swallow

Gewolb. *Dev Med Child Neurol* 2001;43:22-7.

The Late Preterm Infant – Brain Development: Cerebellum

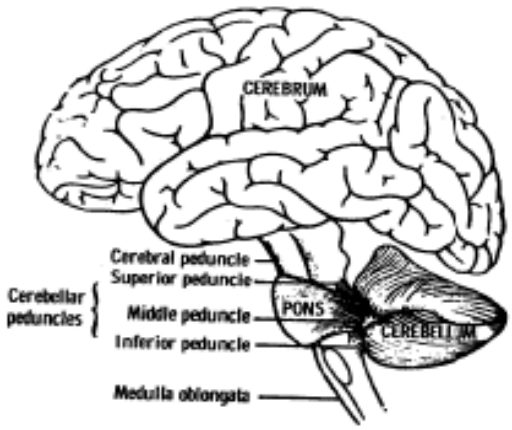


FIG 12–10. **Diagrammatic representation of the principal parts of the brain.** The parts are distorted to show the cerebellar peduncles and the way the cerebellum, pons, and middle peduncle form a napkin ring around the brain stem. (Reproduced, with permission, from: *Gray's Anatomy of the Human Body*, 27th ed. Goss CM [editor]. Lea & Febiger, 1959.)

Volume of the Cerebellum at 34 weeks is only 55% of that at term.

- –Preterm birth alters cerebellar growth and autoregulation
- –Function related to
  - •Fine motor control
  - •Coordination
  - •Motor sequencing
  - •Cognition & language
  - •Social function & learning

Adams-Chapman I. Neurodevelopmental Outcome of the Late Preterm Infant. Clin Perinatol 2006;33:947-64.

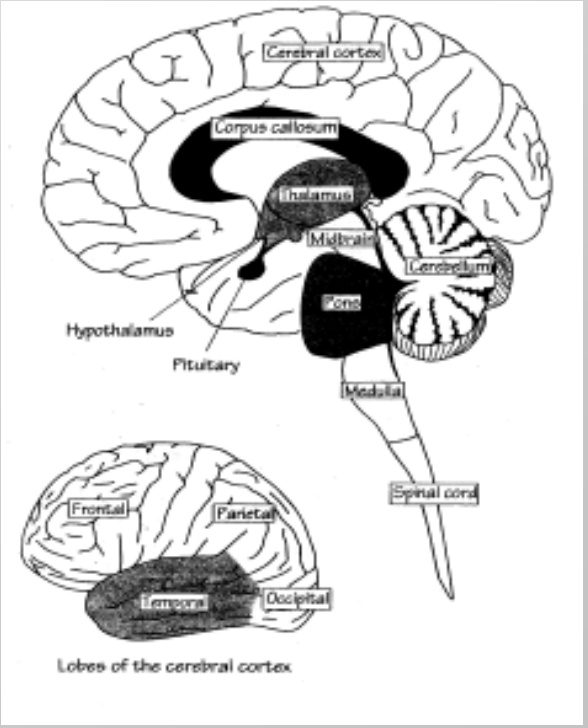
The Late Preterm Infant – Brain Development: White Matter

Volume of the white matter increases 5-fold from 35-41 weeks

- PeriVentricular Leukomalacia precedes the onset of active myelin sheath synthesis – pre-oligodendrocytes

  - PVL associated with cognitive and behavior abnormalities correlates with preferential injury to pre-OL

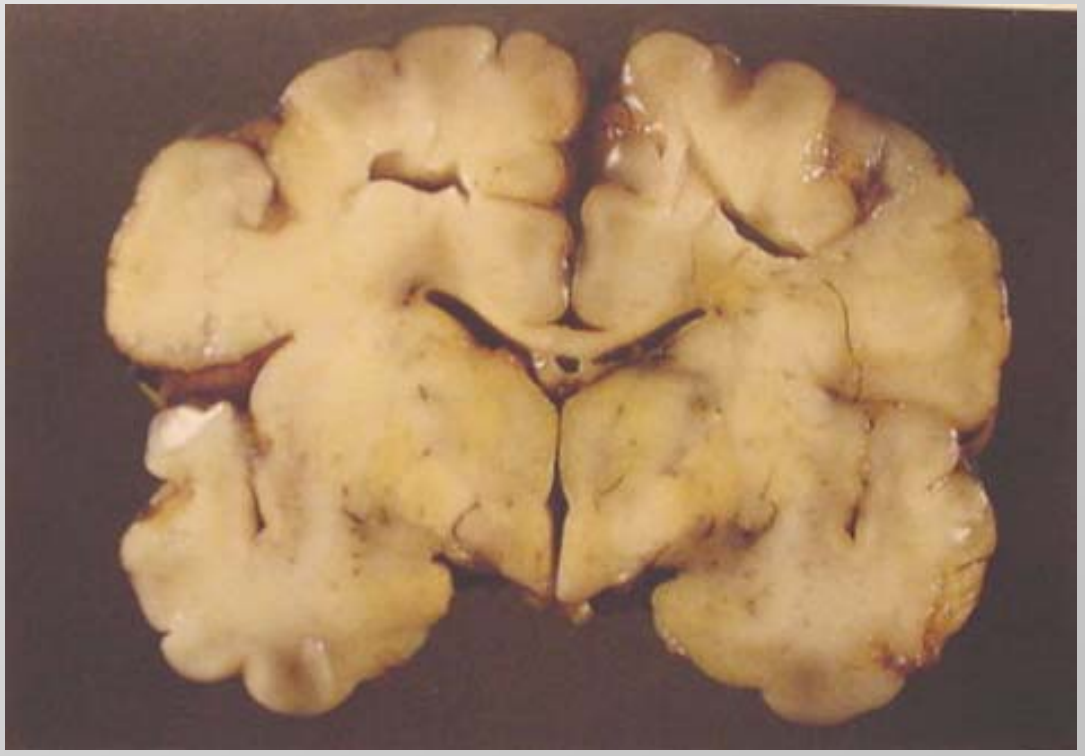
  -In the Late Preterm Infant, PreOL predominate in white matter



Kinney HC. The Near-Term (Late Preterm) Human Brain and Risk for Periventricular Leukomalacia: A Review. *Semin Perinatol* 2006;30(6):81-8.

Hyperbilirubinemia

- Late preterm infants have increased risk for acute bilirubin encephalopathy and kernicteris.

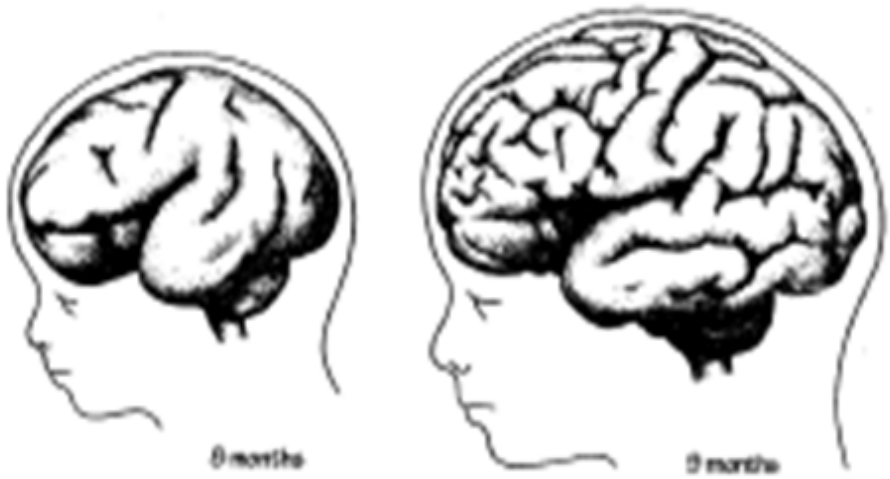


The Late Preterm Infant – Brain Development: Cerebral Cortex

CEREBRAL CORTEX Volume at 34 weeks is only 53% of the volume at term

Cortex is where we think and do higher order functions – cognition, perception, reason, motor control

Brain is in the "Period of Organization" [Hard-wiring]



Late Preterm Infant
Brain Development - Cortex

GAP-43 expression reflects axon formation. This activity peaks at 34-36 weeks

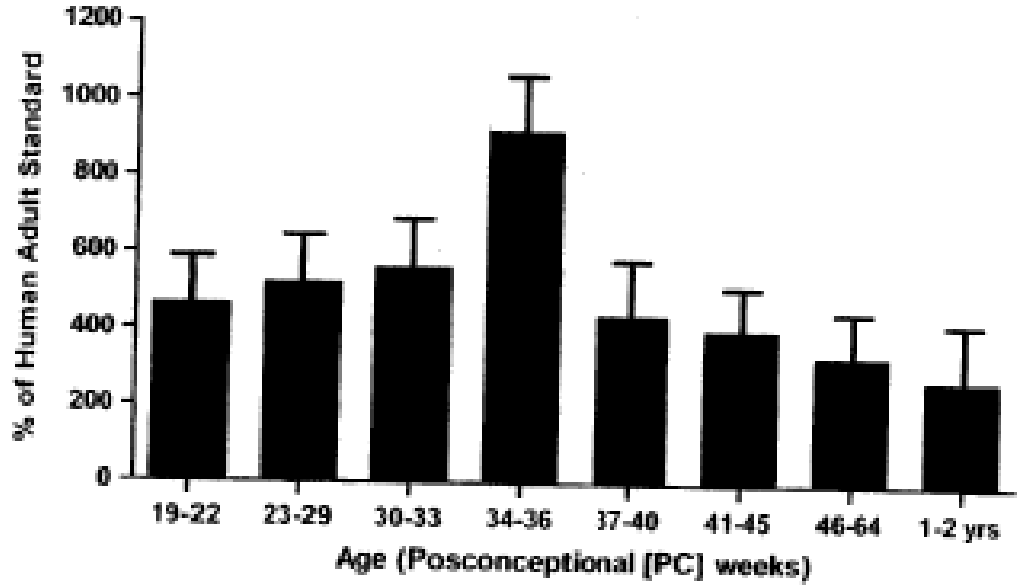


Fig. 4. GAP-43 expression levels in the developing cerebral (parietal) cortex of human infants grouped according to ages (3–5 cases/group) reflecting epochs of brain development (including the late preterm period). Data are expressed as a percent of adult human standard. Of note, during the late preterm period (34–36 weeks), GAP-43 expression in the cerebral cortex remains high, suggesting that axons are still growing ($P = 0.12$) (*Data courtesy of* R.L. Haynes, PhD, Boston, MA, and Natalia Borenstein, MS, Boston, MA).

Billiards SS, Pierson CR, Hayes RL, Folkerth RD, Kinney HC. *Clin Perinatol* 2006;33:915-34.

Late Preterm Infant: Neurodevelopmental Outcomes

- "Given that late-preterm infants are born before their nervous systems have fully developed, large population studies that evaluate long-term neurodevelopmental and behavioral outcomes of these children are needed."

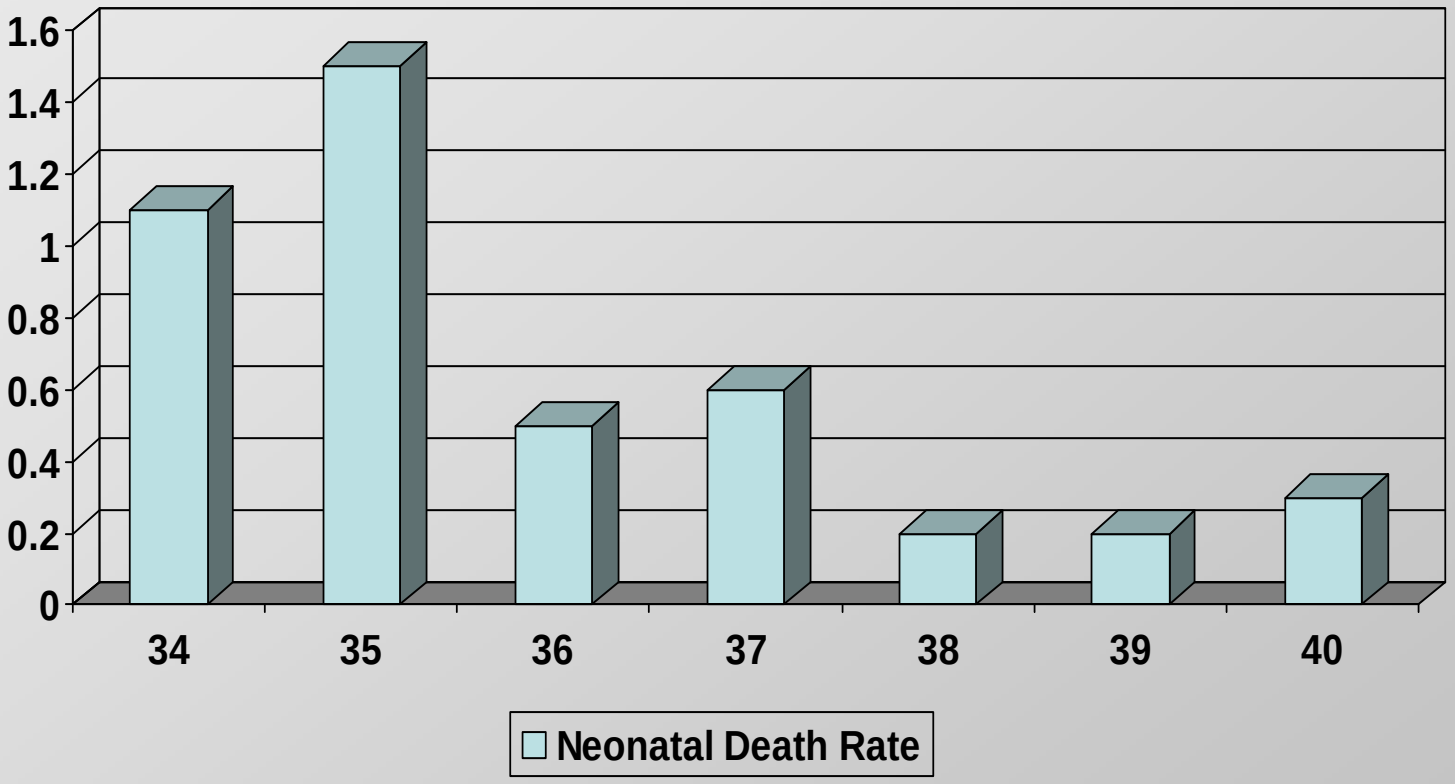
Engle WA, Tomashek KM, AAP Committee on Fetus and Newborn. *Pediatrics*. 2007 Dec;120(6):1390-1401.

Mortality in the Late Preterm

- Late preterm infants were 3 times more likely than term infants to die in the first year of life.
- Even excluding congenital anomalies, infant mortality rates for late preterm infants were 2.6 times higher than in term infants.
    - Early Neonatal (<7 days): 6X more likely to die
    - Late Neonatal: 3X more likely
    - Post Neonatal: 2X more likely
- Late preterm infants are 8.5 times more likely to die with a diagnosis of respiratory distress in the early neonatal period.
- Late preterm infants are twice as likely as term infants to die of SIDS.

Tomashek, KM, Shapiro-Mendosa CK, Davidoff MJ, Petrini JR. Differences in Mortality between Late-Preterm and Term Singleton Infants in the United States, 1995-2002. *J Pediatr* 2007;151:450-6.

Mortality in the Late Preterm



Neonatal death rates from 34-40 weeks of gestation in singleton infants without malformations. Neonatal death rates at 39 weeks were significantly lower when compared to those at 34, 35, 36, or 37 weeks. McIntire, Leveno. Late Preterm Births and Neonatal Morbidity. *Obstet Gynecol*. 2008;111:35-41.

Mortality in the Late Preterm

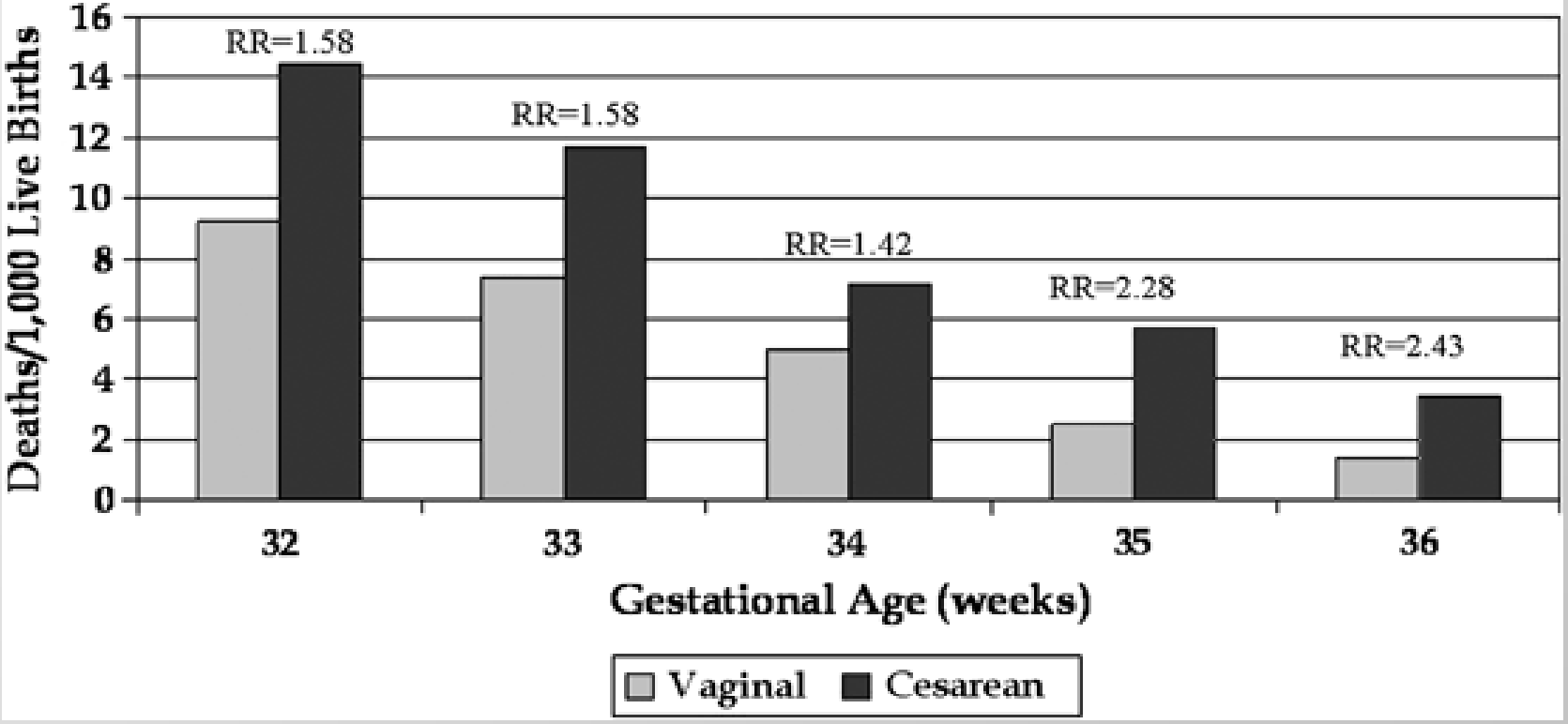


Figure 2. *Neonatal mortality rates (0–27 days) per 1,000 live births for cesarean and vaginal deliveries by gestational age, United States, 2000–2003 (trimmed data) (relative risk = cesarean section vs vaginal delivery).*

Malloy MH. Impact of Cesarean Section on Intermediate and Late Preterm Births, US, 2000-2003. *Birth* 2009;36(1):26-33. Data is risk adjusted, congenital anomalies and maternal conditions removed to achieve data set of low risk preterm infants.

Morbidity in Late Preterm Infants

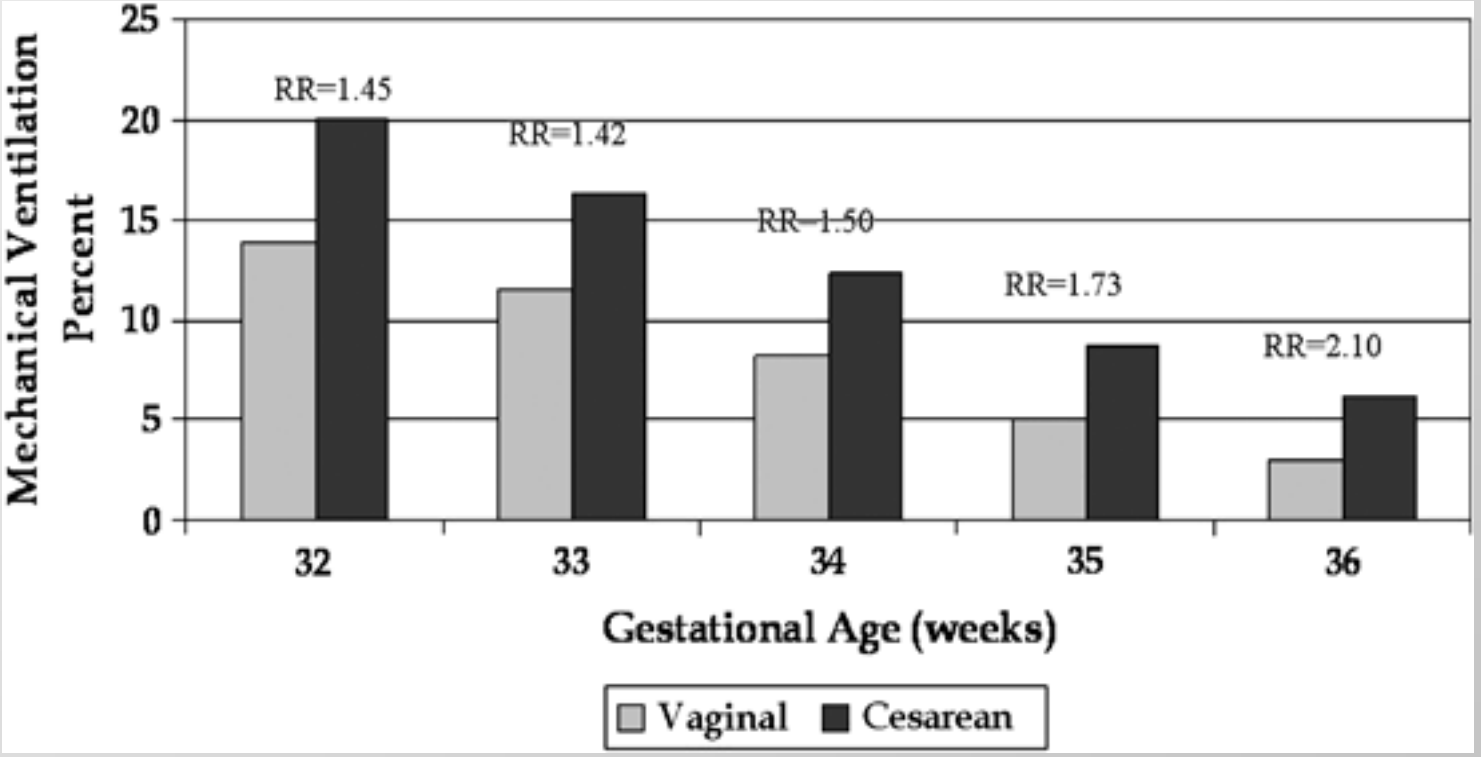


Figure 3. *Percentage of infants requiring any mechanical ventilation after cesarean or vaginal delivery by gestational age, United States, 2000–2003 (trimmed data) (relative risk = cesarean section vs vaginal delivery).*

Malloy MH. Impact of Cesarean Section on Intermediate and Late Preterm Births, US, 2000-2003. *Birth* 2009;36(1):26-33. Data is risk adjusted, congenital anomalies and maternal conditions removed to achieve data set of low risk preterm infants.

Neonatal Morbidity in Late Preterm

- Late preterms were 7X more likely to have newborn morbidity than term infants. Newborn morbidity rate doubled for each gestational week earlier than 38 weeks.
- The proportion of morbidity among late preterm infants was relatively high across the board, ranging from 18.1% to 27.8%.

Shapiro-Mendosa CK, et al. *Pediatrics* 2008;121:e223-e232.

Neonatal Morbidity in Late Preterm

– The independent effect of late preterm birth on morbidity was 7X stronger than any of the selected maternal conditions:

- Hypertensive disease in pregnancy
- Diabetes
- Antepartum hemorrhage
- Acute or chronic lung disease
- Maternal infection
- Cardiac disease
- Renal disease
- Genital herpes

Shapiro-Mendosa CK, et al. *Pediatrics* 2008;121:e223-e232.

Late Preterm Outcomes: Early Childhood

- 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.**
  - **Moster, et al. *JAMA* 2010;304(9):976-982 (relative risk of CP 3.7 at 37 weeks).**

- Increased Risk Developmental Delay, Special Needs in Preschool, Problems with School Readiness
  - **Morse SB, et al. *Pediatrics* 2009;123:e622-e629. [Healthy LPTB]**
  - **Petrini, et al. *J Pediatr.* 2008.**
  - **Chyi LJ, et. al. *J Pediatr*. 2008;153:25-31.**
  - **Fuchs K, Wapner R. *Clin Perinatol.* 2006;33:793-801.**
  - **Adams-Chapman I. Neurodevelopmental Outcome of the Late Preterm Infant. *Clin Perinatol.* 2006;33:947-64.**

Late Preterm Outcomes: Childhood

- 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.**
- Increased cognitive dysfunction and learning problems
  - **Chyi LJ, et. al. *J Pediatr.* 2008;153:25-31.**
  - **Saigal S, et al. *Lancet* 2008;371:261-9.**
  - **Pietz, et al. *Early Hum Dev.* 2004;79:131-43.**

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.* 2006;33:751-63.

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 of Mental Retardation (RR 1.6)
- Increased risk of Schizophrenia and mental disorders (RR 1.6)
- 40% increased risk for medical disability that severely limits working capacity as an adult

Moster, et al. *NEJM* 2008;359:262-73.

Late Preterm Outcomes as Young Adults

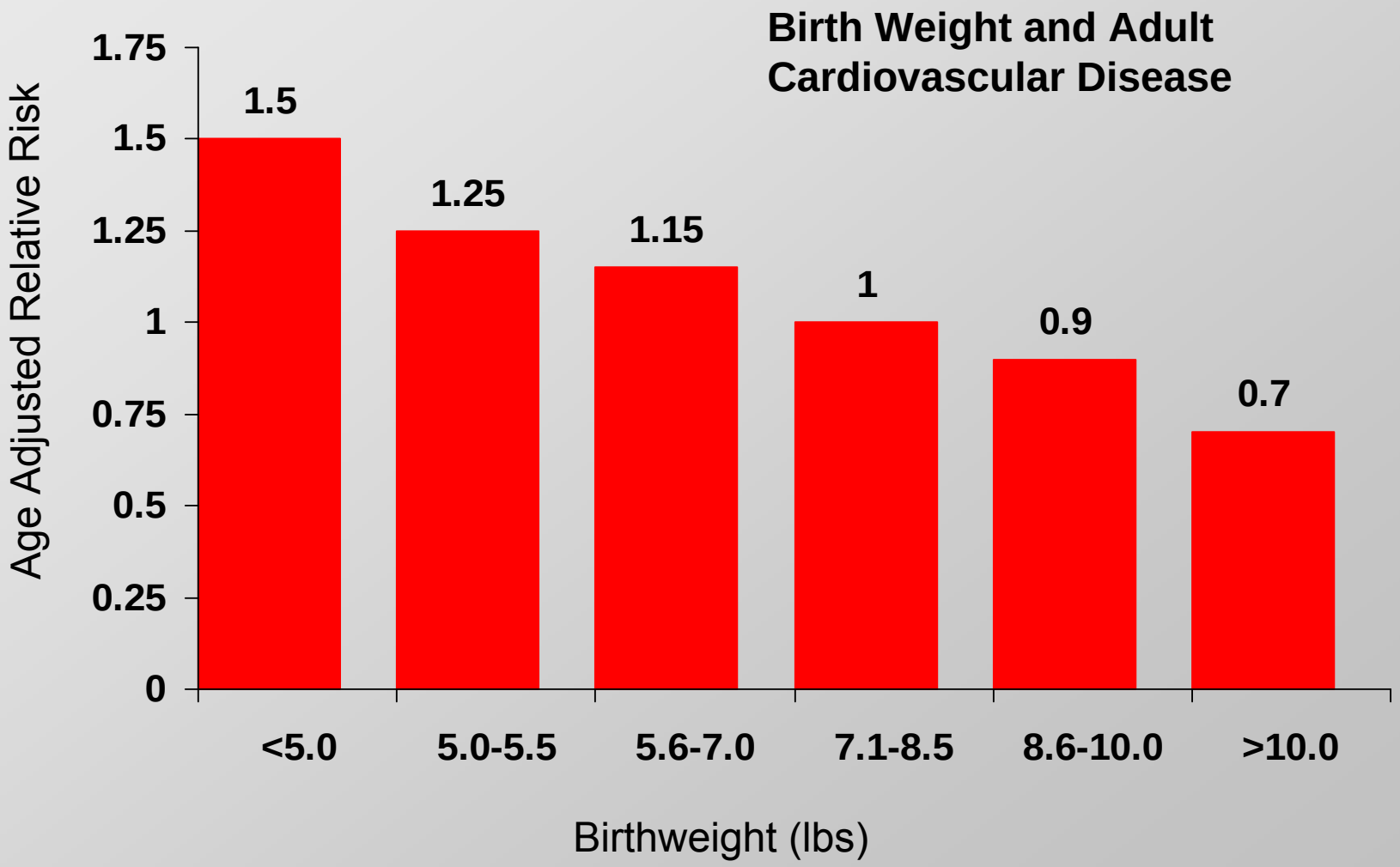
Long-term neurologic handicap due to prematurity measured in young adults (age 23-29) in Sweden (n=522,310)

72% of the long term disability associated with prematurity was in persons who had been late preterm infants (33-37 weeks)

Lindstrom K, et al. *Pediatrics* 2007;120:70.

Fetal Origins of Adult Disease

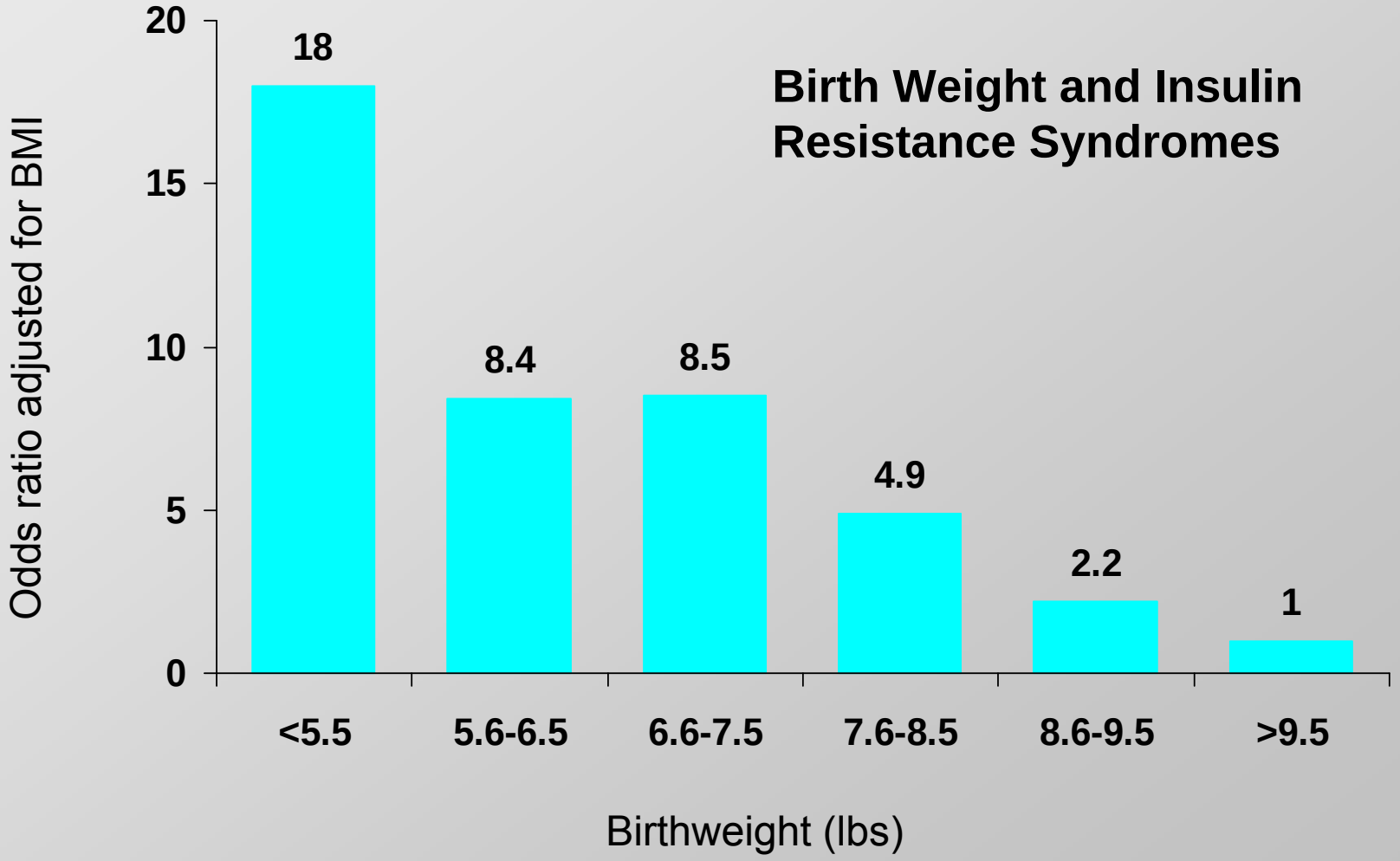
Barker Hypothesis



Rich-Edwards, 1997

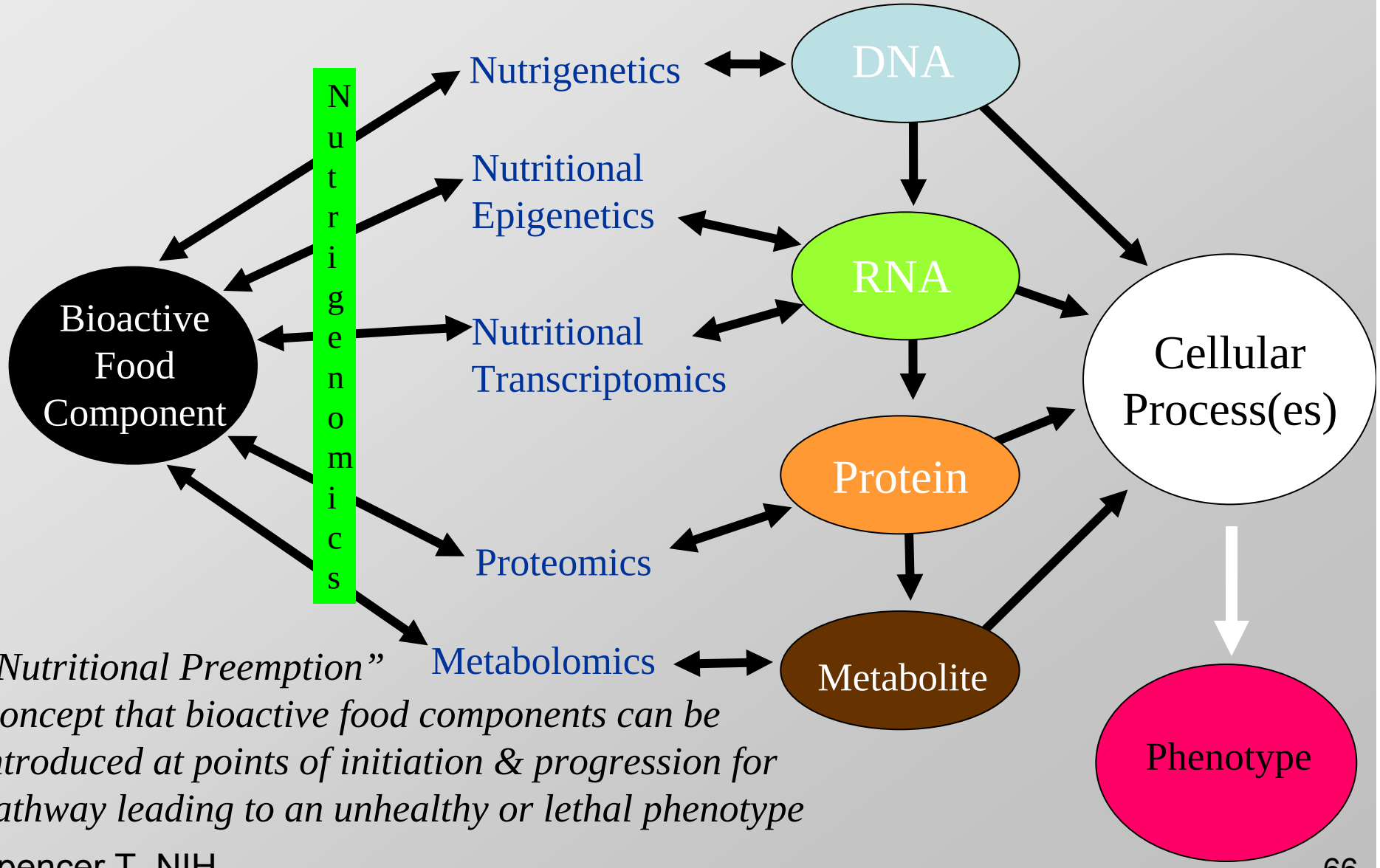
Fetal Origins of Adult Disease

Barker Hypothesis



Barker, 1993

The "Omics" and Ability of Foods to Influence Health



"Nutritional Preemption"
Concept that bioactive food components can be introduced at points of initiation & progression for pathway leading to an unhealthy or lethal phenotype

Spencer T, NIH

Fetal Origins of Disease
New York Times, Oct. 2, 2010

- "Researchers are finding indications that obesity, diabetes, and mental illness among adults are all related in part to what happened in the womb decades earlier."

- "Perhaps the most striking finding is that a stressful intrauterine environment may be a mechanism that allows poverty to replicate itself generation to generation. Pregnant women in low income areas tend to be more exposed to anxiety, depression, chemicals and toxins, more likely to smoke or drink… the result is children who start life at a disadvantage…"

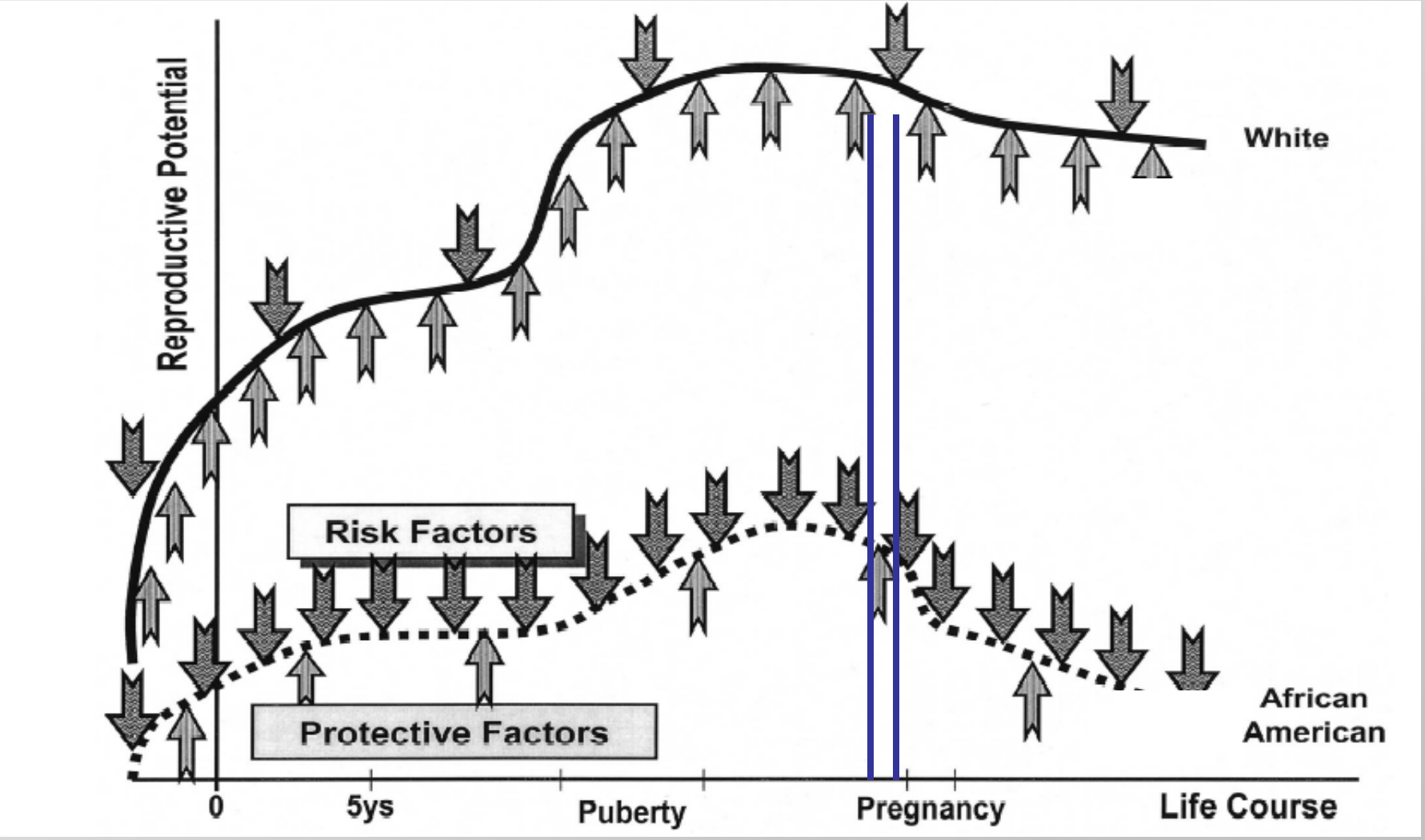
Fetal Programming

- Fetal programming can be defined as an early stimulus or insult operating at a critical or sensitive period of prenatal development that results in a long term change in the structure or function of the organism.

- Infants who are programmed by fetal growth restriction have increased risk of lifelong health complications.

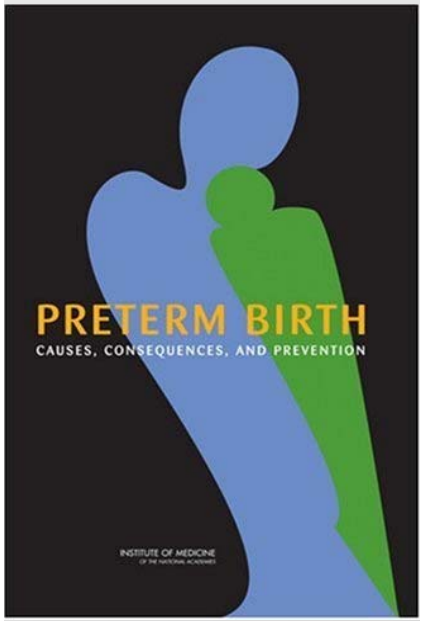
- "Coronary heart disease, the primary cause of death in men and women, is more closely related to birth weight than known behavioral risk factors. Thus, a significant portion of the disease burden borne by adults may have roots in antenatal nutrition and in poor transgenerational maternal health history" - NICHD, 2003 & Barker, 2007

Prematurity Prevention and the Life Course Perspective

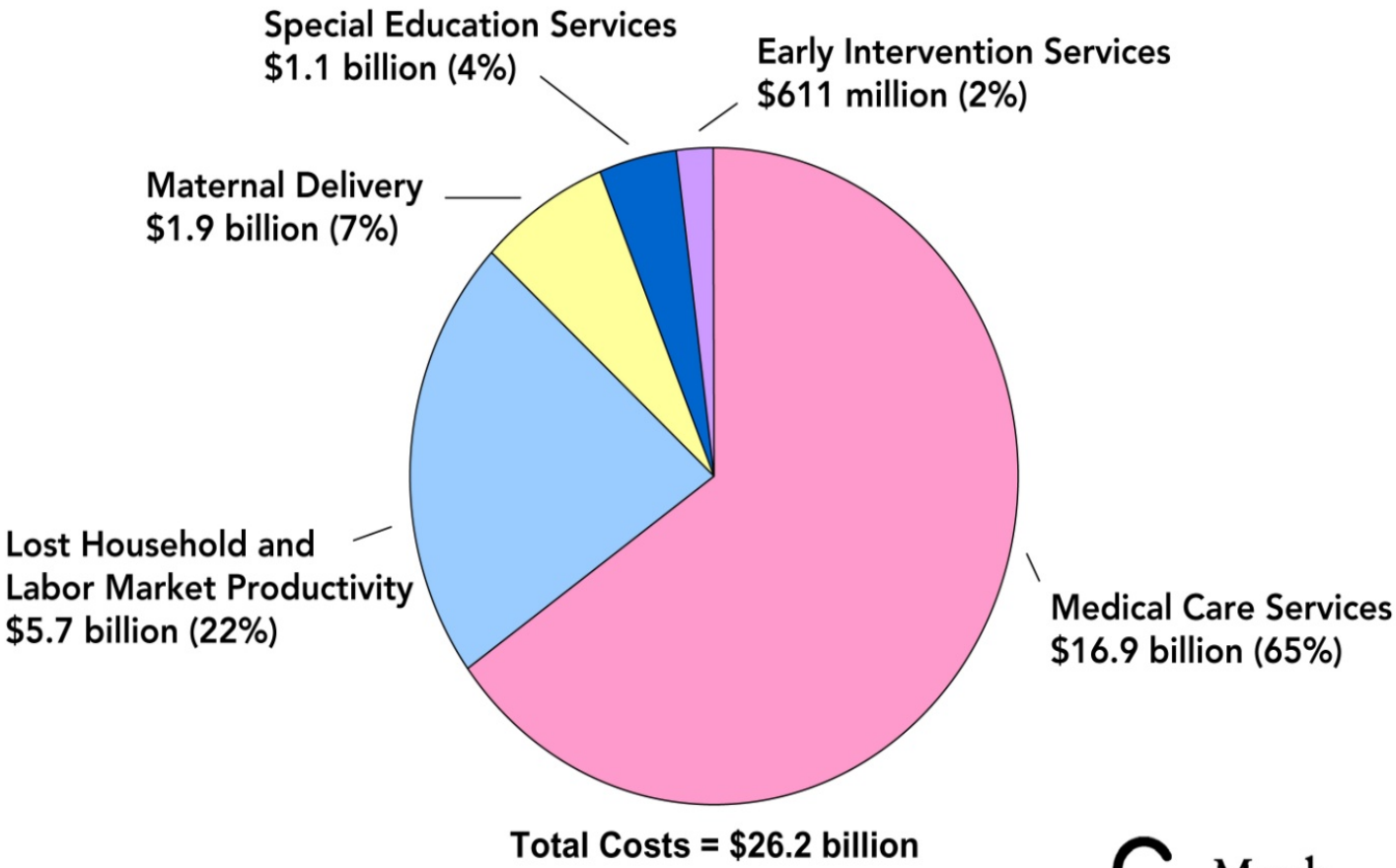


Lu MC, Halfon N. Racial and ethnic disparities in birth outcomes: a life-course perspective. *Maternal Child Health J.* 2003;7:13-30.

Institute of Medicine Report: Preterm Birth: Causes, Consequences, and Prevention, 2007



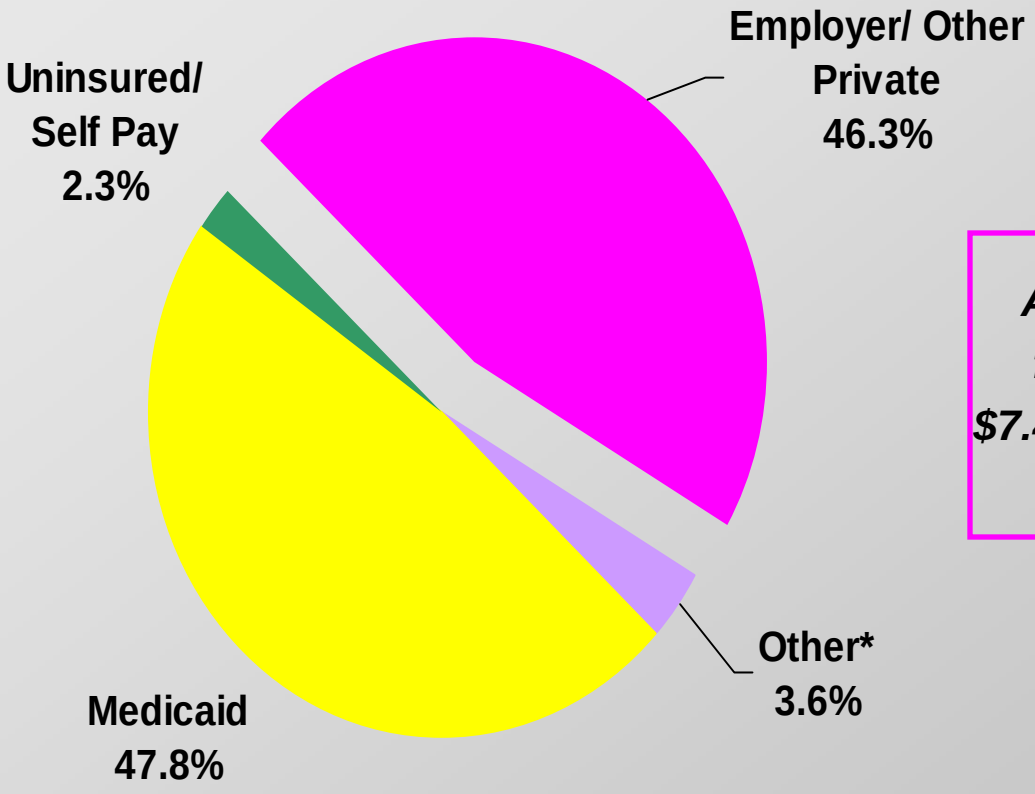
Annual Societal Economic Costs Associated with Preterm Birth, US, 2005



Preterm is less than 37 completed weeks gestation.
Source: Institute of Medicine. 2006. Preterm Birth: Causes, Consequences, and Prevention. National Academy Press, Washington, D.C. Published and unpublished analyses.
Prepared by the March of Dimes Perinatal Data Center, 2006.

March of Dimes
Saving babies, together®

Prematurity Hospital Charges: Percent by Expected Payer, US, 2002



Almost half of hospital charges for premature infants or about $7.4 billion were billed to employers and other private insurers.

***Includes Medicare**
Source: Agency for Healthcare Research and Quality, 2002. Nationwide Inpatient Sample Prepared by March of Dimes Perinatal Data Center, 2005

March of Dimes
Saving babies, together

Initial Costs of Prematurity

- Employer costs for a premature birth are about $41,610 vs $2,830 for a full term infant (March of Dimes).
- Initial hospital costs for preterm infants were projected at $5.8 BILLION (2001 HCUP data).
  - Over 2/3rds of the costs were for the substantial number of infants who were not extremely preterm.

    Russell RB, et al. *Pediatrics* 2007;120:e1-e7.
- KY Medicaid paid out **more than 4X** as much for the care of babies 35-36 weeks (late preterm infants) as they did for babies in the 25-26 weeks category (micropreemies).

Late Preterm Costs

Obstetrical Costs:

A California study estimated that over $49 million could be saved if non-indicated deliveries between 34 and 37 weeks were avoided for one year.

Gilbert WM, Nesbitt TS, Danielson B. The cost of prematurity: quantification by gestational age. *Obstet Gynecol.* 2003;102:488-92.

Late Preterm Medical Costs:

- Increased NICU Admission, stays >5 days
- Increased need for ventilator, respiratory support
- Increased readmissions (feeding problems, jaundice)
- Preterm avg. 14.5 days of hospitalization in first year of life (parents miss work)

Early Intervention Costs (Massachusetts):

- Mean cost of EI services per moderate/late preterm infants (33-36 weeks) was more than twice the cost per term birth.
- Moderate/late preterm infants comprised 8.7% of the infants served, but 16% of the costs to the system.
- Very preterm births incurred only 8% of the costs to the system.

Clements KM, Barfield WD, Ayadi FA, Wilbur N. *Pediatrics* 2007;119:e866-e874.

Why Are Late Preterm Rates Rising?

Changing culture of childbearing

"An inaccurate perception held by the public is that improved neonatal care has resolved the problems of preterm infants."

(Iams, 2008)

- Less concern with "natural" childbirth
- Public preference/autonomy
  - scheduling of deliveries, negotiation of delivery date
  - elective induction
  - cesarean delivery of maternal request (CDMR)
- More high risk pregnancies
  - advanced maternal/paternal age (AMA/APA)
  - chronic/developing problems
  - multiples births, infertility management
  - obesity, diabetes (gestational), pre-eclampsia

Why Are Late Preterm Rates Rising?

Changes in clinical management (more interventions)

"Although ACOG stated that elective delivery should not be performed before 39 weeks... there existed the widespread perception among obstetric care providers that this recommendation was unwarranted." (Oshiro, 2009)

- Increased fetal monitoring
- Window to administer antenatal steroids 24-34 weeks
- Increase in survival to almost 100% at 34 weeks
- Litigious environment, fear of suit, defensive medicine
  - 2006 ACOG liability survey 89.2% (79.1% in 2003) named in a claim; average 2.6/career
- Change in 'risk tolerance'
  - Ecker JL, Frigoletto FD. *NEJM*. 2007 Mar 1;356:885-8.
- Reimbursement system changes

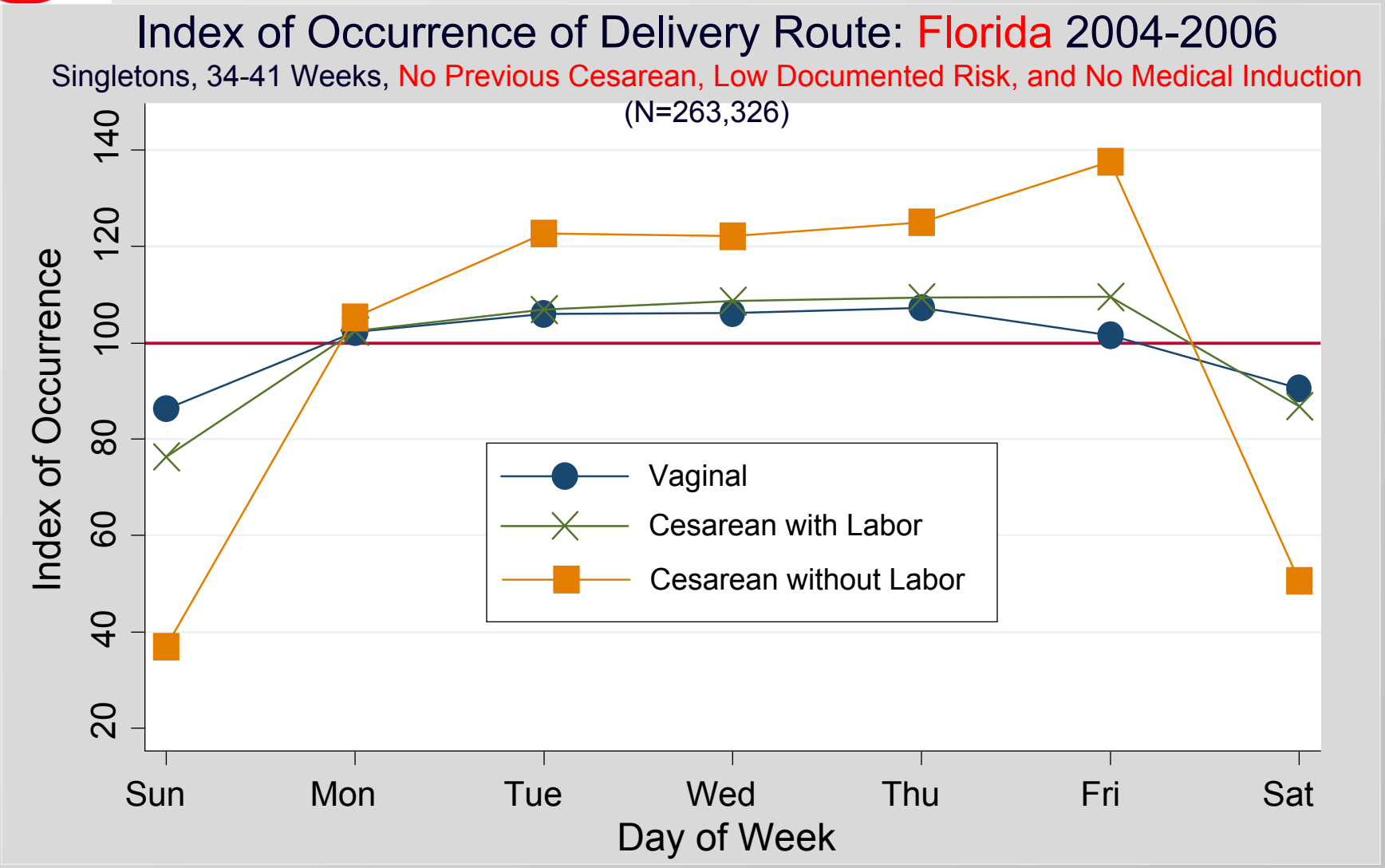
Low Documented Risk for Cesarean Delivery (FL)

NONE of the following are documented using the birth certificate:

- Hypertension prepregnancy (Chronic)
- Hypertension gestational (PIH, Preeclampsia)
- Hypertension - Eclampsia
- Diabetes Prepregnancy (Diagnosis prior to the pregnancy)
- Gestational Diabetes (Diagnosis in this pregnancy)
- Prolonged labor (≥ 20 hours)
- Moderate/Heavy meconium staining of the amniotic fluid
- Fetal intolerance of labor (such that in-utero resuscitative measures and/or further fetal assessment and/or operative delivery actions are taken)
- Clinical Chorioamnionitis diagnosed during labor or maternal temperature >38ºC
- Non-vertex presentation
- Fetal presentation at birth other than cephalic
- A birth weight greater than 4,500-g
- Any of these congenital anomalies:
  - Anencephaly
  - Congenital diaphragmatic hernia
  - Meningomyelocele/Spina bifida
  - Omphalocele
  - Cyanotic congenital heart disease
  - Gastroschisis
- Modified GINDEX indicates intensive prenatal care use

Goodman et al., 2008

Day of the Week: Births 34-41 Weeks



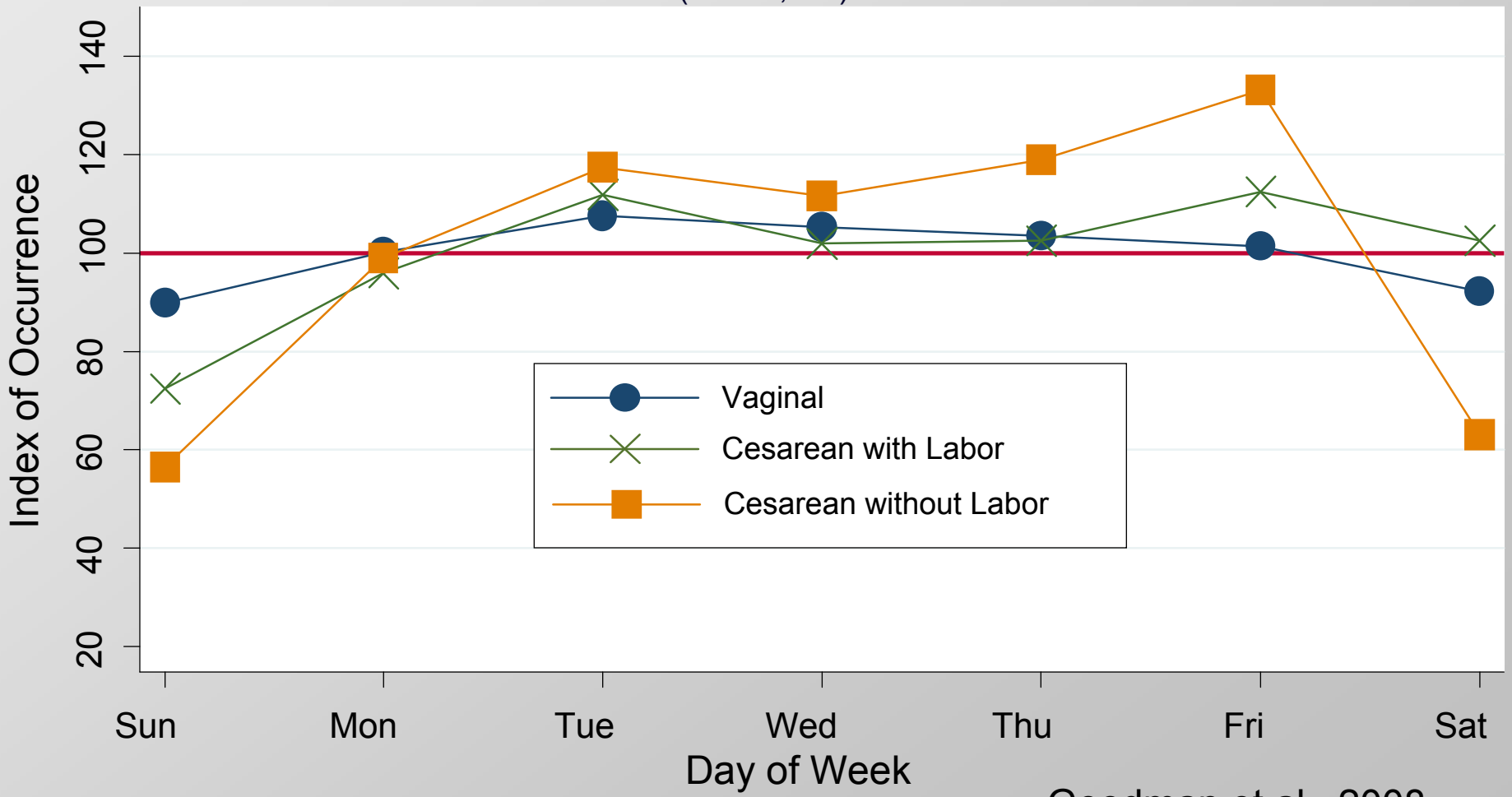
Data Source: 2004-2006, Florida Final Birth File.

Goodman et al., 2008

Day of the Week: Late Preterm

Index of Occurrence of Late Preterm: Florida 2004-2006

Singletons, 34-36 Weeks, No Previous Cesarean, Low Documented Risk, and No Medical Induction (N=263,326)



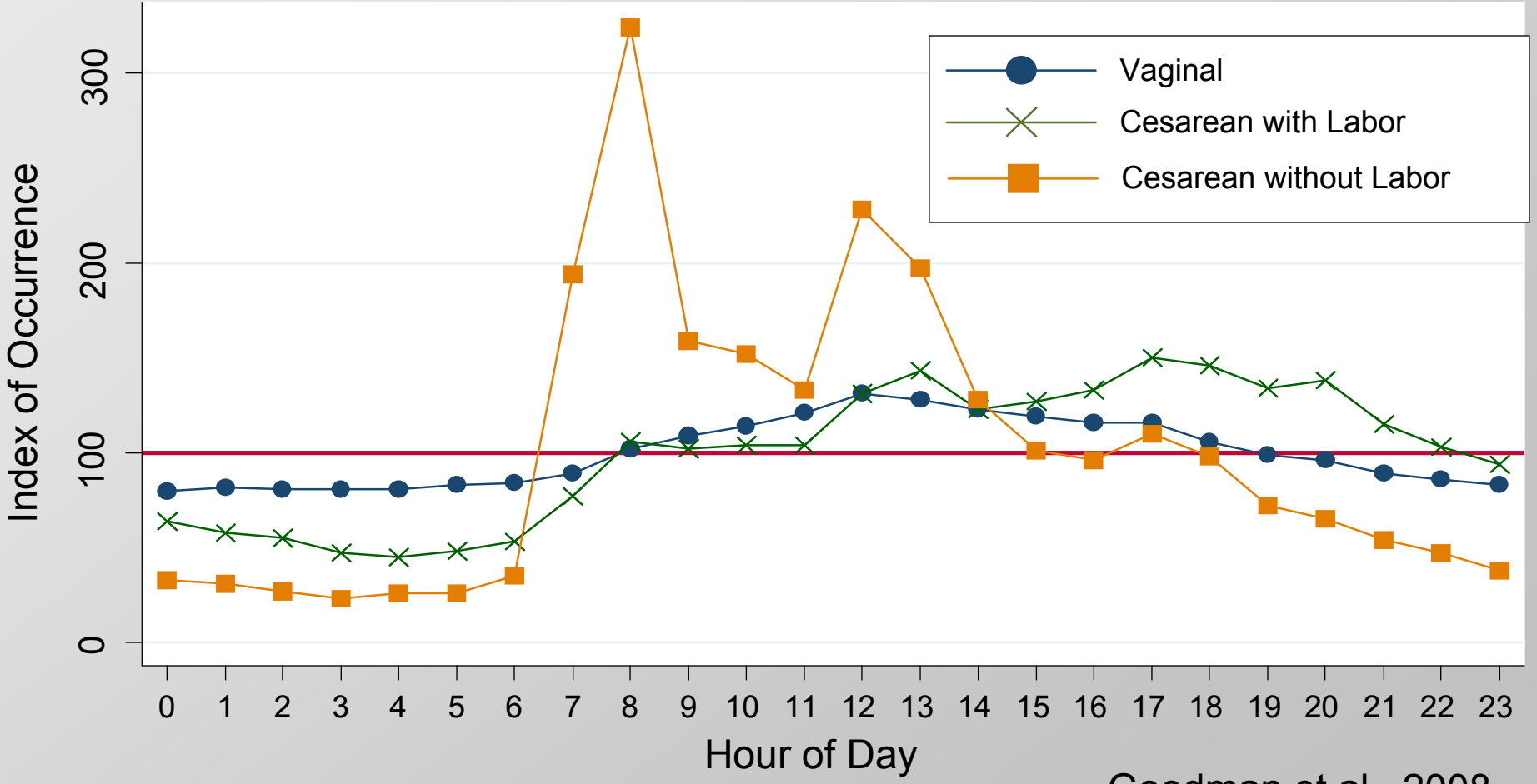
Data Source: 2004-2006, Florida Final Birth File.

Goodman et al., 2008

Hour of the Day: Births 34-41 Weeks

Index of Occurrence of Delivery Route: Florida 2004-2006

Singletons, 34-41 Weeks, No Previous Cesarean, Low Documented Risk, and No Medical Induction (N=260,023)



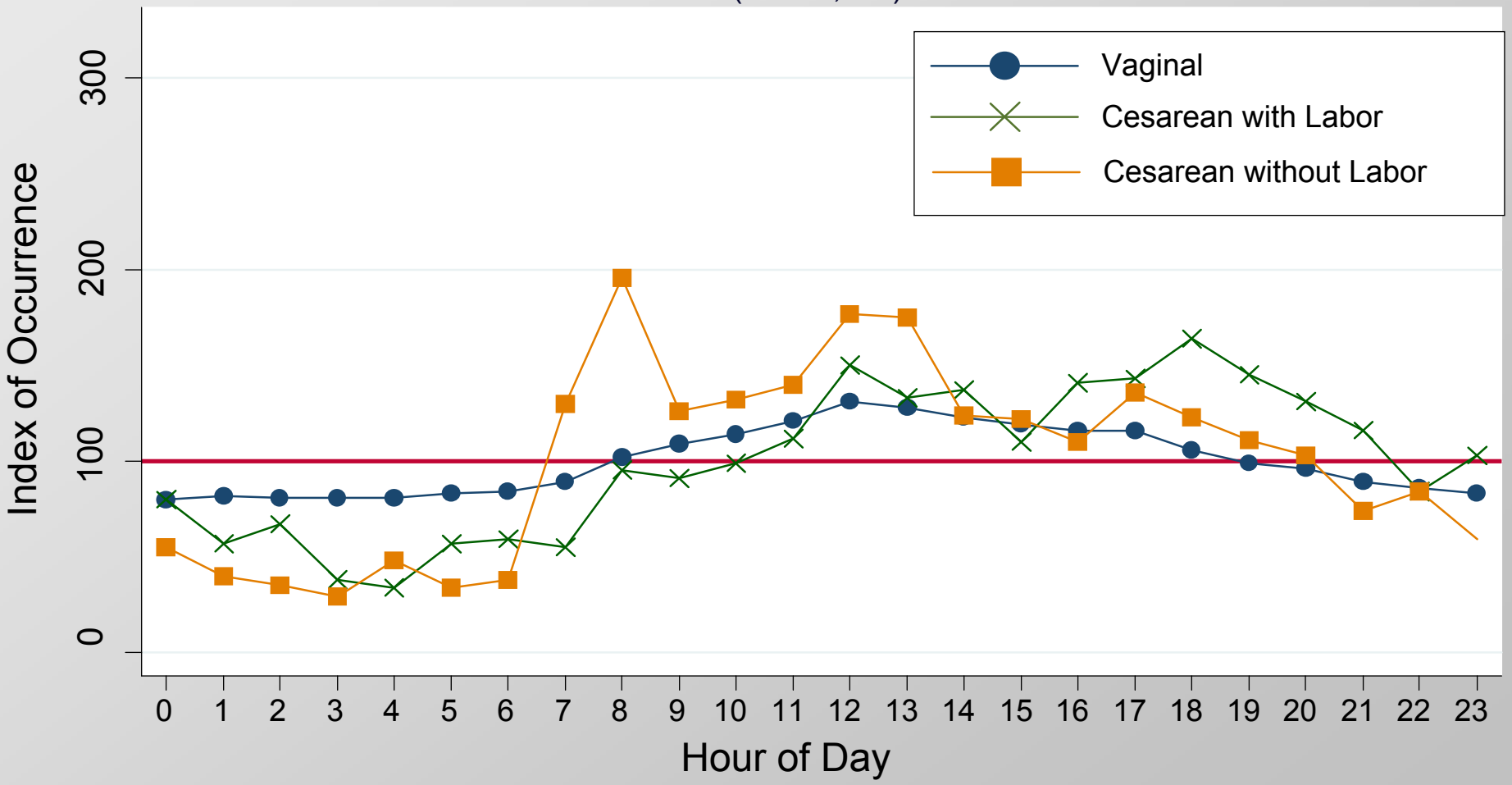
Goodman et al., 2008

Data Source: 2004-2006, Florida Final Birth File.

Hour of Day: Late Preterm

Index of Occurrence of Late Preterm Birth: Florida 2004-2006

Singletons, 34-36 Weeks, No Previous Cesarean, Low Documented Risk, and No Medical Induction (N=260,023)

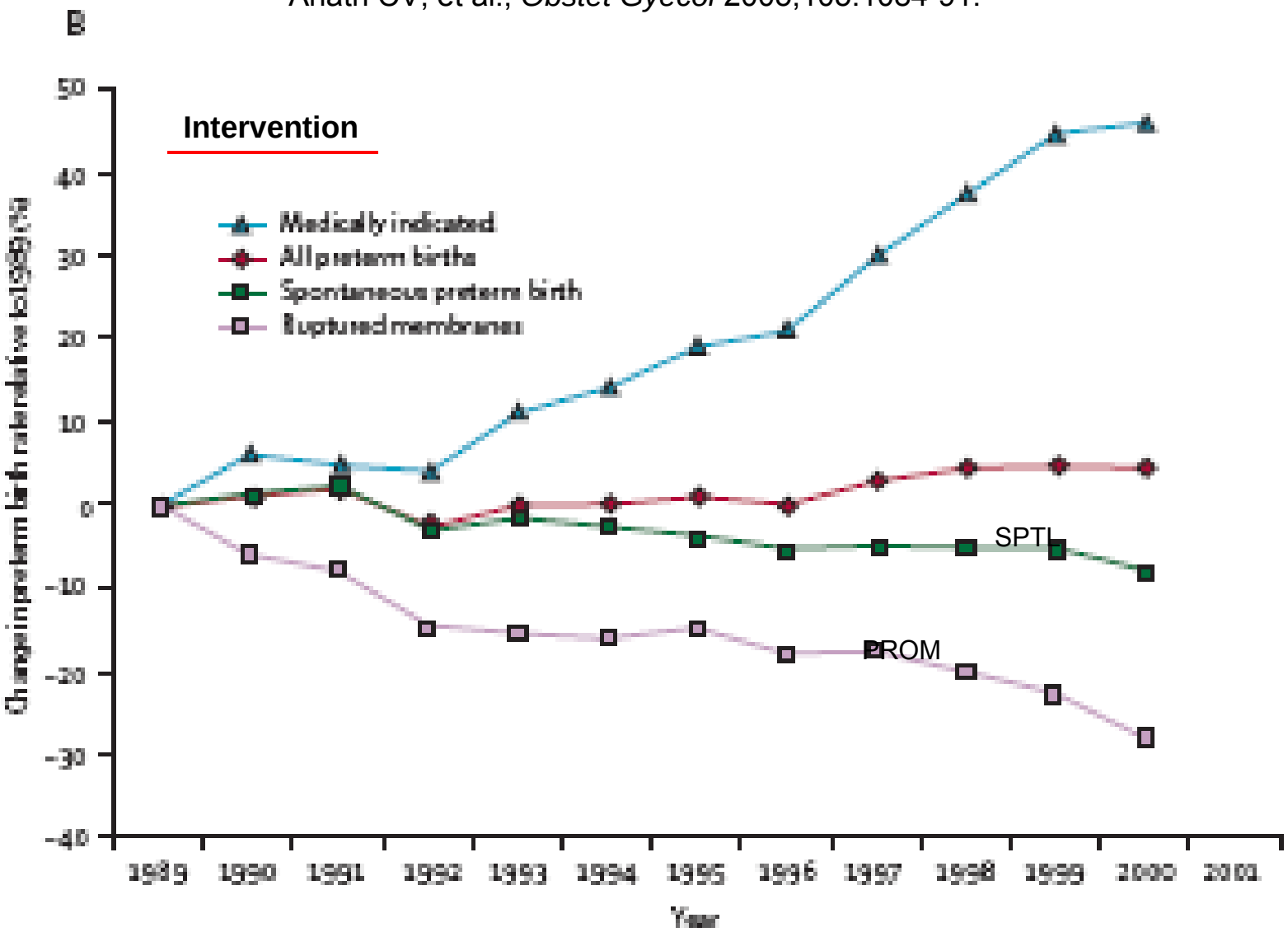


Goodman et al., 2008

Data Source: 2004-2006, Florida Final Birth File.

Reasons for Singleton Preterm Births, U.S. 1989-2000

Anath CV, et al., *Obstet Gyecol* 2005;105:1084-91.



Obstetrical Intervention and Preterm

MacDorman M, Declercq E, Zhang J. *Am J Public Health* 2010 Sept:e1-e7.

- NCHS, singleton preterm infants US,1991-2006
- Singleton preterm births
  - Increased 13% - almost entirely late preterms
  - C/S for singleton PTB increased 47%
  - Inductions doubled
- Mother of singleton PTB 88% more likely to have an intervention in 2006 than in 1991 (adjusted)
- Preterm births among adolescent mothers did not increase
- Preterm birth rate increased most rapidly among non-Hispanic white women and declined among non-Hispanic black women

Shift in Peak Month of Births

- In U.S. the day of the most births fell in September until late 1990's – 4 of last 7 years, it has been December.
- Changes track with tax breaks that began in 1990's.
- Economists determined people who stood to gain the most from the tax breaks were the ones who gave birth in December more frequently.
  [Chandra A, Harvard S, Dickert-Collins, Michigan State]
- CDC study found voluntary cesareans increase the risk of infant mortality.
- Changes seen in Salt Lake City after healthcare provider policy change discouraging elective deliveries before 39 weeks (shifted births to September).

- Leonhardt D. To-Do List: Wrap Gifts. Have Baby. *Econonmix Dec 20,2006.*

The NEW ENGLAND JOURNAL of MEDICINE

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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.
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Elective cesarean delivery before 39 weeks is common (35.7%) and associated with respiratory and other adverse neonatal outcomes, increased risk 2-4X:

At 38 wks OR 1.2-2.1

At 37 wks OR 1.8-4.2

C-section and Induction

- Labor induction and the risk of a cesarean delivery. Ehrenthal, et al. *Obstet & Gynecol 2010:116:35-42.*
- 7,800 women with first time delivery, delivering at term
  - Almost 44% induced, of those 40% were elective
  - In low risk group
    - 29.2% induced with first time deliveries
    - 20% of C-sections in the low risk group were failed inductions

Signore C. No Time for Complacency. *Obstet Gynecol.* 116(1):4-6.

"We must remember that incautious use and timing of interventions—particularly in elective cases – can lead to unnecessarily poorer outcomes for women and newborns."

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

ACOG Practice Bulletin, No. 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.

Delivery before 39 weeks even with documented fetal lung maturity has increased neonatal morbidity (Bates. *Am J Ob Gyn.* 2009;201(6):S17.)

Prevention of Preterm Birth

What can we do to prevent preterm birth?

- Access to care/systems of care
- Reduce elective deliveries prior to 39 weeks
- Home visiting
- “Centering Pregnancy”
- Smoking cessation
- “Healthy Babies are Worth the Wait”

Original Research

Decreased Preterm Births in an Inner-City Public Hospital

Kenneth J. Leveno, MD, Donald D. McIntire, PhD, Steven L. Bloom, MD, Miriam R. Sibley, RN, and Ron J. Anderson, MD

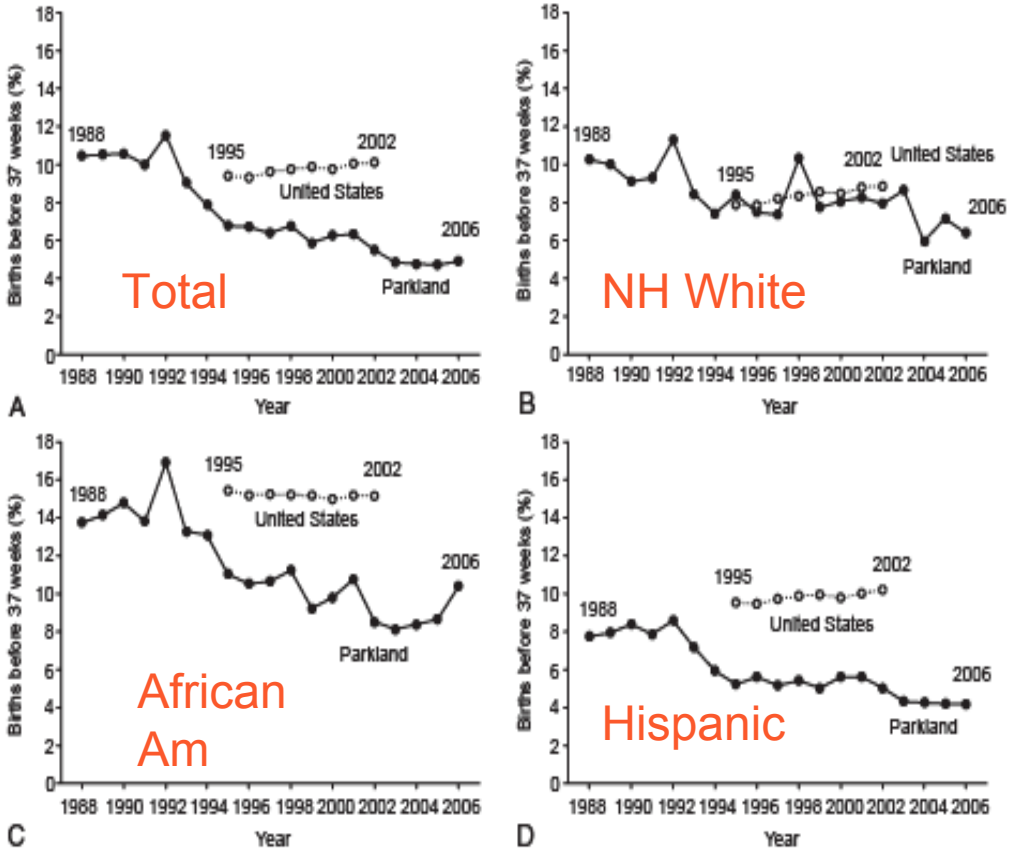


Fig. 1. Percentage of women with preterm births before 37 weeks of gestation in the United States (1995–2002) compared with Parkland Hospital (1988–2006). **A.** Overall. **B.** White women. **C.** African-American women. **D.** Hispanic women. Data for both cohorts are limited to women who had prenatal care and live singleton births with birth weights of 500 g or more.

Leveno. Decreased Preterm Births. Obstet Gynecol 2009.

CONCLUSION: Preterm birth significantly decreased in minority women delivered at an inner-city public hospital. We hypothesize that the reduction in preterm births was the result of a public health care program specifically targeting minority pregnant women.

Obstet Gynecol 2009;113:578–84

Decreasing Elective Deliveries before 39 Weeks in an Integrated Health Care System

Continuous quality improvement project in 9 hospitals, Utah

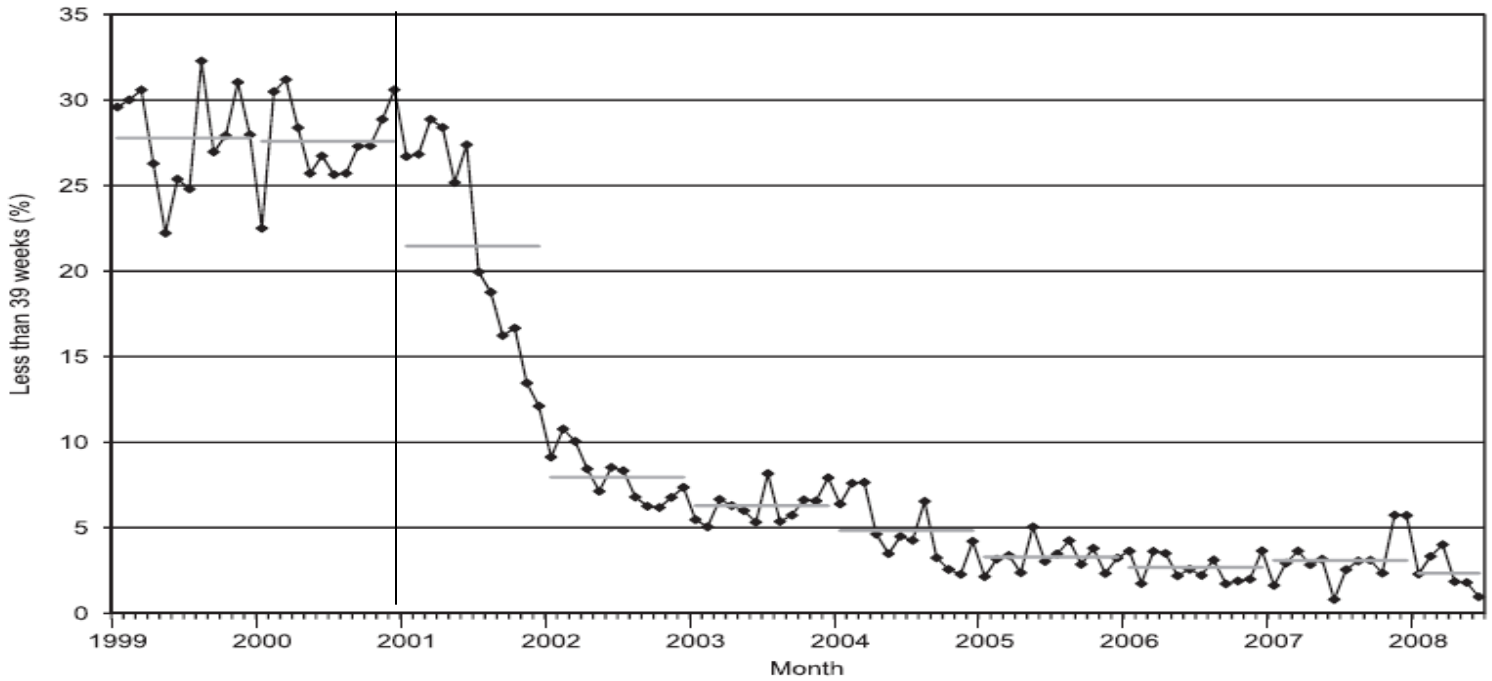


Fig. 3. Percent of elective deliveries before 39 weeks of gestation. Data from Intermountain Healthcare.
Oshiro. Decreasing Elective Deliveries Before 39 Weeks. Obstet Gynecol 2009.

Oshiro BT. *Obstet Gynecol* 2009 Apr;113(4):804-10.

CLINICAL OPINION www.AJOG.org

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-e7. Improved outcomes, lower C/S rates. Decreased malpractice claims by half, cost of claims by 5-fold

Health Access Nurturing Development Services

Kentucky HANDS Program

- An intensive **home visitation** program for overburdened **first time parents**, designed to assist in critical developmental points beginning prenatally, following the family **until the child is 2** years old.

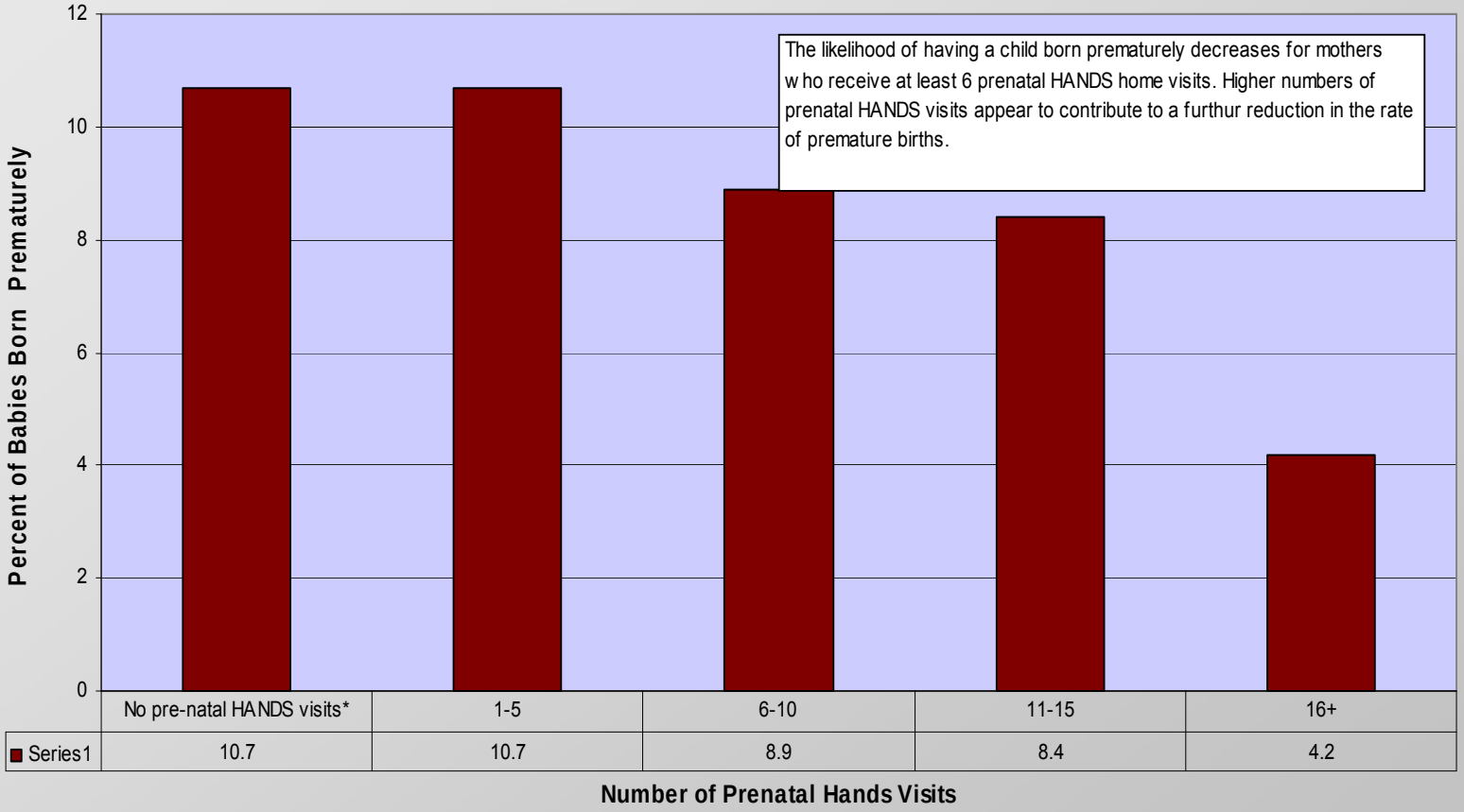
- **Program Services** (strengths-based)
  - Preventative health education, including promoting healthy prenatal, well child, and interconception care
  - Child development
  - Home safety
  - Decision making & problem solving skills
  - Family goals
  - Parent-child interaction, parenting skills
  - Early brain development
  - Support and community referrals

- **Mix of Paraprofessionals and Professionals**

PREMATURITY in HANDS Participants

Prematurity and Number of Prenatal HANDS Home Visits

(based on 2000-2003 data for all teen mothers with no prior pregnancies, n=19,369)



Note: May include families who received subsequent post-natal HANDS visits.

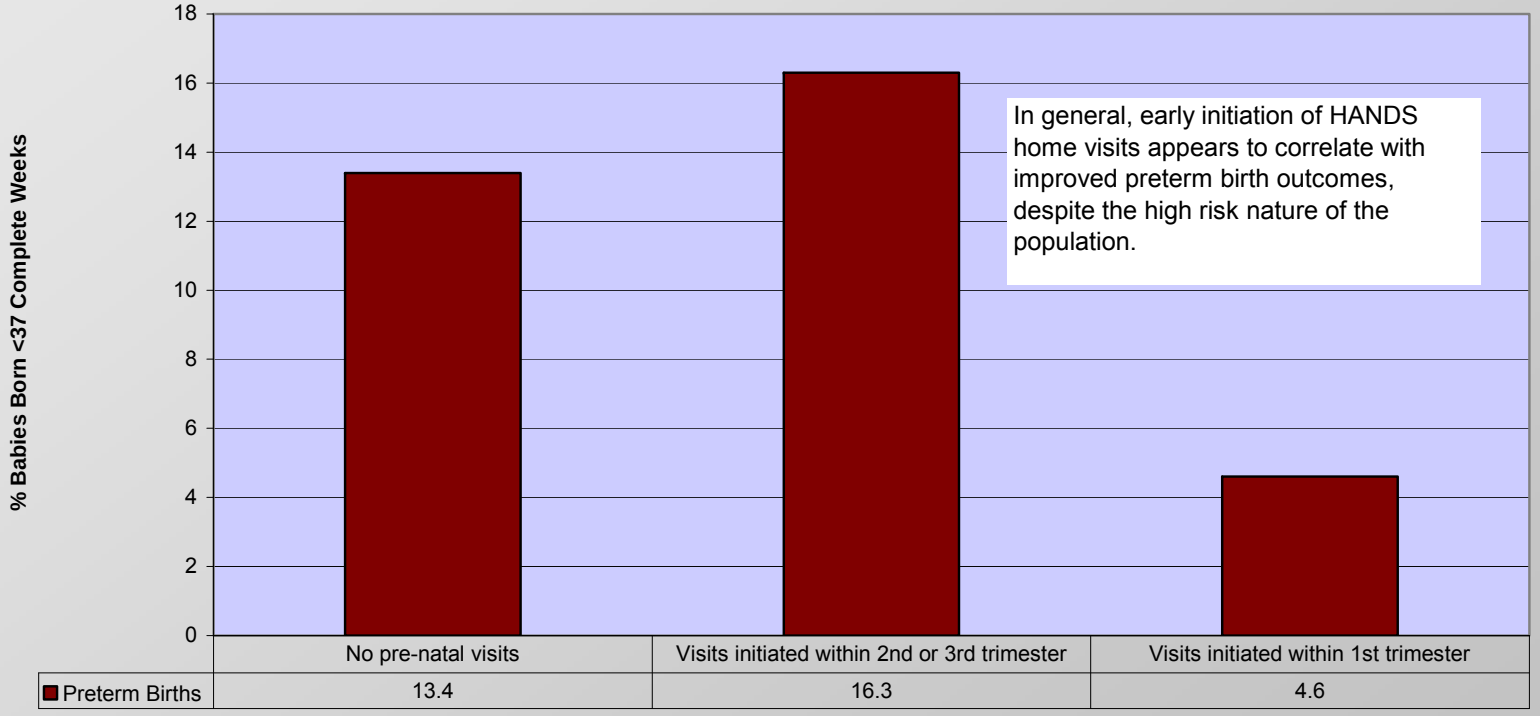
Data sources: Kentucky Vital Statistcs Data and HANDS participant database

Prematurity by Entry into Program

Rate of Preterm Births in Relation to Initiation of HANDS Home Visits (Timing of Intervention)

Teen Mothers, 1st Child

(Calendar Years 2002, 2003 combined)



Timing of Prenatal HANDS visits

Note: May include families who received subsequent post-natal HANDS visits.

Data sources: Kentucky Vital Statistcs Data and HANDS participant database

CENTERING + SMILES

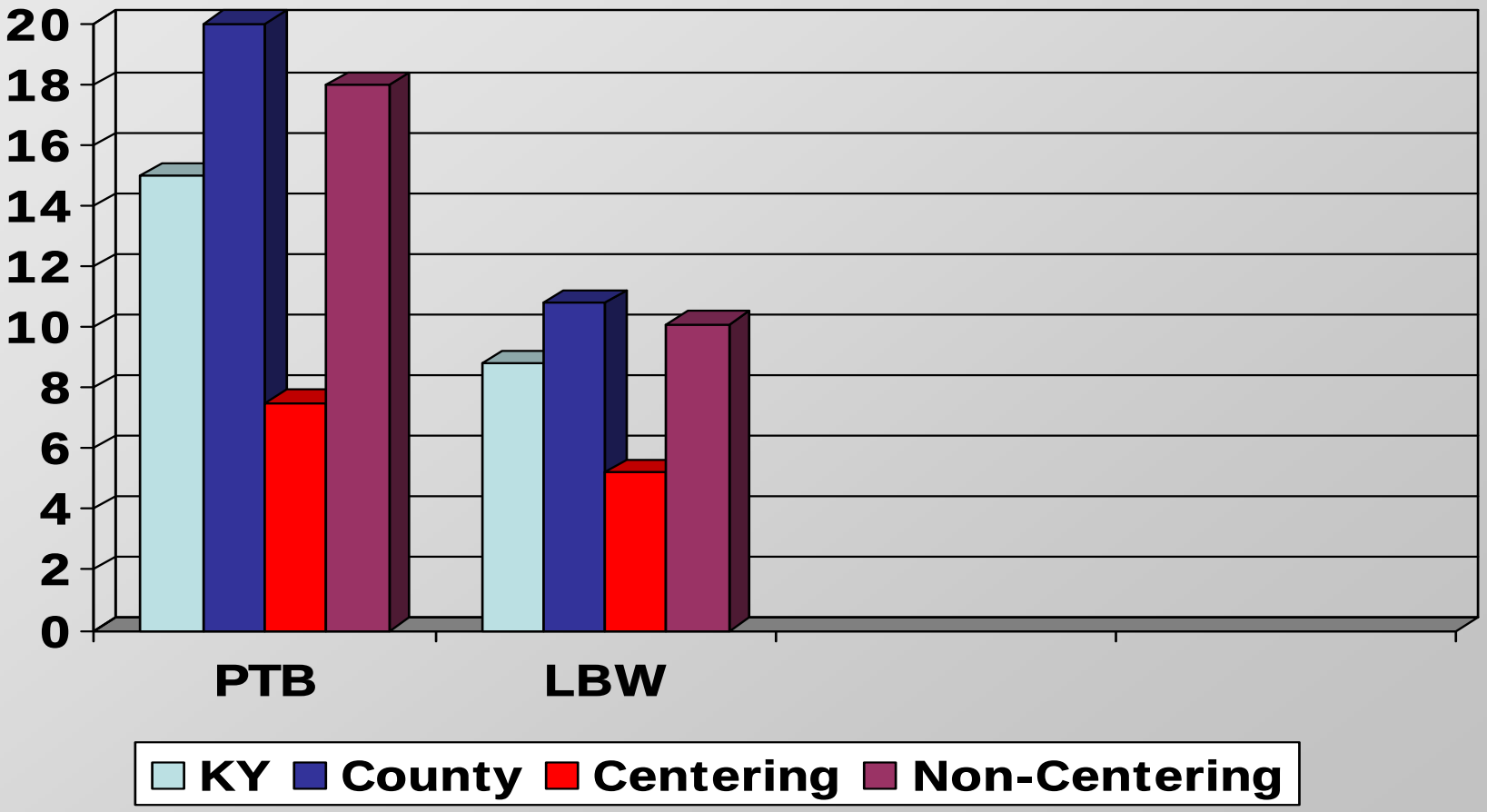
- Centering Pregnancy: Group prenatal care for low risk women
  - Women are grouped by EDC
  - Meet monthly for visit & education
  - Self-management emphasis
  - Facilitated discussion, topical but based on self-assessments done by attendees

- Centering + Smiles: Centering + Dental Care

-- Consortium for Applied Oral Health Research and Treatment (KY-CARAT)

Improved Outcomes with Centering Pregnancy

Preliminary Data C=273, NC=49



Smoking during Pregnancy

"Smoking during pregnancy is the

SINGLE MOST PREVENTABLE CAUSE

of morbidity and mortality

for maternal and infant health

in the United States."

CDC

Healthy Babies ARE WORTH THE WAIT®

A Prematurity Prevention Partnership

A PREMATURITY PREVENTION PARTNERSHIP

march of dimes®

Johnson & Johnson PEDIATRIC INSTITUTE L.L.C.

Kentucky UNBRIDLED SPIRIT Department for Public Health

Overview

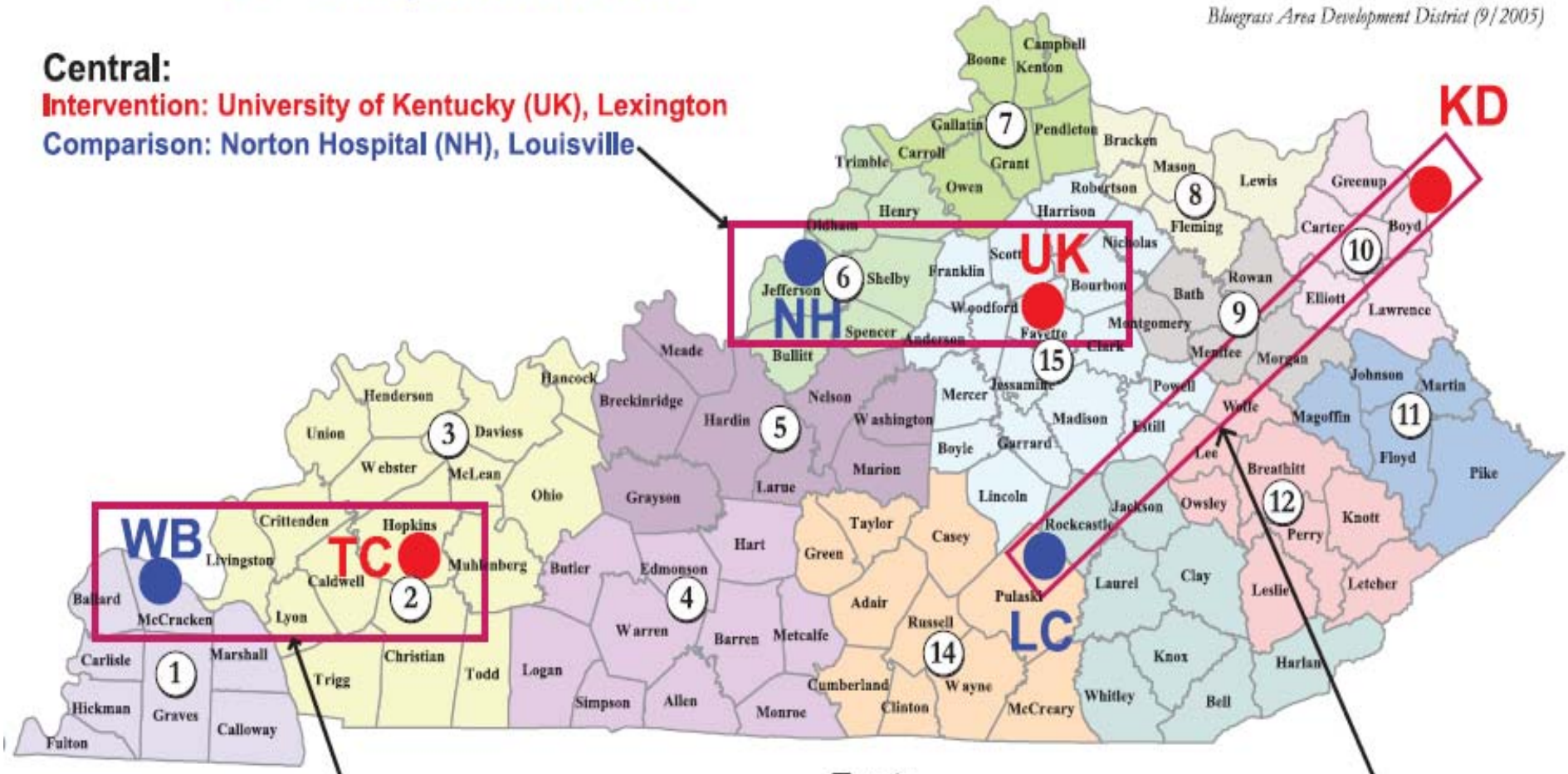
Healthy Babies ARE WORTH THE WAIT®

- *HBWW*® was a three year (2007-2009) pilot program that aims to reduce "preventable" preterm births at 3 intervention sites & 3 comparison sites in Kentucky.
  - **Goal: 15% reduction in the rate of singleton preterm births at the intervention sites**
  - Mixed ecological, "real world" design
  - Focus on late preterm birth (34-36 weeks)
  - Collaboration between clinical and public health professionals and the local community
  - Provides education for pregnant women, the community and perinatal providers

Healthy Babies are Worth the Wait® 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, patient support, and public education:

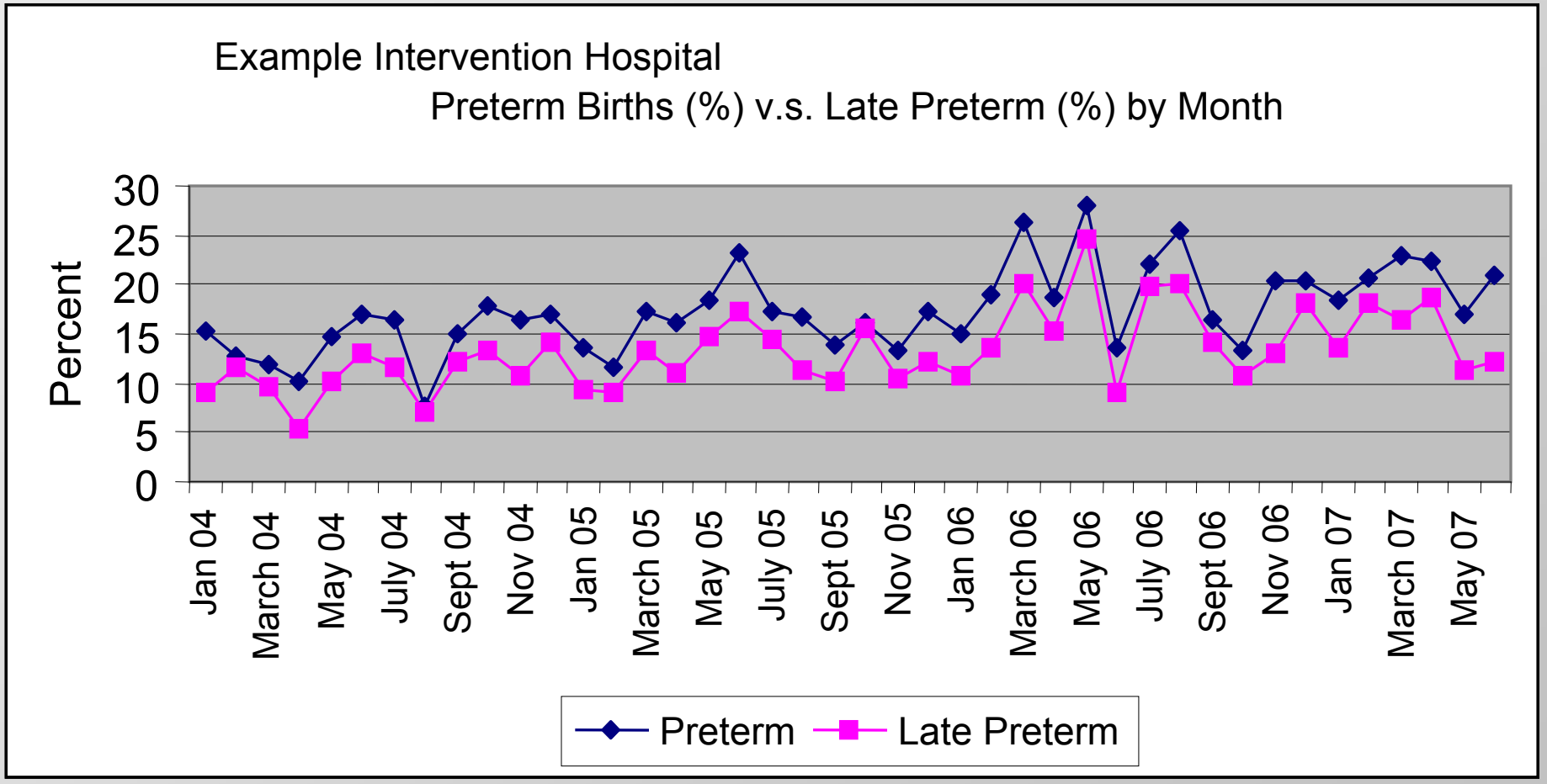
– **Partnerships**

  Advisory Council, Local Implementation Teams, Local partners, etc.

– **Professional Education & Action**
  - Grand Rounds & training
  - Standard clinical guidelines (folic acid, smoking cessation, progesterone, screenings)
  - Patient safety protocols

– **Patient Education and Action**
  - Augmenting existing services for case management, screening & referral
  - Health literacy in the context of prenatal care

– **Public/ Community Education and Action**
  - Community toolkit
  - Media toolkit
  - Web site



*Singleton Births from Kentucky Vital Statistics Data 2004-2007;
2006 and 2007 data are preliminary and numbers could change;

Singleton births only where mother was not transferred in for delivery;
Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 2004-2007

"Grade Card" Sample

Summary of Inductions and Scheduled C/S of Infants prior to 39 wks GA					
PHYSICIANS	**Total**	**Medical Indication**	**Medical Indication Rate**	**Infants Admitted to NICU Who Were Induced or Sectioned without Medical Indication**	
Doc A	5	5	100%	0	
Doc B	3	1	33%	0	
Doc C	2	2	100%	0	
Doc D	3	2	66%	0	

Late Preterm Birth
Monthly Comparisons

(percent of deliveries)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YR Avg
2006	11	10	10	11	18	13	11	20	13	8	16	10	**13**
2007	14	21	13	12	10	11	12	11	7	9	8	13	**12**
2008	12	12	12	11	14	13	10	8	10	10	10	11	**11**
2009	6	7	7	13	19	7	6	9	8	11	6	11	**9**

Before implementation of an official dept. policy

Partnerships and Collaboration

- Hospitals and Health Departments met face to face to improve referrals and consistent information, and establish better communication and feedback [e.g., fax referral form, meetings with OB office managers].
- Identified local needs for better systems of care [e.g., substance abuse, oral health].
- Co-located and shared responsibility of staff between two agencies [e.g., psychosocial screening & referral].

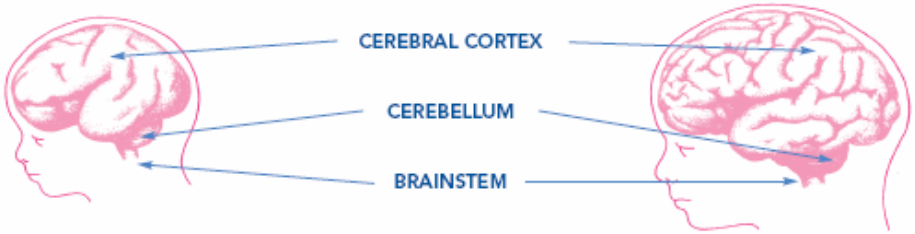
HBWW® Messages

- See the doctor BEFORE & DURING pregnancy
- Don’t smoke or use alcohol while pregnant
- Take folic acid every day
- Brush, floss and visit the dentist
- Avoid scheduled delivery before 39 weeks
- Babies’ brains grow a lot between 35 and 40 weeks

HBWW® Materials

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™

The Brain Card

- Focus groups identified this information as having the most impact and most likely to change behavior
- Utilized by providers to facilitate communication with patients

HBWW® Materials

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

March of Dimes materials are for information purposes only and are not to be used as medical advice. Always seek medical advice from your health care provider. Our materials reflect current scientific recommendations at time of publication. Check marchofdimes.com for updated information. Modeled after a fetal brain card developed by the Healthy Babies Are Worth the Wait™ Initiative.

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Engaging the Public

HBWW Consumer Survey

79% could give an acceptable answer on how to explain prematurity to a friend

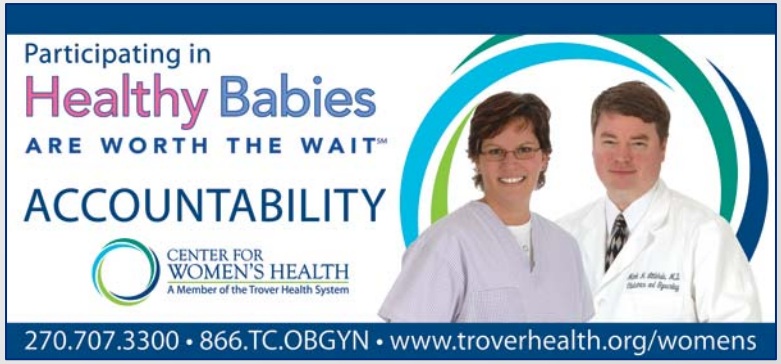
Causes of preterm birth?

- High risk conditions (38%)
- High risk behaviors (25%
- Stress (9%)

How serious is preterm birth in your community?	
Very serious	14%
Somewhat serious	23%
Not at all	7%
Not sure	54%
How serious if your baby is born 3 weeks early?	
Very serious	2%
Serious	11%
Somewhat serious	41%
Not really	42%

Goldenberg (2009): only 25% of women defined full term as 39-40 wks; 92% reported that giving birth before 39 weeks was safe

Communication Samples



Billboard

Newspaper

Billboard

Web Site and Community Toolkit

Search the site | Search

HOME | ESPAÑOL | CONTACT US

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

If you are pregnant or trying to get pregnant, avoid smoking, drinking alcohol, and taking street drugs. All of these can harm your baby. Ask your healthcare provider to help you quit.

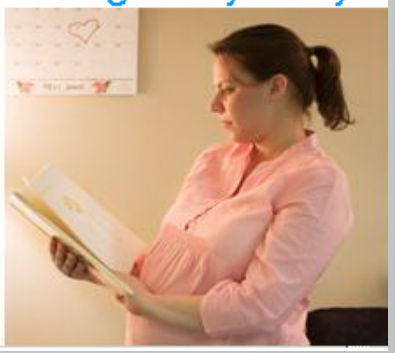
New @

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 36 weeks) can develop serious problems, as their brains are not fully developed.

Although new research tells us that premature birth is a disorder much like heart disease, which can't always be prevented, there are many things that individuals, healthcare providers and communities can do to help reduce the risk of premature birth.

Pregnancy Diary



www.prematurityprevention.org

HBWW Preliminary Results

- C-section rates in the intervention sites increased only 2.2% compared to 11% in the comparison sites.
- Smoking rates decreased 10% in intervention sites compared to 8% in comparison sites.
- Prematurity rates dropped, not only in the intervention sites, but state wide:

Kentucky had the largest drop in rates of preterm birth of any of our surrounding states.

Percent Change in Preterm and Late Preterm Birth Rates US, KY and Selected Contiguous States, 2006-2008

	Preterm (<37 wks)					Late preterm (34-36 wks)				
	2006	2007	2008	% Chng 06-07	% Chng 07-08	2006	2007	2008	% Chng 06-07	% Chng 07-08
United States	12.8	12.7	12.3	-0.8	-3.1	9.1	9.0	8.8	-1.1	-2.2
Kentucky	15.1	15.2	14	0.7	-7.9	10.9	11.0	10.2	0.9	-7.3
Tennessee	14.8	14.2	13.5	-4.1	-4.9	10.3	10.0	9.7	-2.9	-3.0
Virginia	12	12.1	11.3	0.8	-6.6	8.6	8.6	8.1	0.0	-5.8
West Virginia	14	13.9	13.7	-0.7	-1.4	10.3	9.9	10	-3.9	1.0
Indiana	13.2	12.9	12.4	-2.3	-3.9	9.5	9.3	8.9	-2.1	-4.3
Ohio	13.3	13.2	12.6	-0.8	-4.5	9.4	9.2	8.7	-2.1	-5.4

Source: NCHS 2010

Percent Change in Preterm/Late Preterm Birth Rates US, KY and Region VI States, 2006-2008

	Preterm (<37 wks)					Late preterm (34-36 wks)				
	2006	2007	2008	% Chng 06-07	% Chng 07-08	2006	2007	2008	% Chng 06-07	% Chng 07-08
United States	12.8	12.7	12.3	-0.8	-3.1	9.1	9.0	8.8	-1.1	-2.2
Kentucky	15.1	15.2	14.0	0.7	-7.9	10.9	11.0	10.2	0.9	-7.3
Arkansas	13.7	13.9	13.5	1.4	-2.8	9.9	10.1	9.7	2.0	-3.9
Louisiana	16.4	16.5	15.4	0.6	-6.6	11.4	11.7	10.6	2.6	-9.4
New Mexico	14.1	12.8	12.3	-9.2	-3.9	10.2	9.4	9.1	-7.8	-3.1
Oklahoma	13.9	13.5	13.4	-2.8	-0.7	9.9	9.8	9.8	-1.0	0
Texas	13.7	13.6	13.3	-0.7	-2.2	9.9	9.8	9.6	-1.0	-2.0

Source: NCHS 2010

Prematurity Prevention Is Public Health

- High prevalence
- High mortality and morbidity
- Modifiable risk factors
- Multiple determinants
- Sometimes happens doing everything right
- Potentially preventable
- Disparities
- Improvements come through communities
- Must approach as a population health issue, not just a medical issue (like diabetes, obesity, tobacco)

Prematurity Prevention

- Providers: Research to practice quickly
- Patients: Create comprehensive, coordinated systems of care
- Public: Prematurity prevention is a worthy investment because prematurity affects not only families, but health care & education systems, employers, and the future workforce.
- Payors: prematurity prevention is both cost-effective and a quality strategy
- Preventing "Preventable Prematurity" protects the baby's developing brain and improves the baby's chances for a healthy, productive life

Questions for Our Speaker

Evelyn Delgado, DSHS Assistant Commissioner and Q&A Facilitator

Remote sites can send in questions by either:

- Typing *GoToWebinar* in the chatbox;
- Emailing GrandRounds@DSHS.state.tx.us; or
- Calling (512) 458-7111 x 6756.

For those in K-100, please, come down to the microphone on the left side of the auditorium to ask your questions.

Thank you for coming!

Our next Grand Rounds presentation is ….

The Forensic Patient

November 17, 2010