



# The Prematurity Problem The Kentucky Data

January, 2006  
Frankfort, KY

Prepared by the Kentucky Department for Public Health, Division of Adult and  
Child Health Improvement  
Data prepared by Tracey Jewell, Lead Epidemiologist



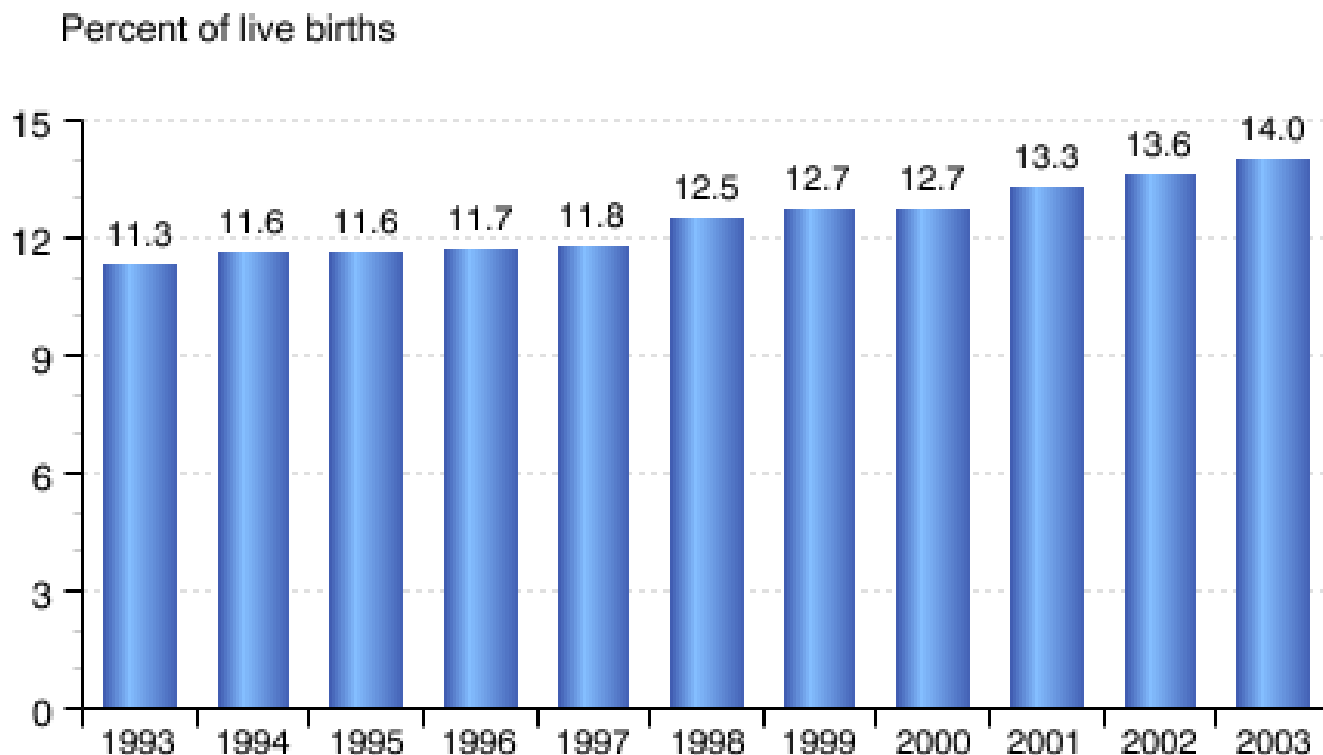
# March of Dimes National Campaign to Prevent Prematurity

- Prematurity is the number one killer of newborn infants
- One in four premature infants may suffer lifelong disability or impairment
  - Cerebral Palsy, Mental Retardation, Neurologic Defects, Developmental Delay, Impaired Vision, Asthma

# Definition of terms

- Preterm = Less than 37 completed weeks of gestation
- Late Preterm = 34 0/7 weeks to 36 6/7 weeks
- Very Preterm = Less than 32 weeks
- Extreme Prematurity = less than 28 weeks
  
- Low Birth Weight = Less than 2500 gm
- Very Low Birth Weight = Less than 1500 grams
- Extremely Low Birth Weight = Less than 1000 grams

# Percent of Live Births that were Preterm\*; Kentucky, 1993-2003

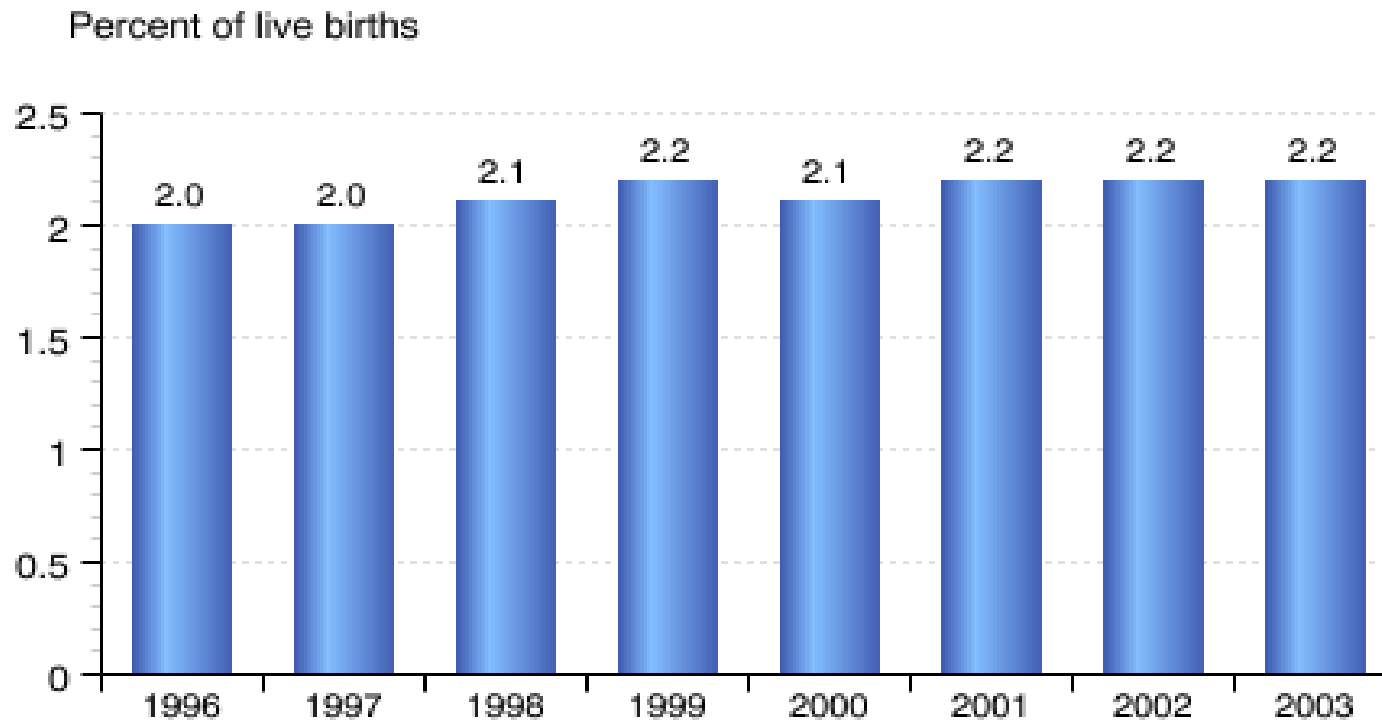


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\*Preterm birth is defined as any live birth occurring <37 completed weeks gestation

Data Source: March of Dimes Peristats

## Percent of Live Births that were Very Preterm\* in Kentucky, 1996-2003

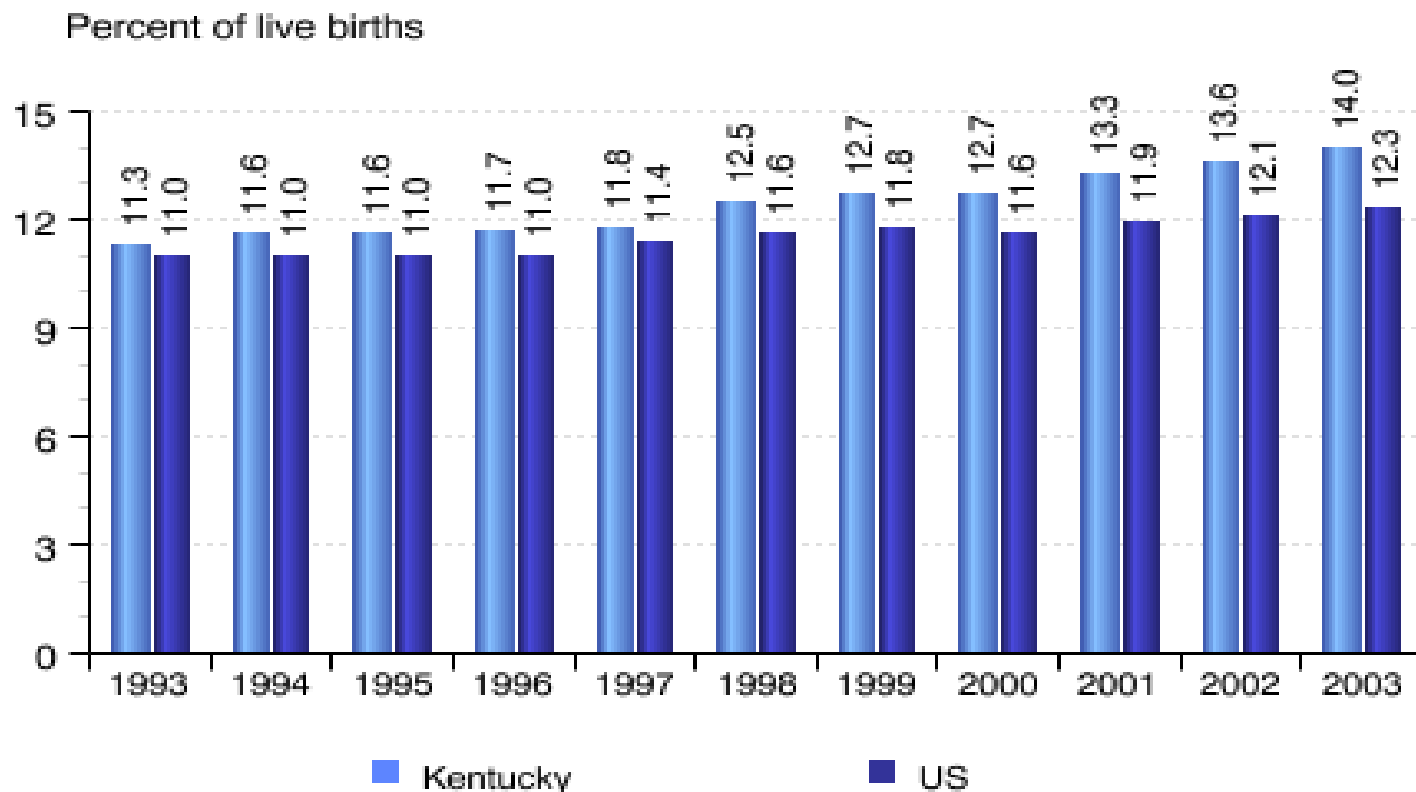


Copyright March of Dimes, 2004

\*Very preterm birth is defined as any live birth occurring <32 completed weeks gestation

Data Source: March of Dimes Peristats

# Percent of Live Births that were Preterm\*; Kentucky and U.S., 1993-2003

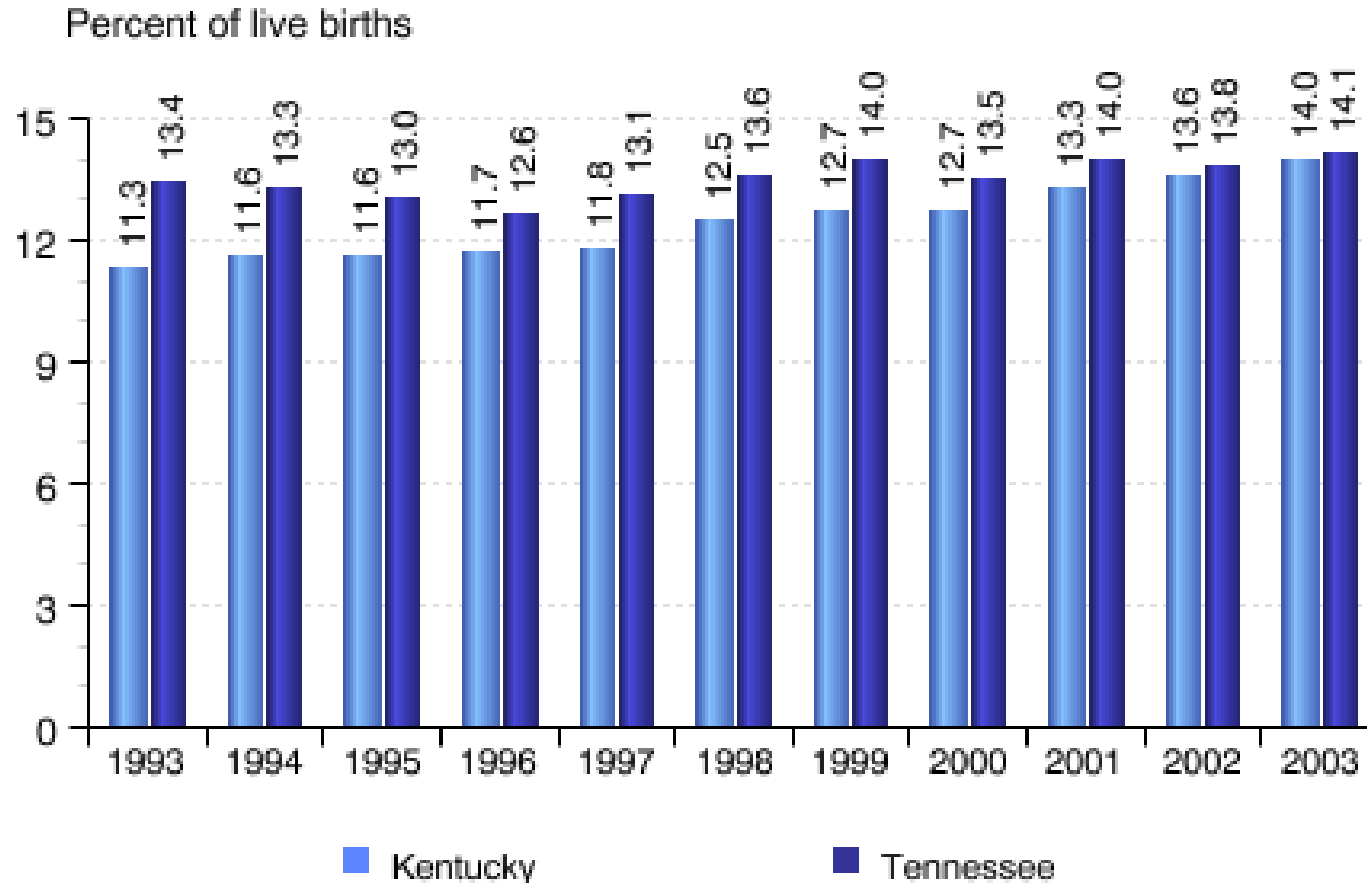


Copyright March of Dimes, 2004

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

Data Source: March of Dimes Peristats

# Percent of Live Births that were Preterm\*; Kentucky and Tennessee, 1993-2003

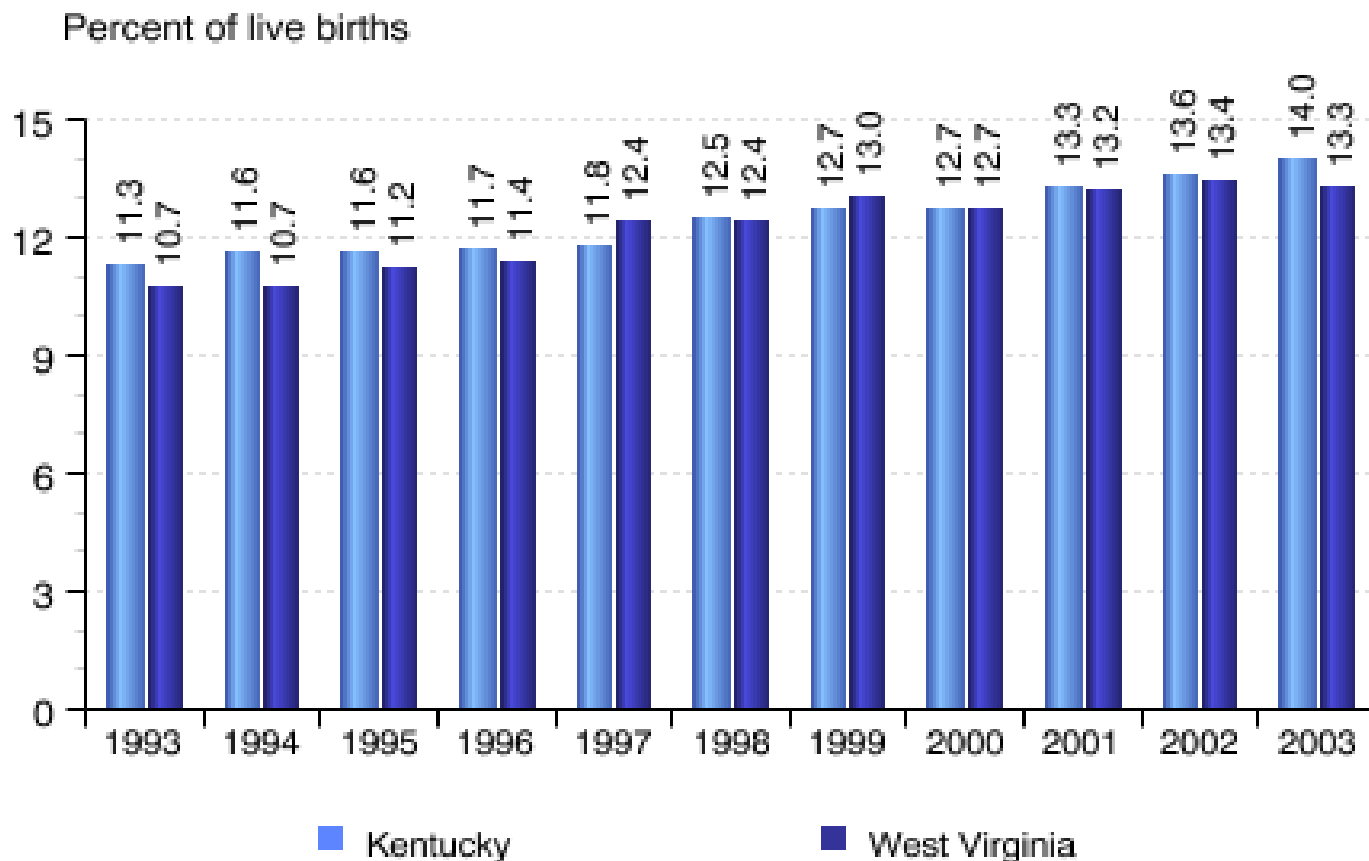


Copyright March of Dimes, 2004

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

Data Source: March of Dimes Peristats

# Percent of Live Births that were Preterm\*: Kentucky and West Virginia, 1993-2003

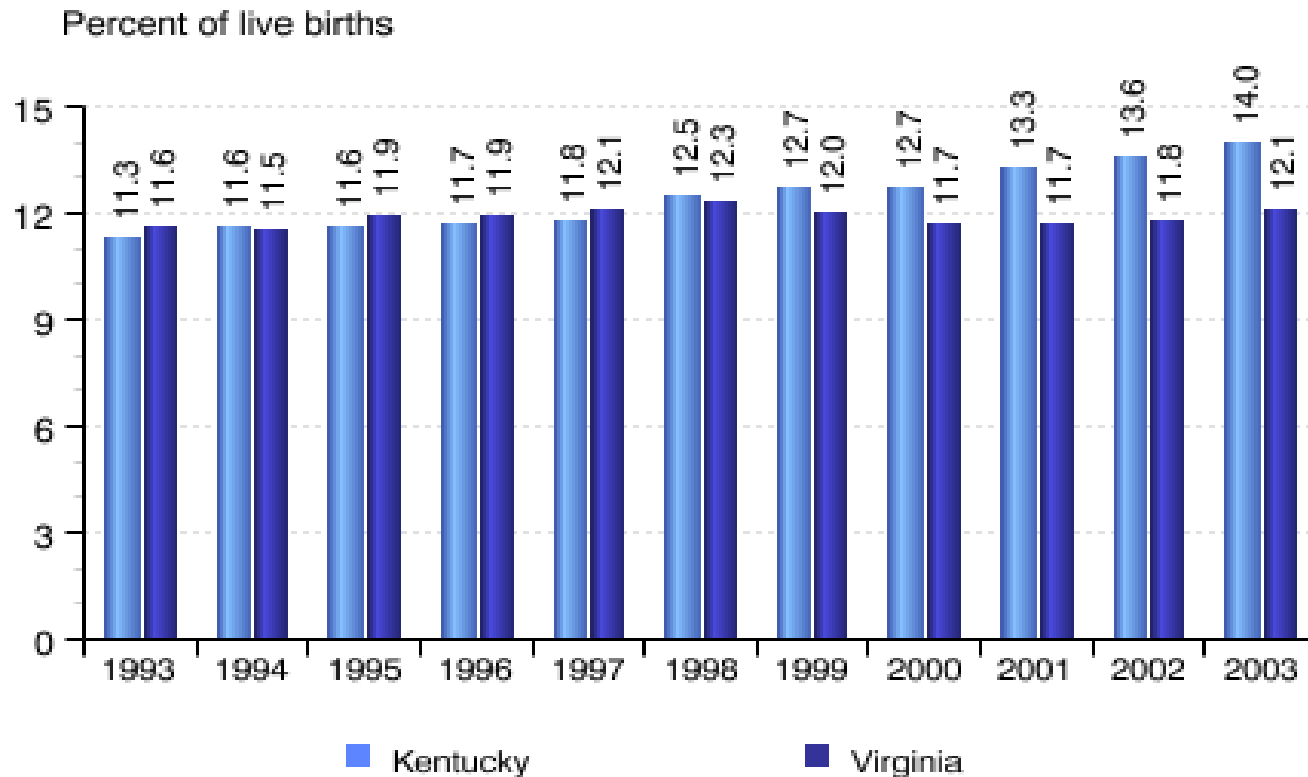


Copyright March of Dimes, 2004

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

Data Source: March of Dimes Peristats

# Percent of Live Births that were Preterm\*; Kentucky and Virginia; 1993-2003

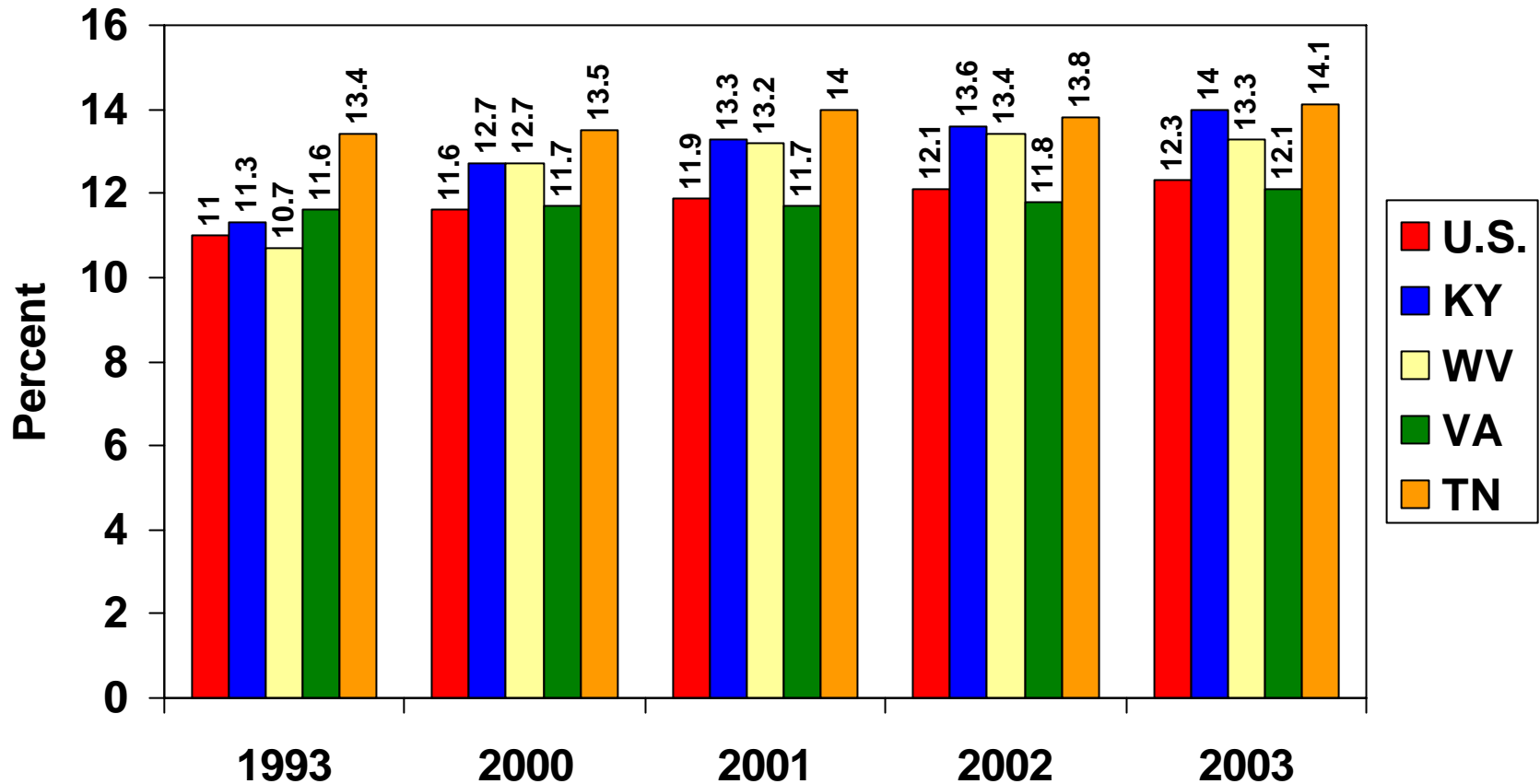


Copyright March of Dimes, 2004

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

Data Source: March of Dimes Peristats

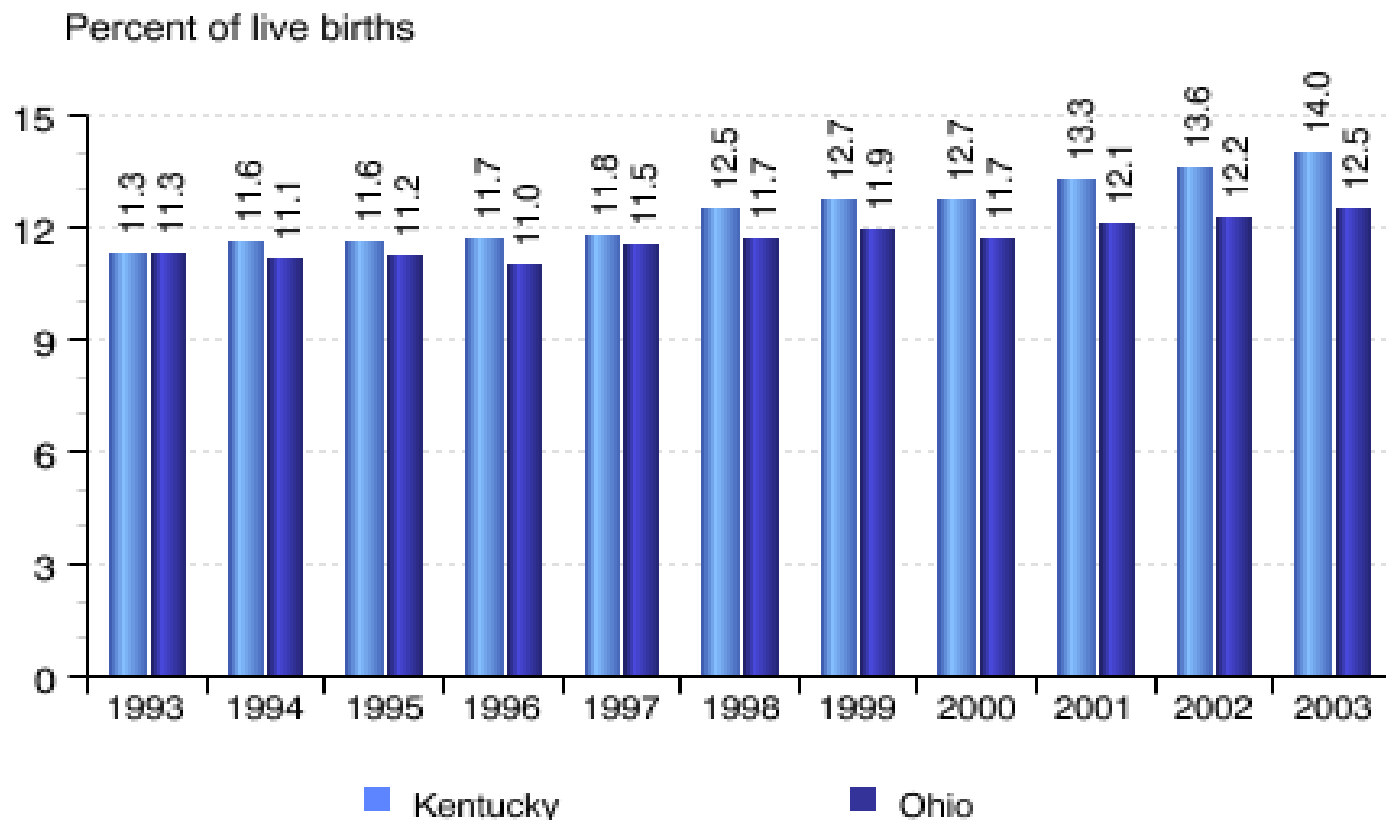
# Percent of Live Births that were Preterm\* Among Southern Contiguous States; 1993, & 2000-2003



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

Data Source: March of Dimes Peristats

# Percent of Live Births that were Preterm\*; Kentucky and Ohio, 1993-2003

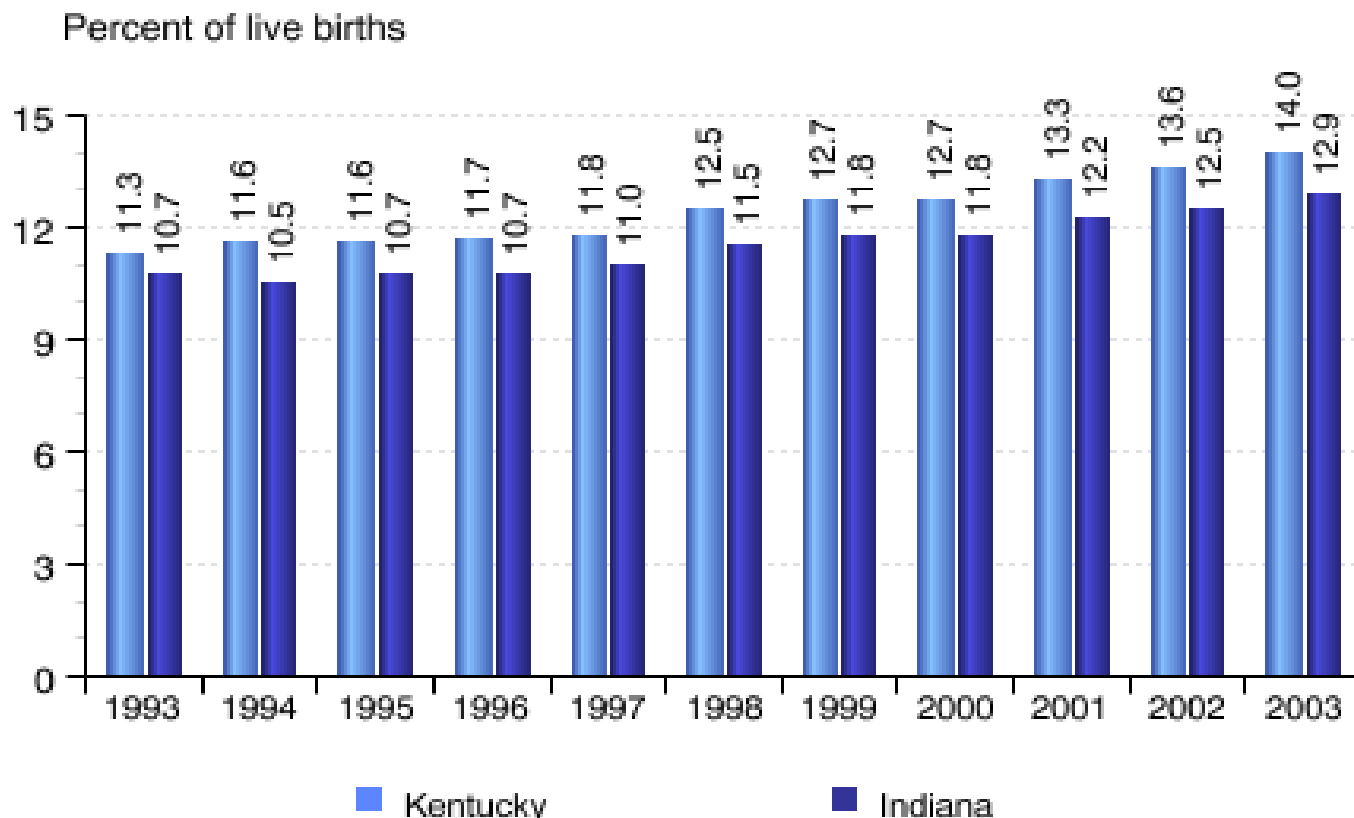


Copyright March of Dimes, 2004

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

Data Source: March of Dimes Peristats

# Percent of Live Births that were Preterm\*; Kentucky and Indiana, 1993-2003

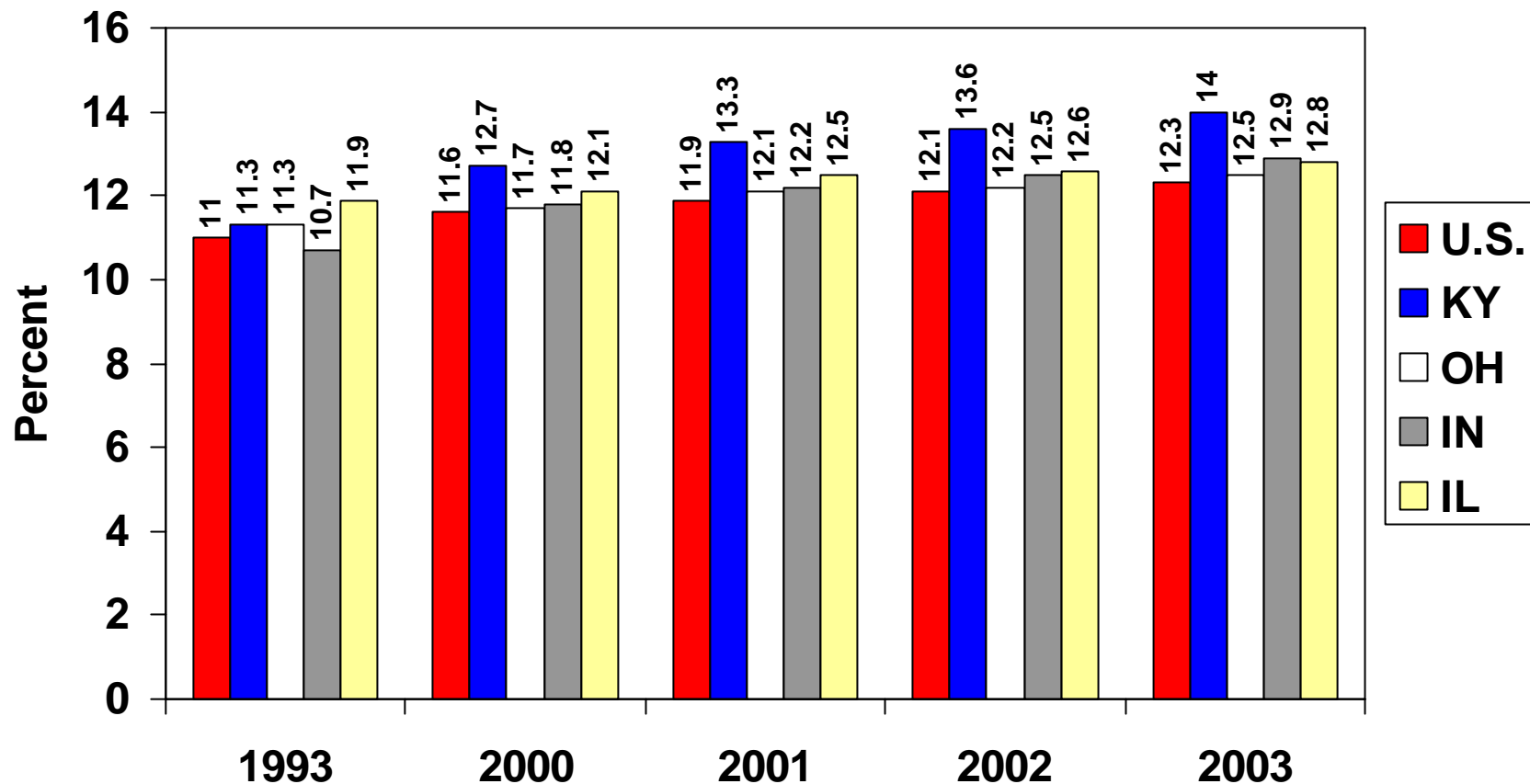


Copyright March of Dimes, 2004

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

Data Source: March of Dimes Peristats

# Percent of Live Births that were Preterm\* Among Northern Contiguous States; 1993, & 2000-2003

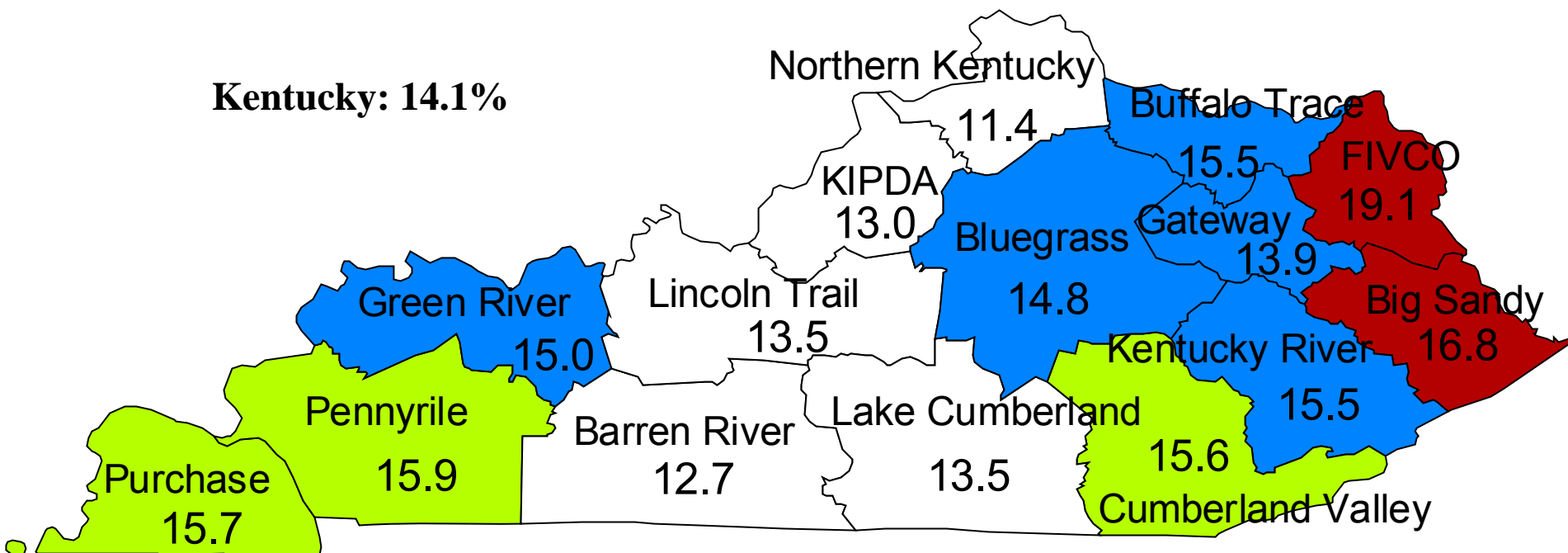


\*Preterm birth is defined as any live birth occurring <37 completed weeks gestation

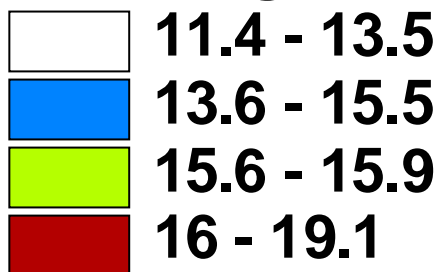
Data Source: March of Dimes Peristats

# Percent of Live Births to Kentucky Residents that were Preterm\* by Area Development District; Year 2003

Kentucky: 14.1%



## Percentage

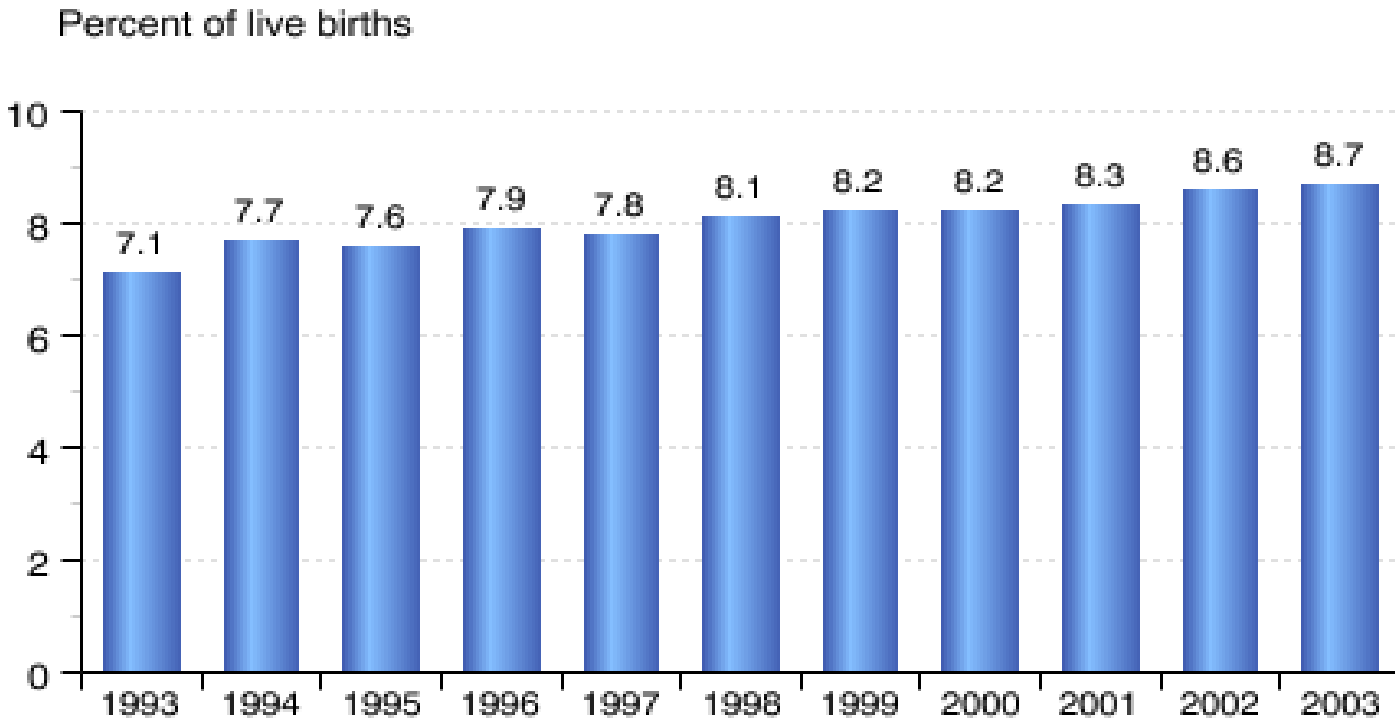


\*Preterm birth is defined as any live birth occurring before 37 completed weeks gestation

Note: Area Development District is based on the Mother's county of residence at time of birth

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 2003

# Percent of Live Births that were Low Birth Weight\*; Kentucky, 1993-2003

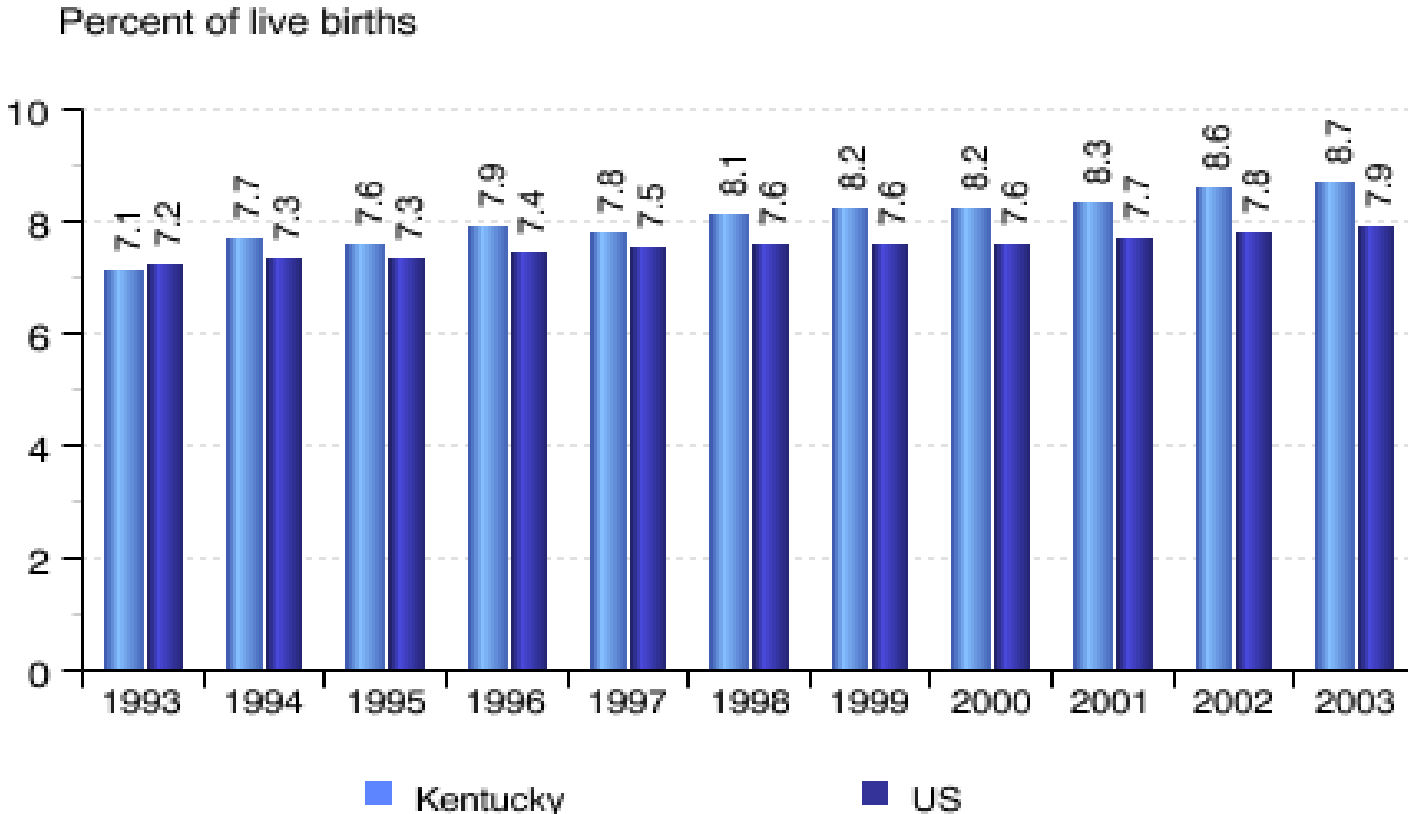


Copyright March of Dimes, 2004

\*Low birth weight is defined as any live birth weighing <2500 grams at birth

Data Source: March of Dimes Peristats

# Percent of Live Births that were Low Birth Weight\*; Kentucky and U.S., 1993-2003

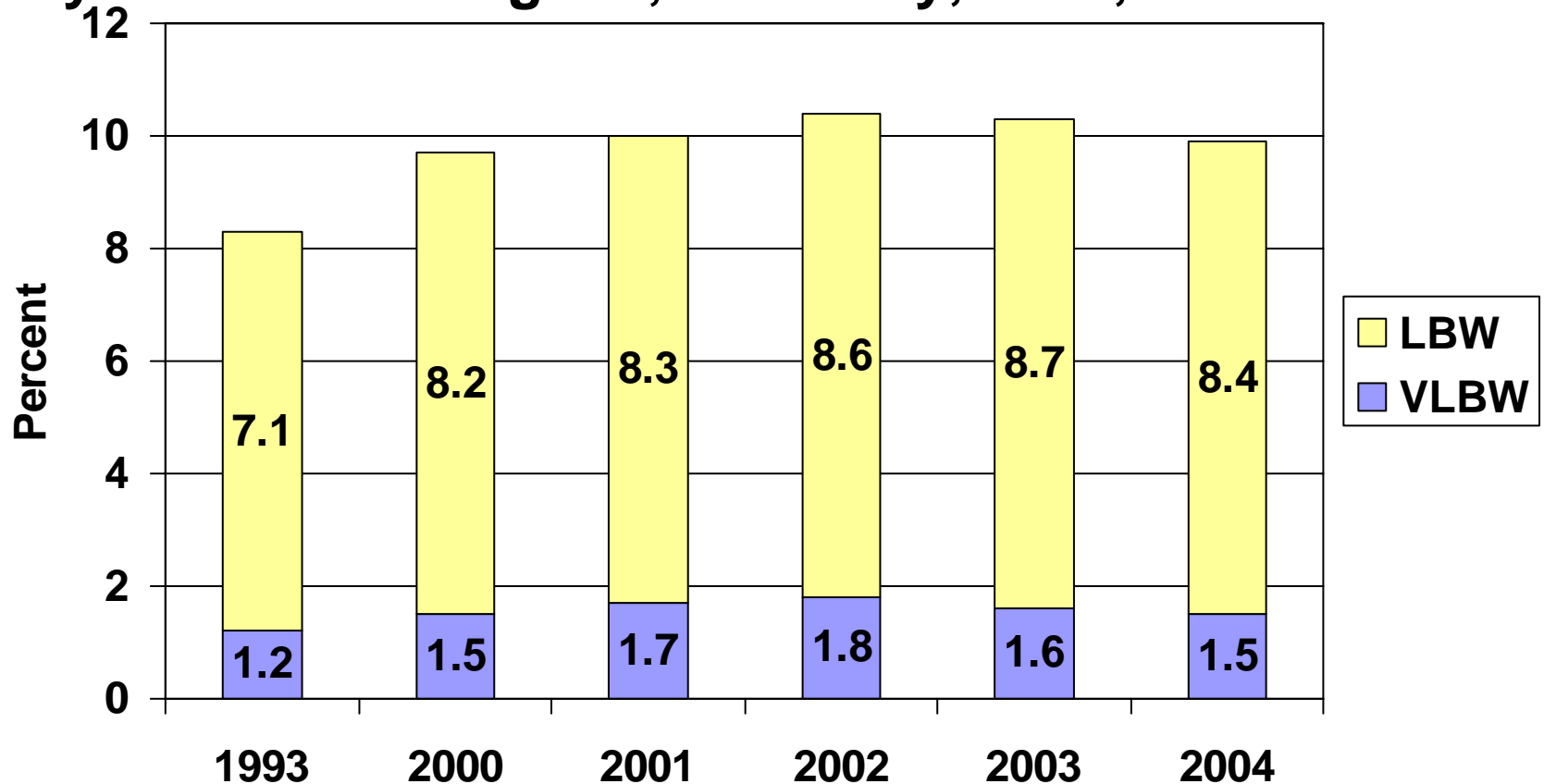


Copyright March of Dimes, 2004

\*Low birth weight is defined as any live birth weighing <2500 grams at birth

Data Source: March of Dimes Peristats

# Percent of Live Births that were Low Birth Weight\* and Very Low Birth Weight\*\*; Kentucky, 1993, & 2000-2004<sup>^</sup>



\*Low birth weight is defined as any infant weighing <2500 grams at birth

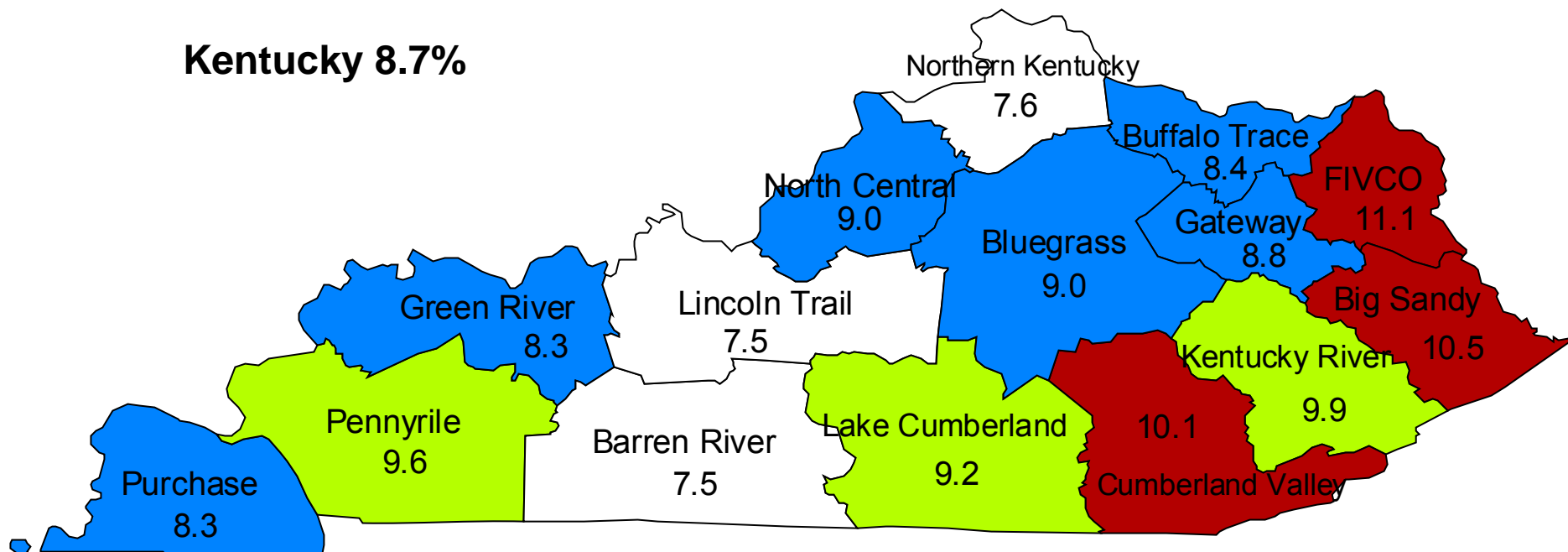
\*\*Very low birth weight is defined as any infant weighing <1500 grams at birth

<sup>^</sup>2004 data is preliminary and numbers could change

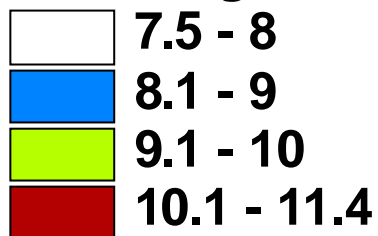
Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 1993, & 2000-2004

# Low Birth Weight\* Live Births by Area Development District; Kentucky, 2003

Kentucky 8.7%



## Percentage



\*Low birth weight is defined as any live birth weighing <2500 grams at birth

Note: Area Development District is based on the Mother's county of residence at time of birth

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 2003



# Major Categories of Risk for Preterm Birth

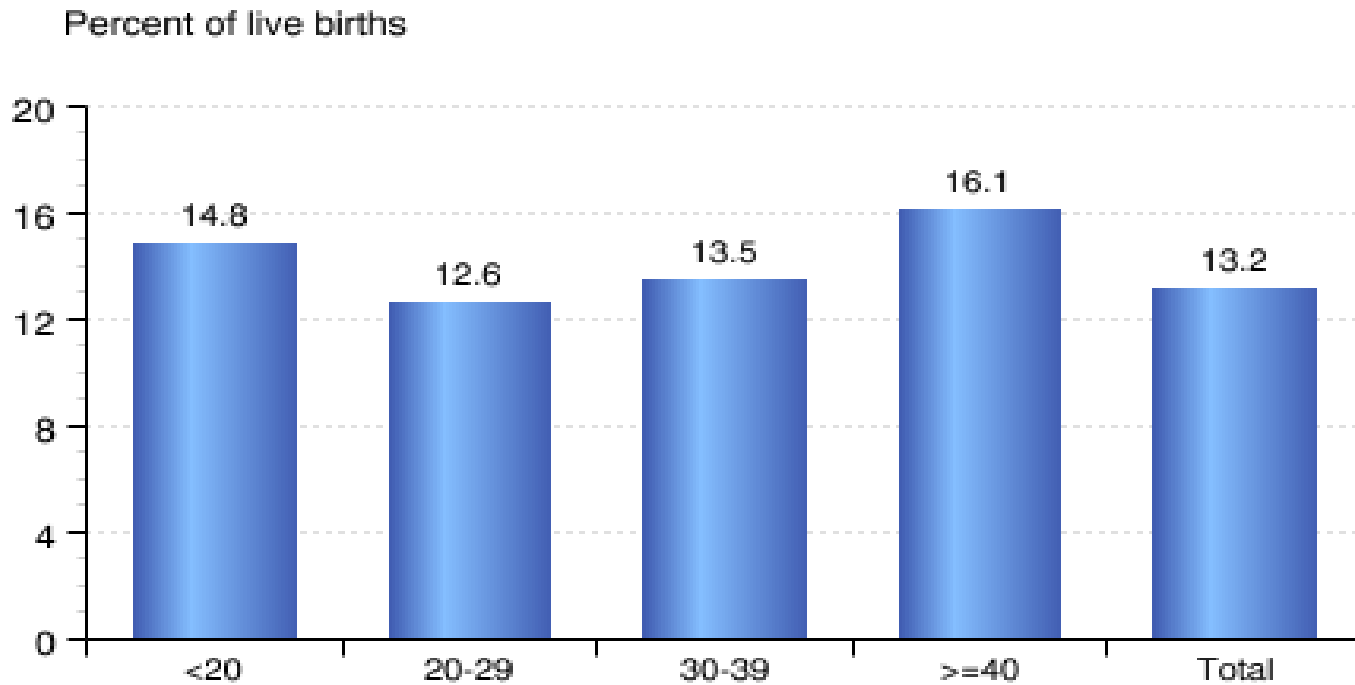
- Unintended pregnancy
- Extremes of Maternal Age
- Maternal Race
- Multiple Gestations
- C-section delivery
- Gestational age 34, 35,36 weeks



# Major Categories of Risk for Preterm Birth

- Extremes of Maternal Age

# Rate of Preterm\* Birth by Maternal Age; Kentucky, 2000-2002

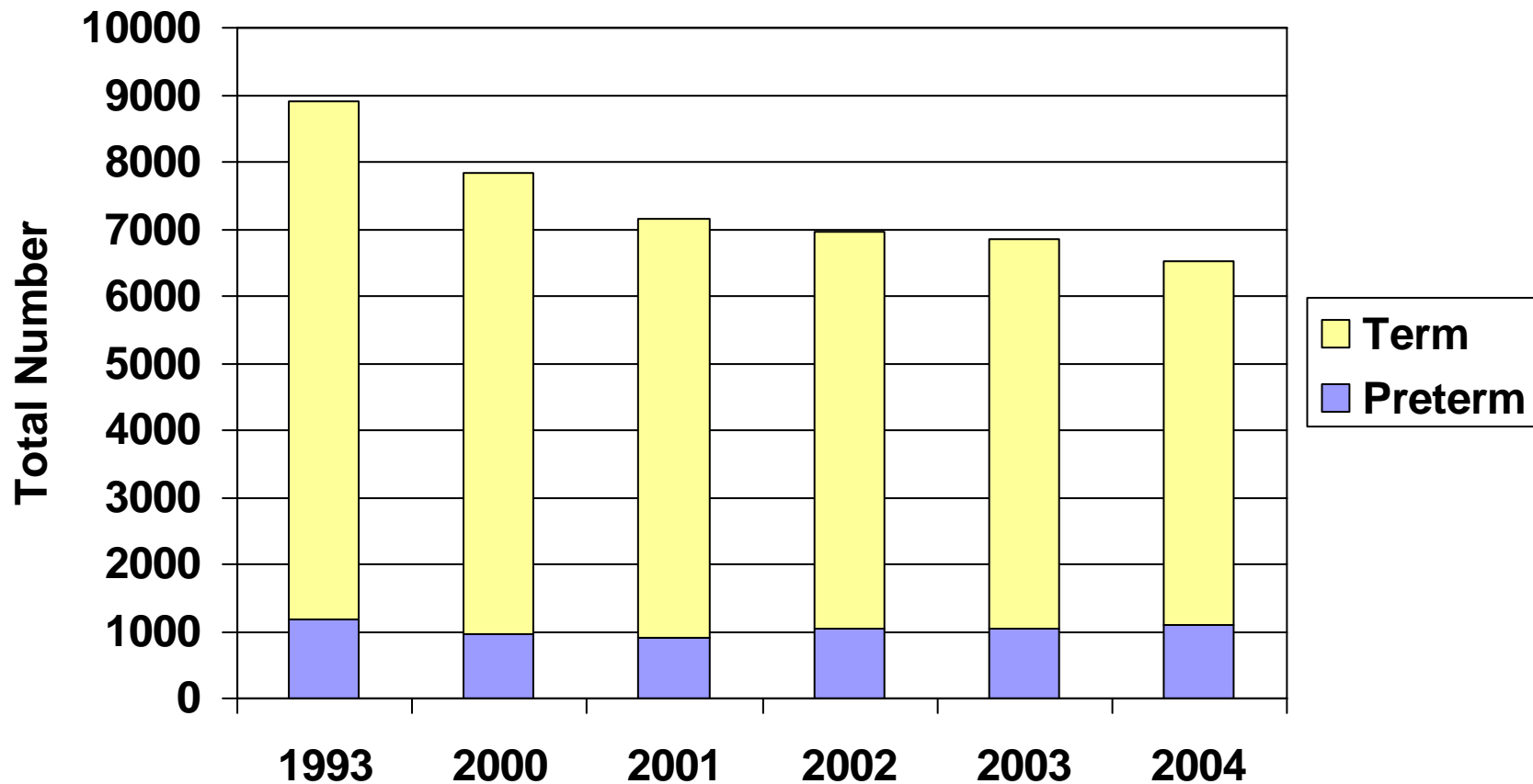


Copyright March of Dimes, 2004

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

Data Source: March of Dimes Peristats

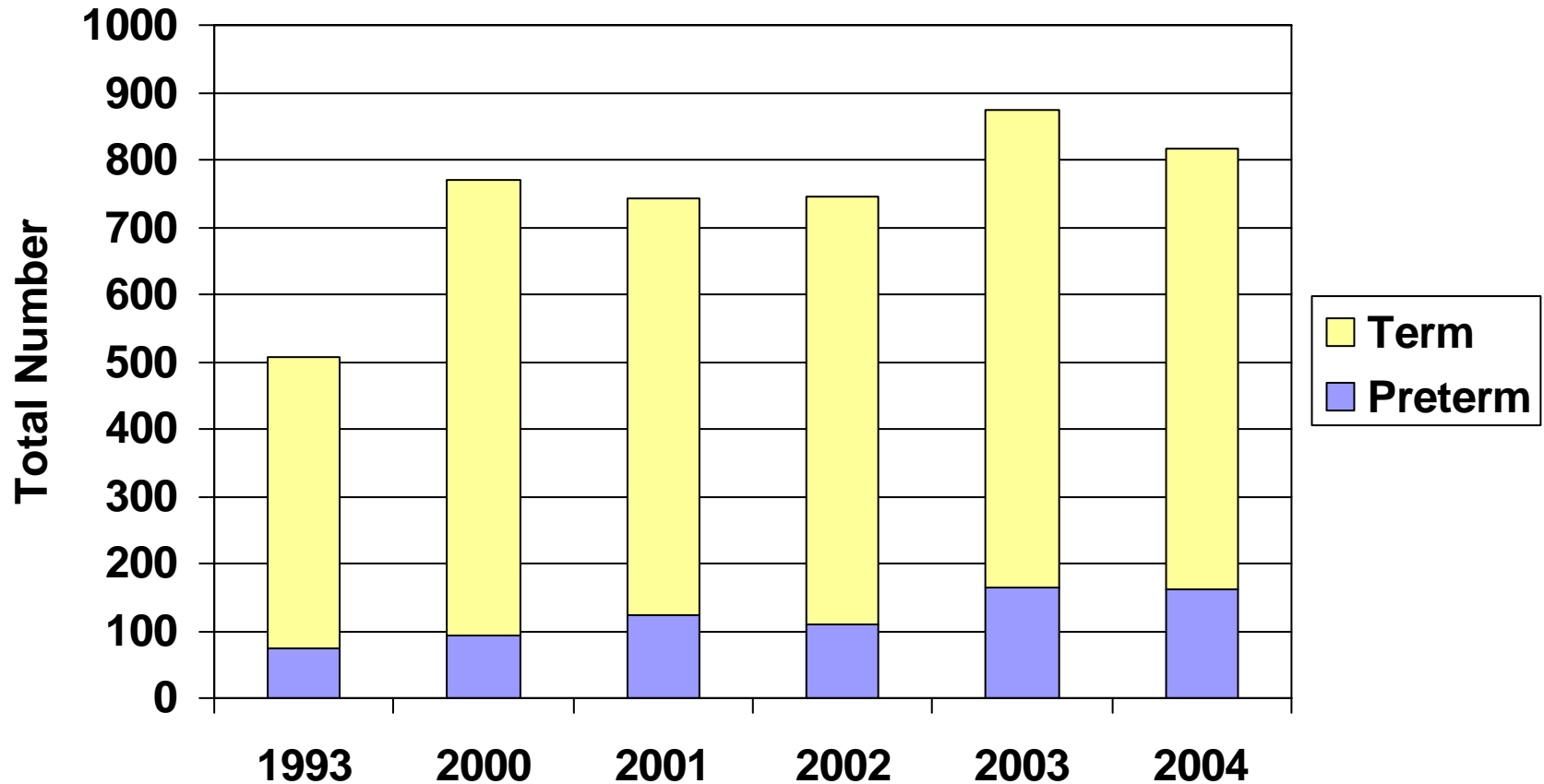
# Kentucky Births to Women $\leq 20$ Years of Age; Term and Preterm Births



\*2004 data is preliminary and numbers could change

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 1993, & 2000-2004

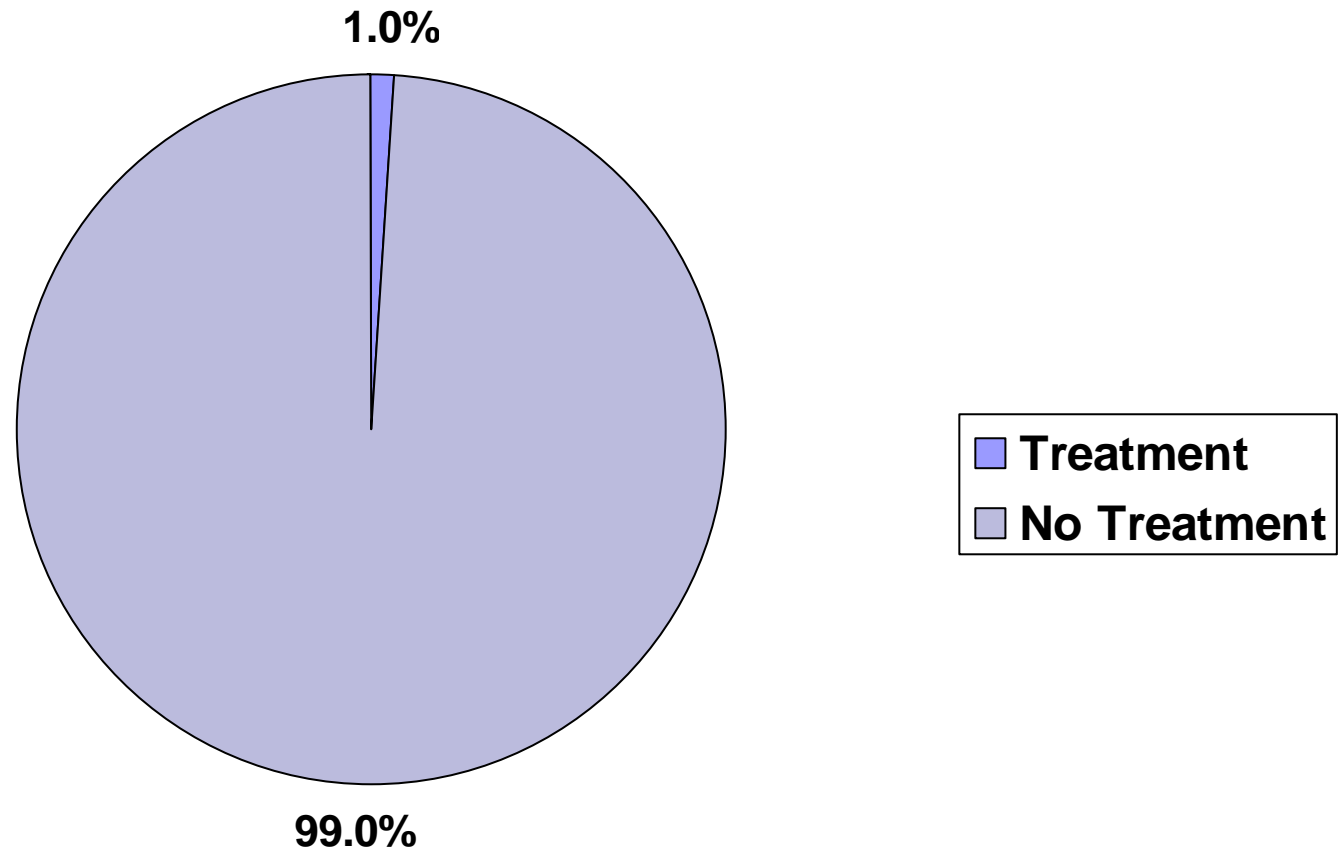
# Kentucky Births to Women $\geq 40$ Years of Age; Term and Preterm Births



\*2004 data is preliminary and numbers could change

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 1993, & 2000-2004

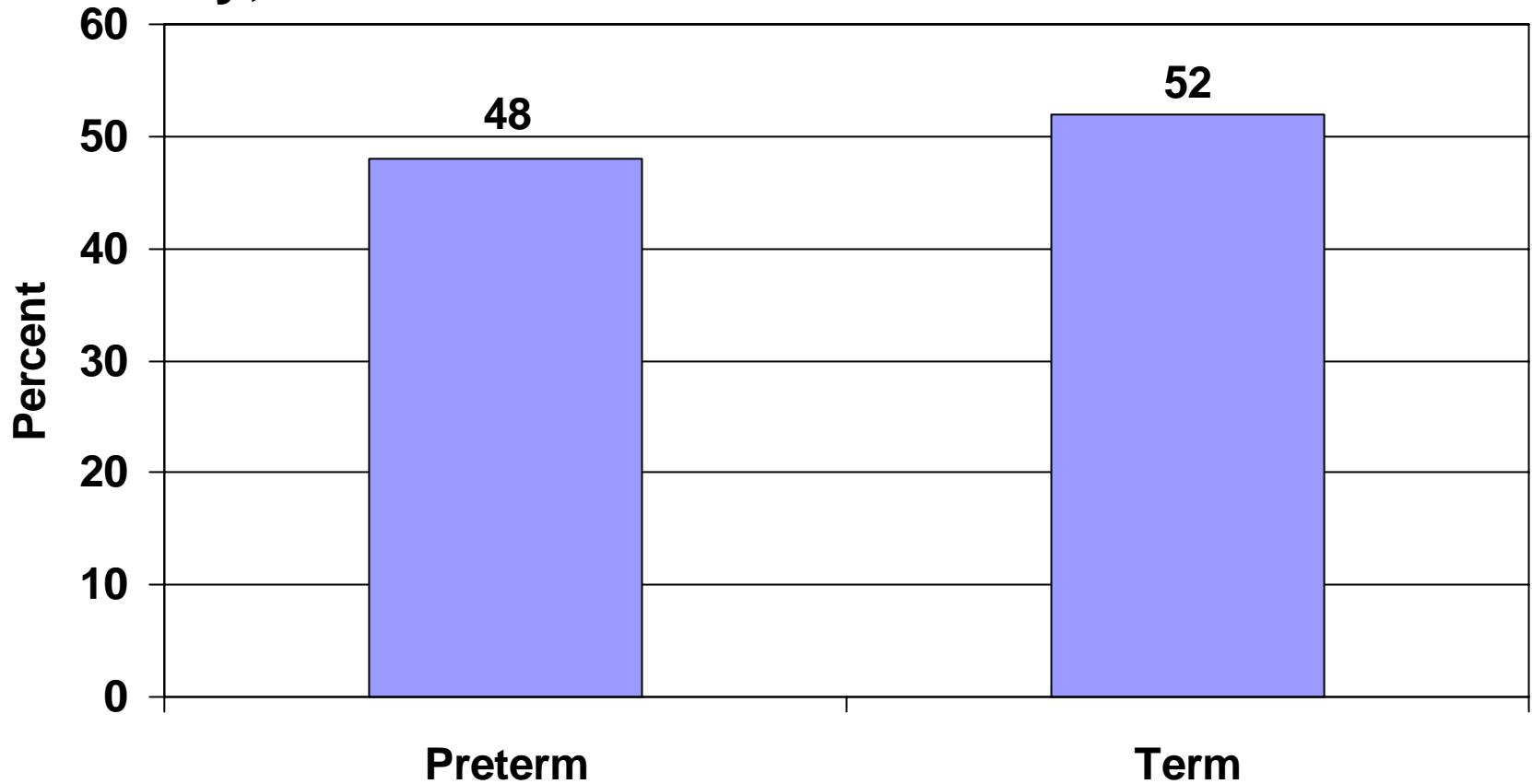
# Percent of Live Births Resulting from Infertility Treatment; Kentucky, 2004\*



\*2004 data is preliminary and numbers could change

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 2004

# Percent of Infertility Births by Preterm Status; Kentucky, 2004\*\*

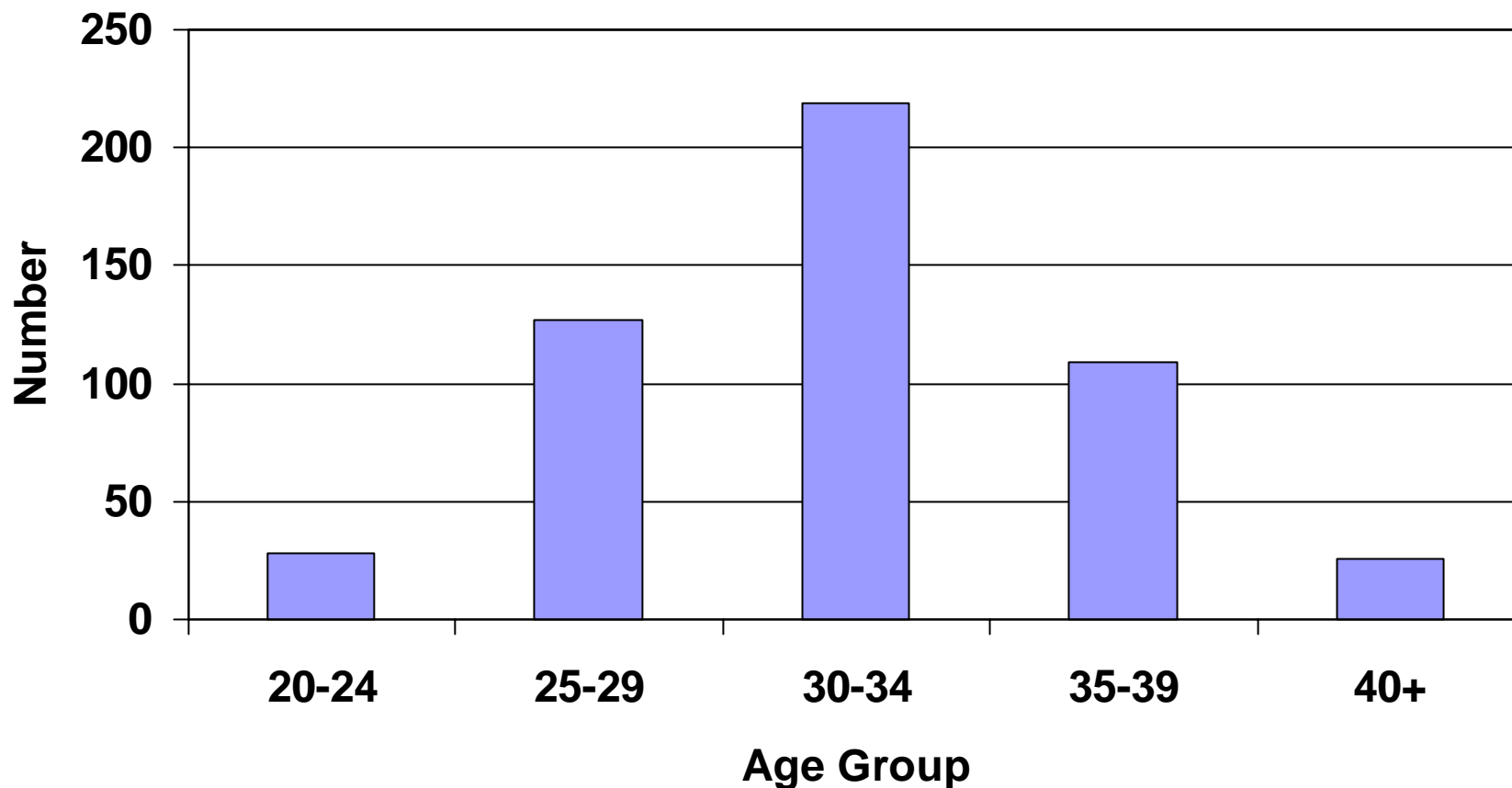


\*Preterm birth is defined as any live birth occurring <37 completed weeks gestation

\*\*2004 data is preliminary and numbers could change

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 2004

# Births that Resulted from Infertility Treatment by Maternal Age Groups; Kentucky, 2004\*



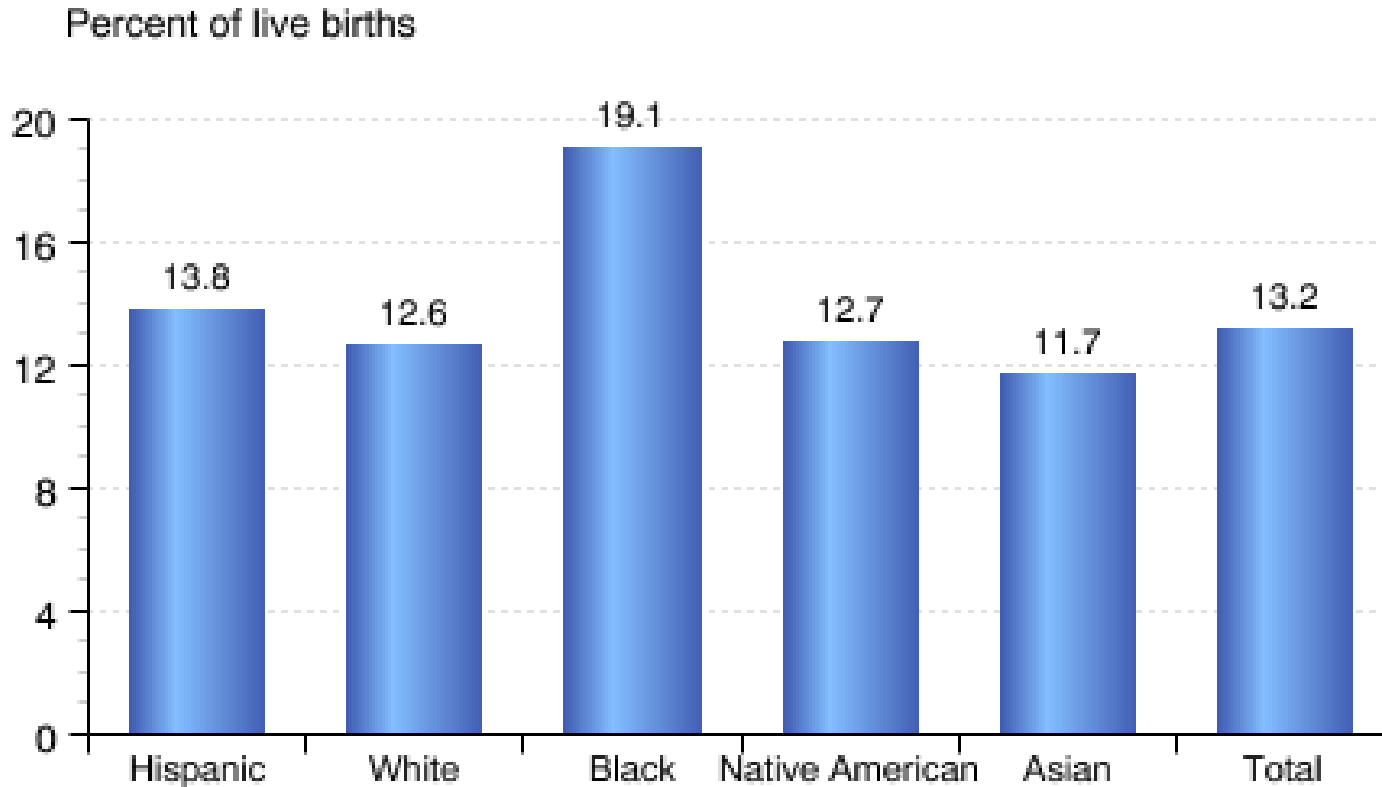
\*2004 data is preliminary and numbers could change  
Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 2004



# Major Categories of Risk for Preterm Birth

- Extremes of Maternal Age
- Maternal Race/Ethnicity

# Percent of Live Births that were Preterm by Ethnicity/Race; Kentucky, 2000-2002

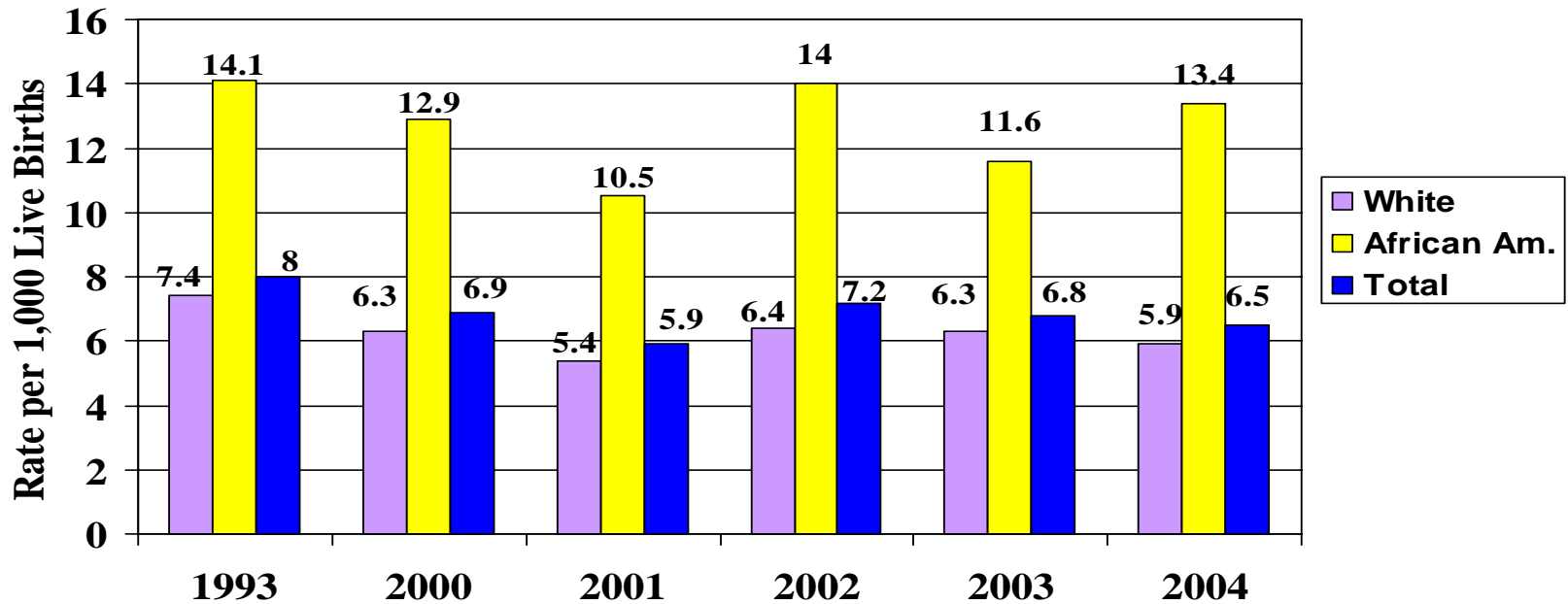


Copyright March of Dimes, 2004

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

Data Source: March of Dimes Peristats

# Infant Mortality Rates\* by Race; Kentucky 1993, & 2000-2004\*\*



Infant death is a death occurring at any time between 0-364 days of age

\*Rates are per 1,000 Live Births per specified race

\*\*2004 data is preliminary and numbers could change

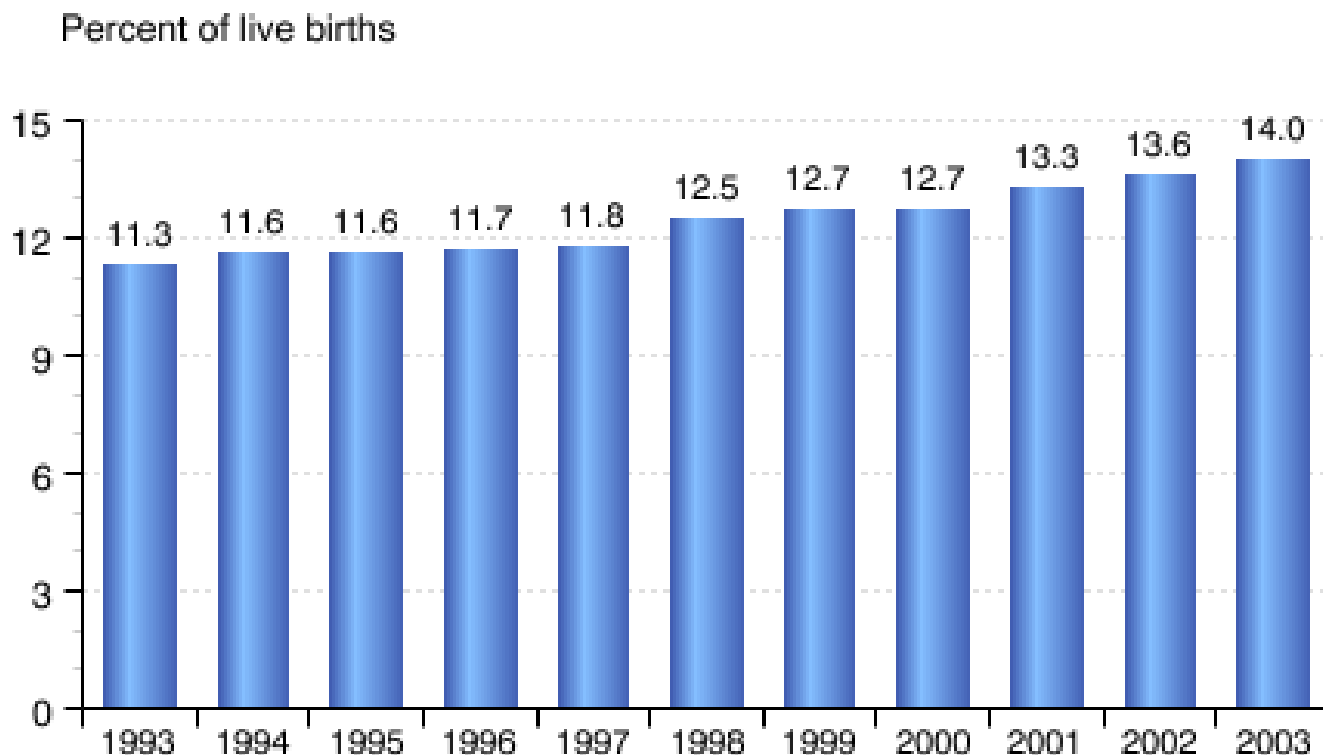
Source: Kentucky Vital Statistics Files, Death Certificate Files, 1993 & 2000-2004



# Major Categories of Risk for Preterm Birth

- Unintended pregnancy
- Extremes of Maternal Age
- Maternal Race
- Multiple Gestations

# Percent of Live Births that were Preterm\*; Kentucky, 1993-2003

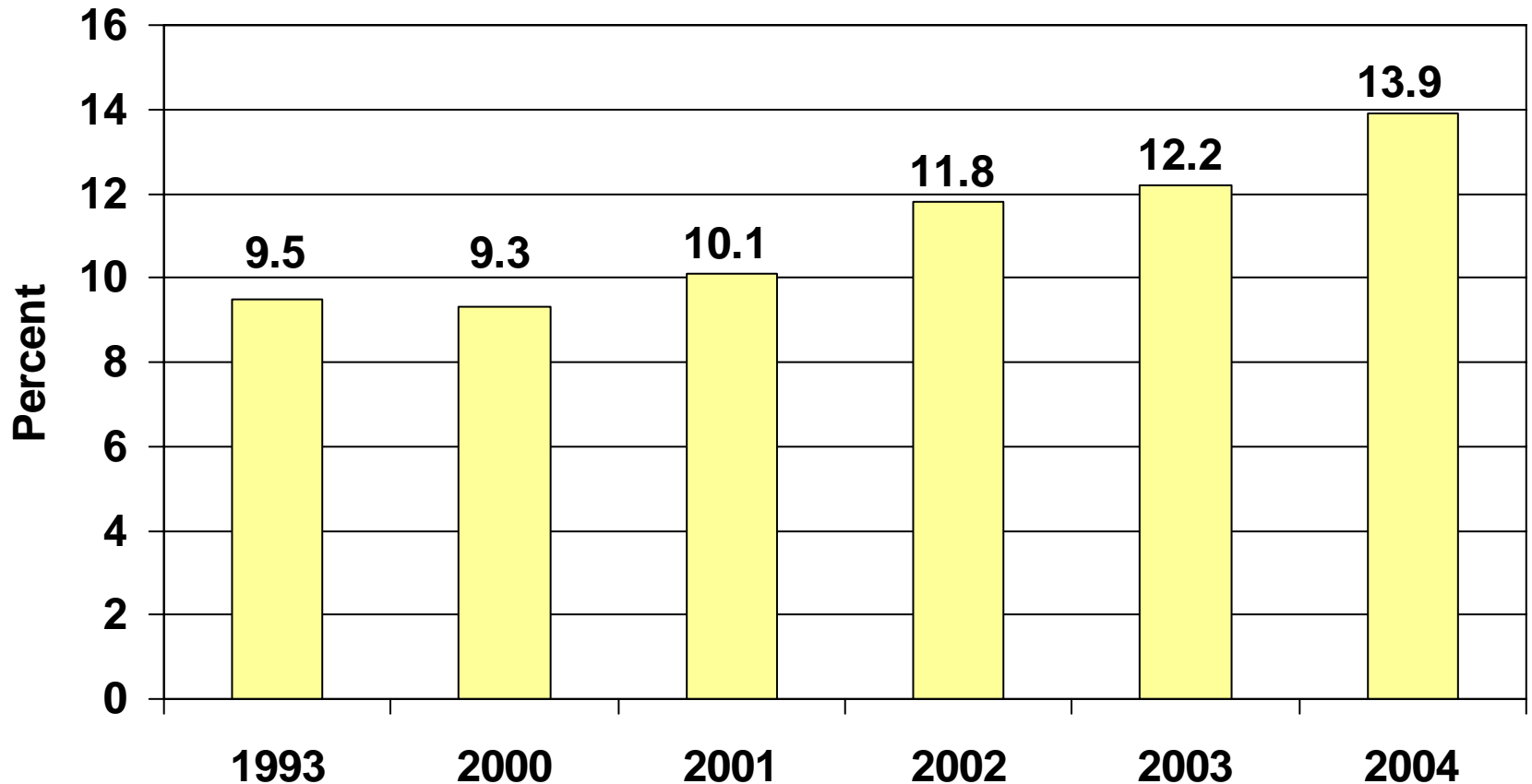


Copyright March of Dimes, 2004

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

Data Source: March of Dimes Peristats

# Percent of Singleton Live Births that were Preterm\*; Kentucky, 1993, & 2000-2004\*\*

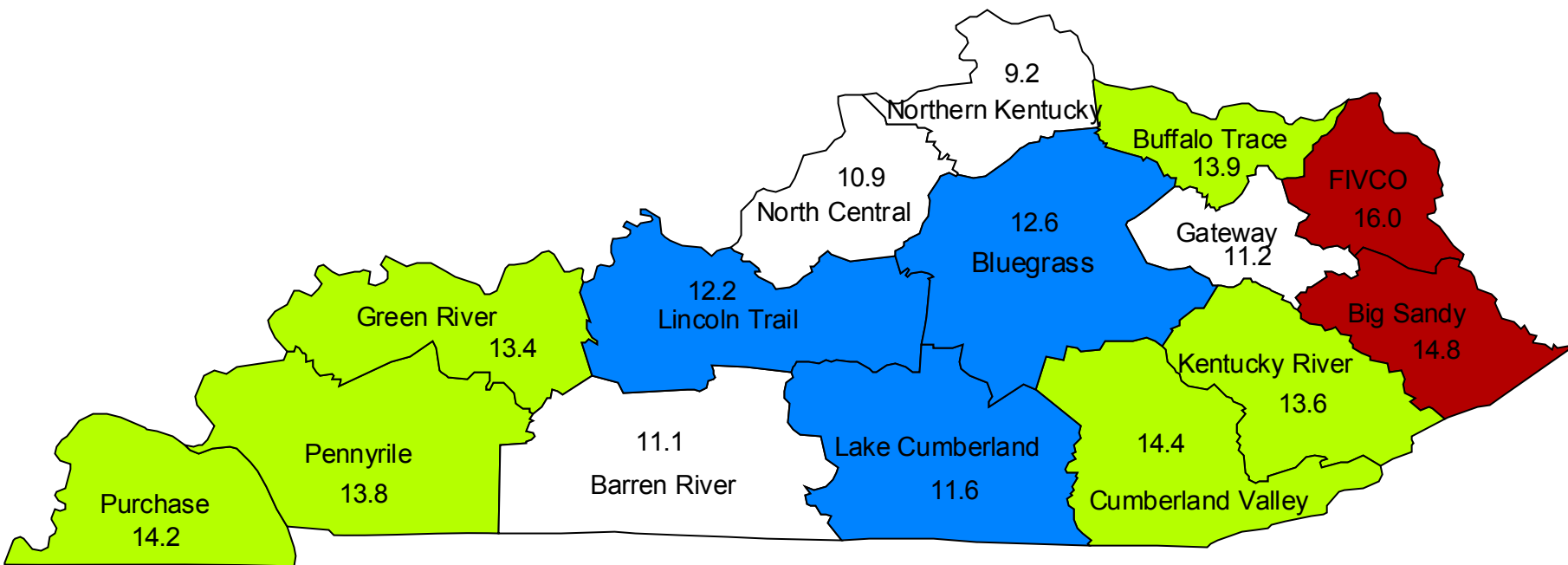


\*Preterm birth is defined as any live birth occurring <37 completed weeks gestation

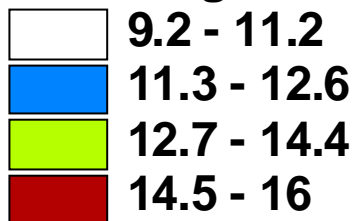
\*\*2004 data is preliminary and numbers could change

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 1993, & 2000-2004

# Singleton Live Births (percent) that were Preterm\* by Area Development District; Kentucky, 2003



## Percentage



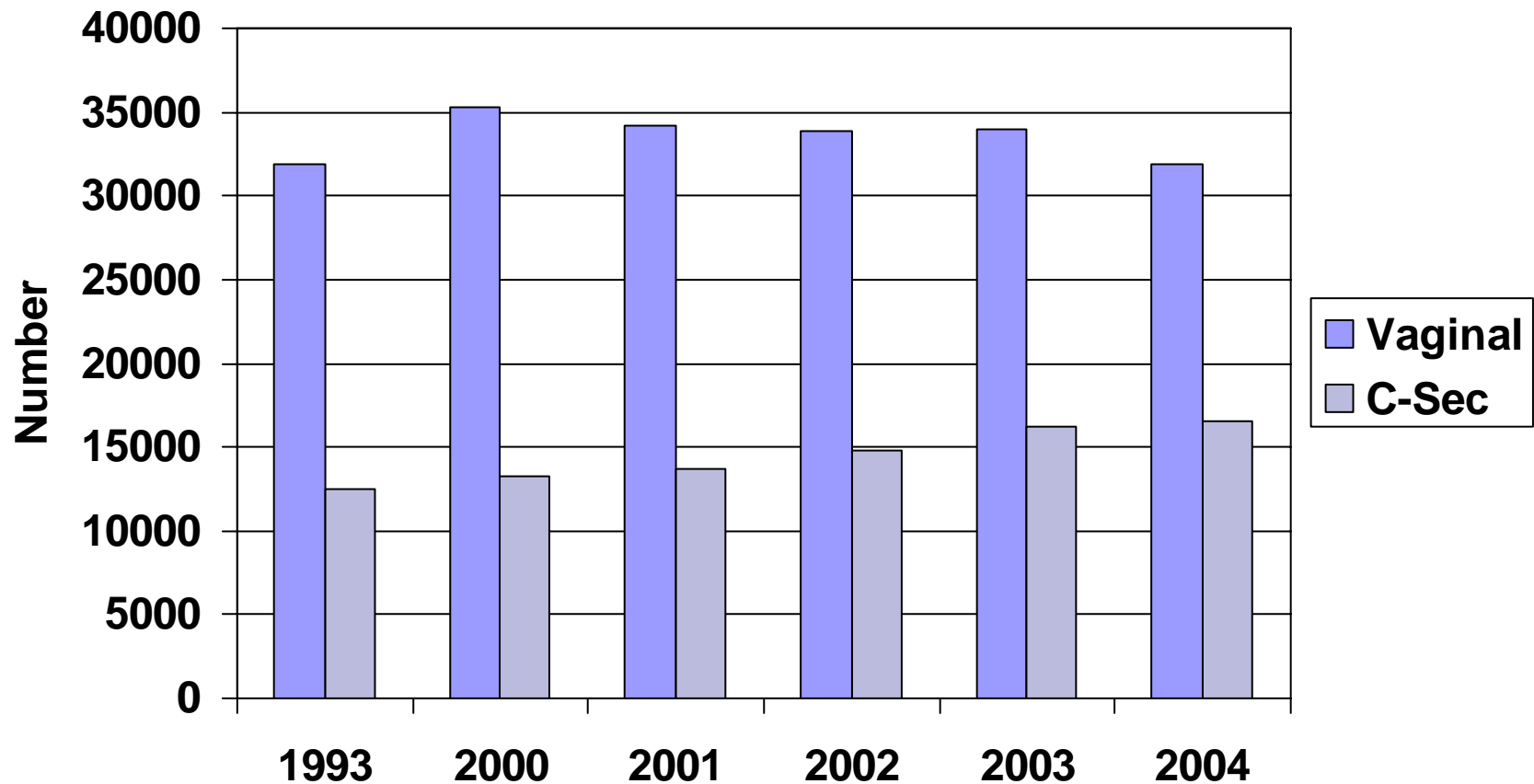
\*Preterm birth is defined as any live birth occurring <37 completed weeks gestation  
 Area Development District is based on Mother's county of residence at time of birth  
 Data Source: Kentucky Vital Statistics files, Live Birth certificate files, 2003



# Major Categories of Risk for Preterm Birth

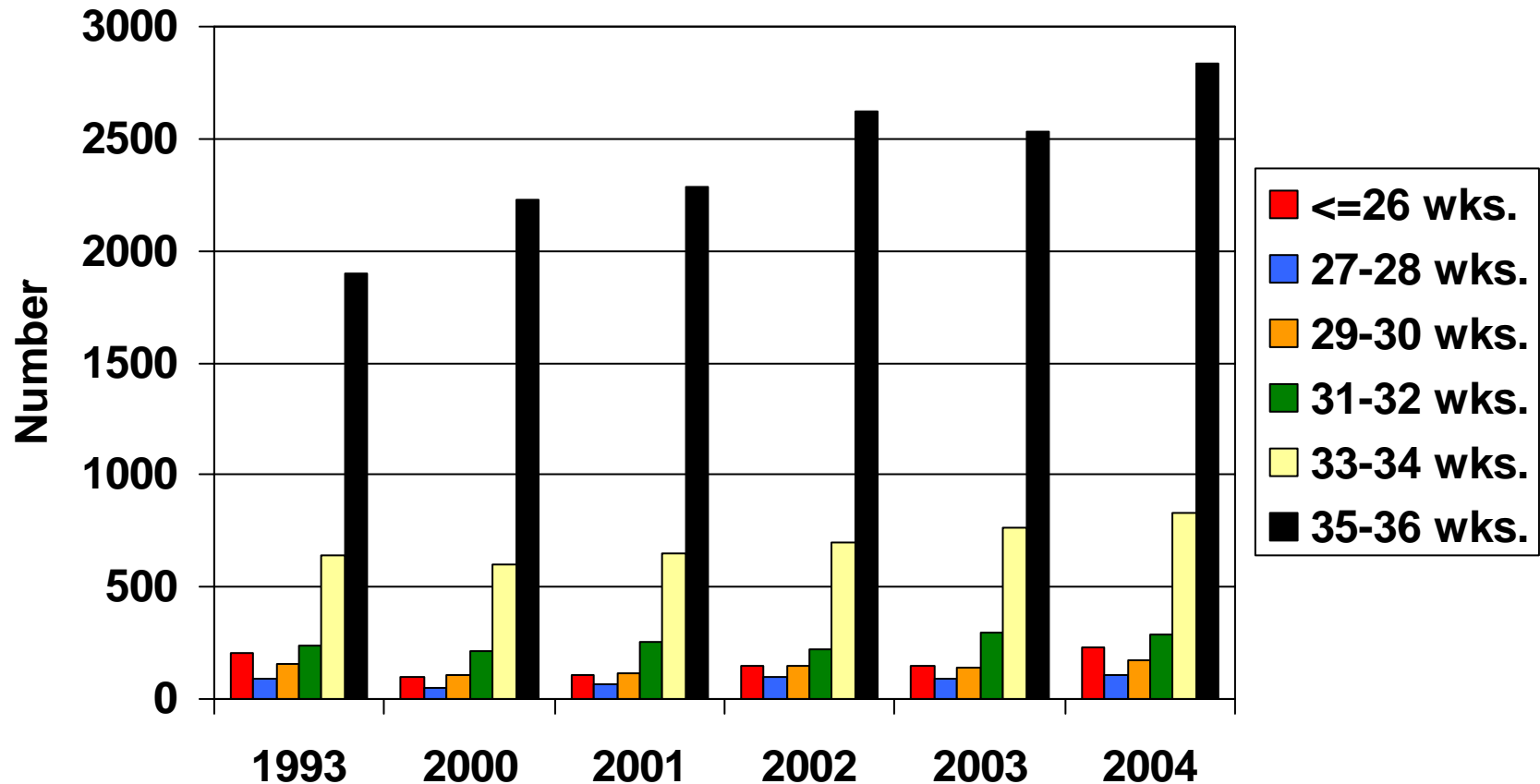
- Unintended pregnancy
- Extremes of Maternal Age
- Maternal Race
- Multiple Gestations
- C-section delivery

# Kentucky Live Births by Delivery Type



\*2004 data is preliminary and numbers could change  
Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 1993, & 2000-2004

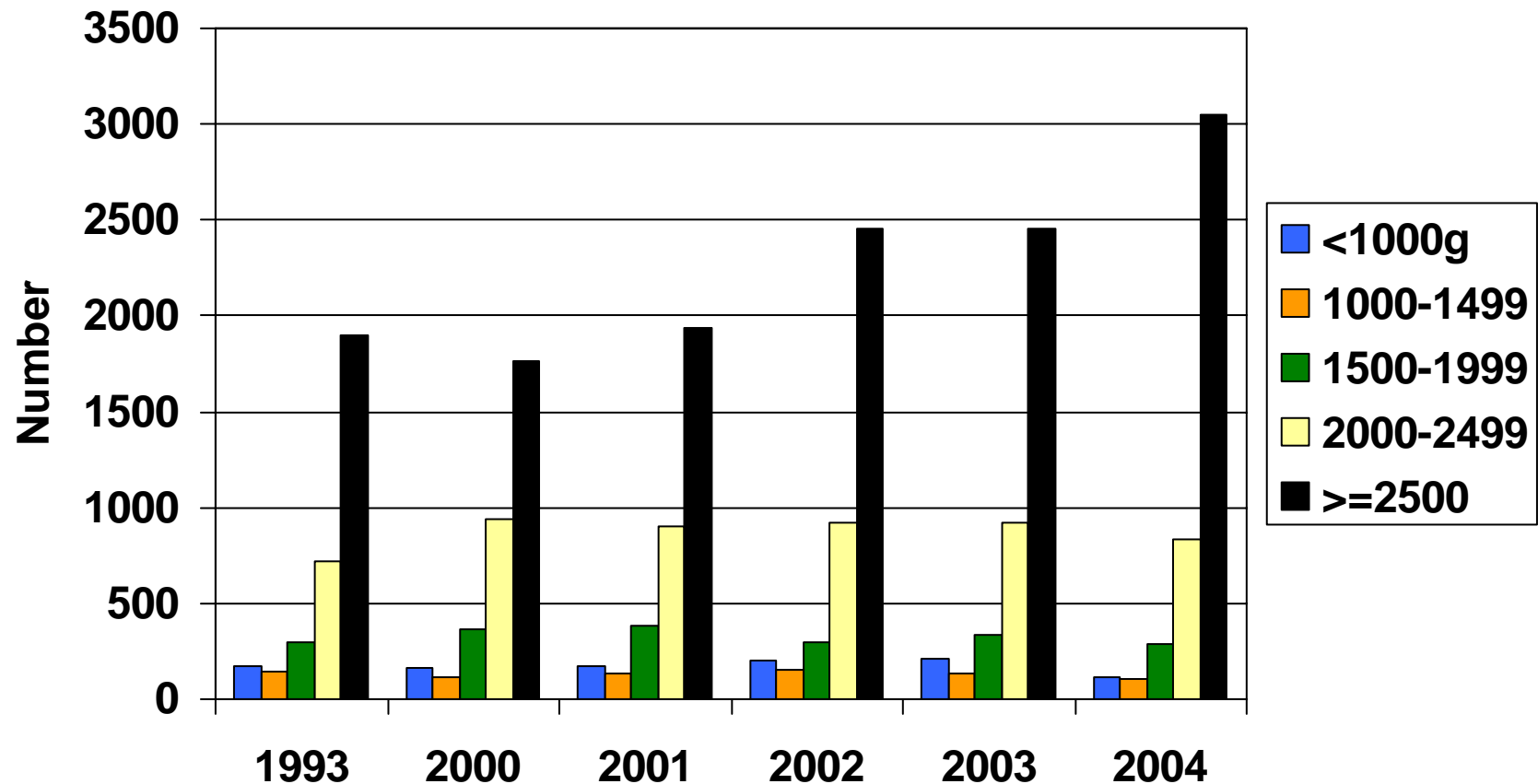
# Preterm\* Vaginal Live Births by Gestational Age in Kentucky



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

\*\*2004 data is preliminary and numbers could change  
Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 1993, & 2000-2004

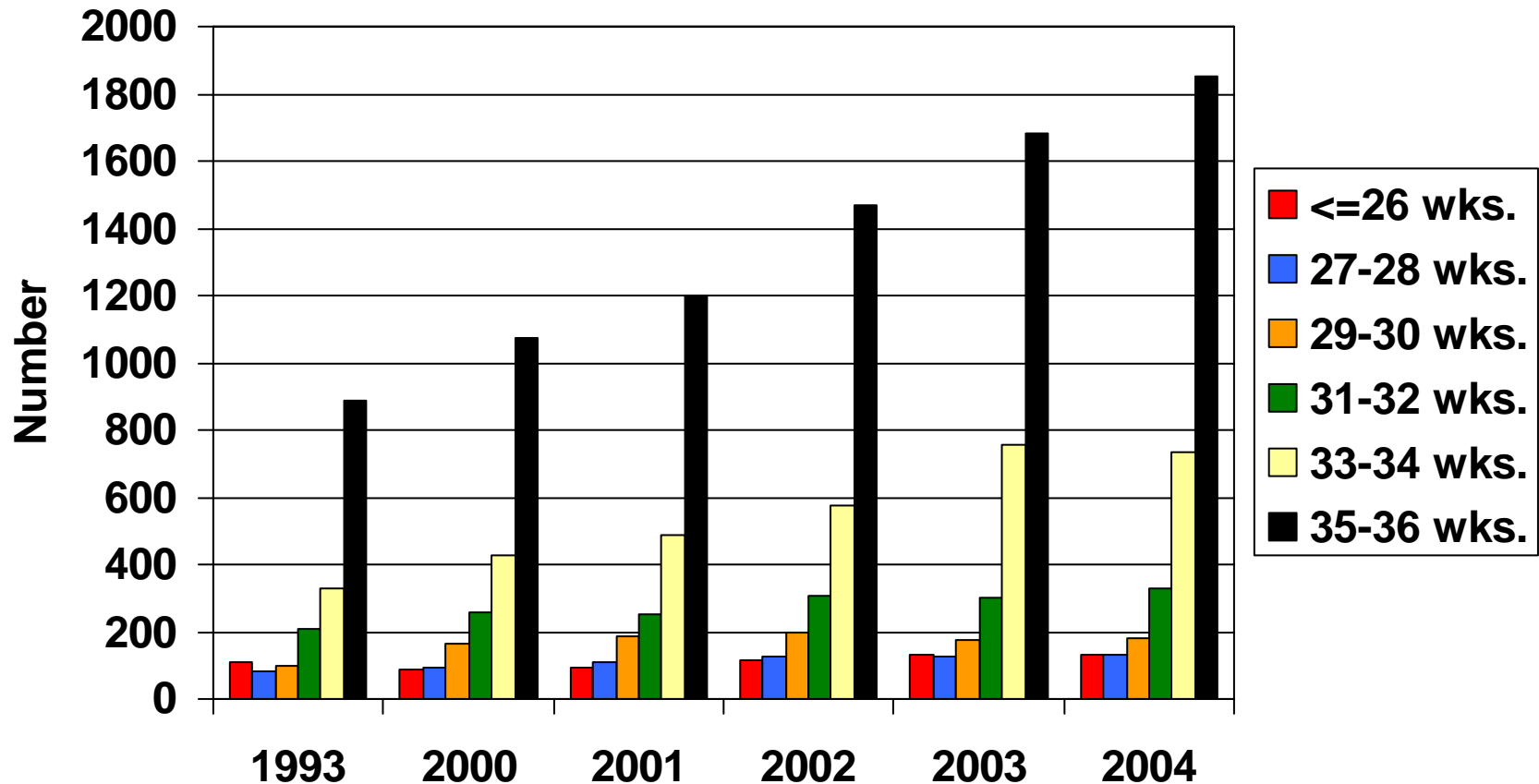
# Preterm\* Vaginal Live Births by Birth Weight in Kentucky



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

\*\*2004 data is preliminary and numbers could change  
Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 1993, & 2000-2004

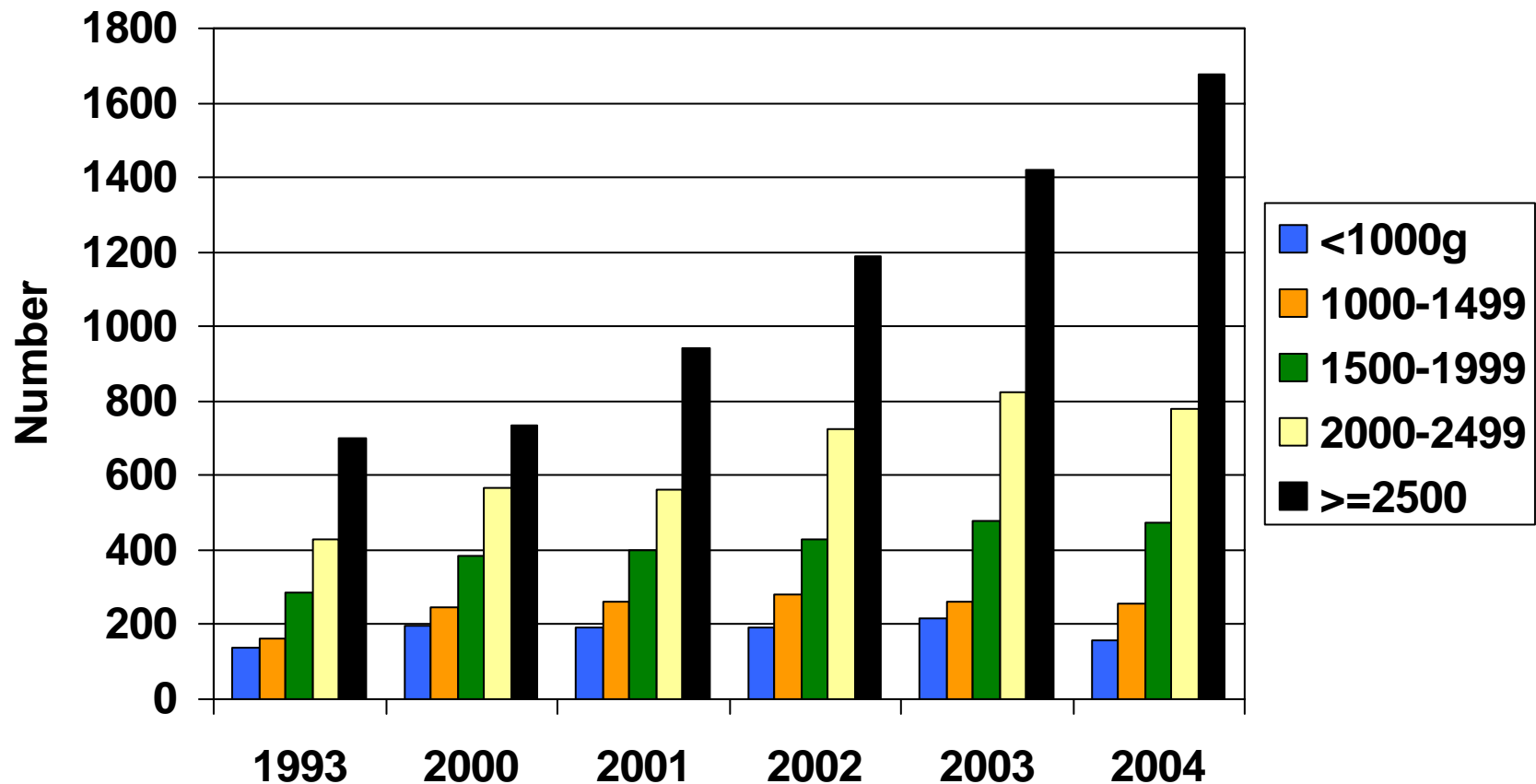
# Preterm\* Cesarean Live Births by Gestational Age in Kentucky



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

\*\*2004 data is preliminary and numbers could change  
 Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 1993, & 2000-2004

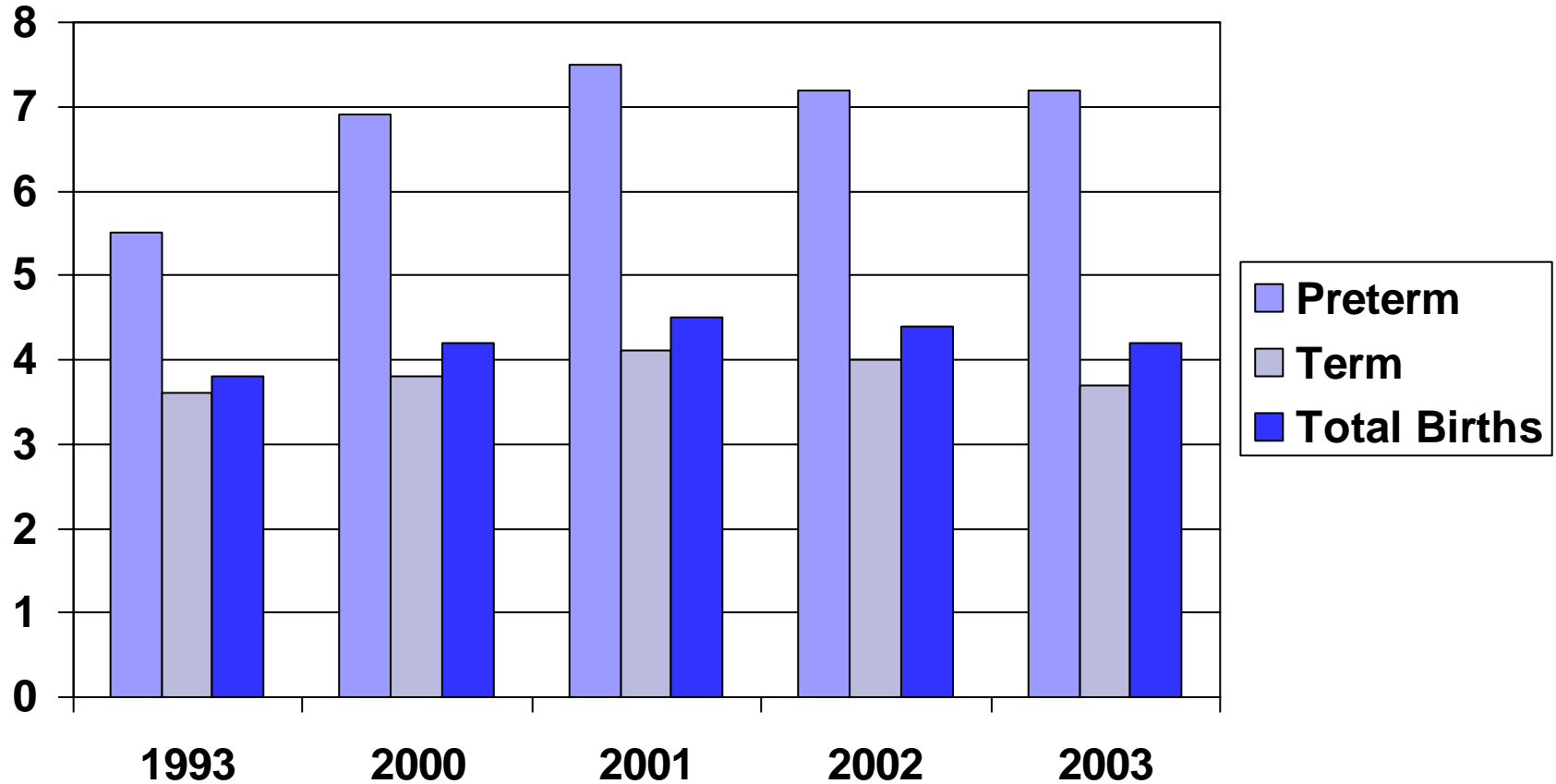
# Preterm\* Cesarean Live Births by Birth Weight in Kentucky



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

\*\*2004 data is preliminary and numbers could change  
Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 1993, & 2000-2004

# Percent of Live Births that were Complicated by PIH by Preterm\* Status; Kentucky, 1993, & 2000-2003

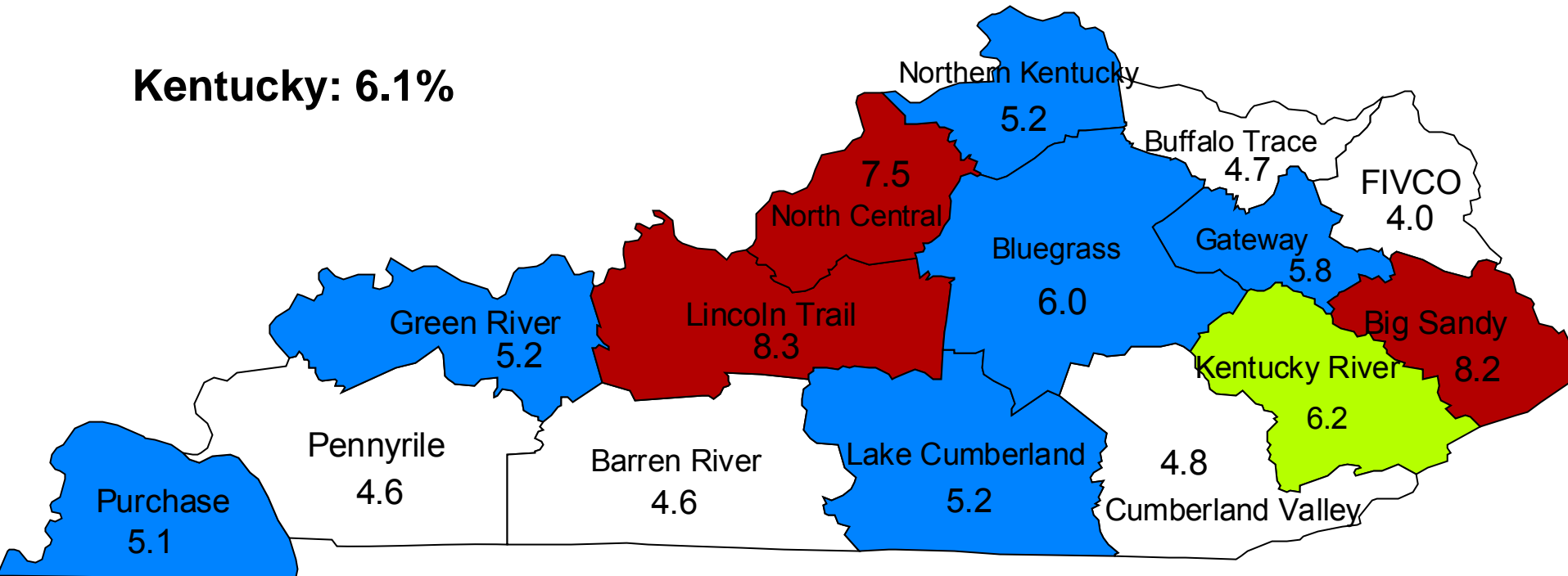


\*Preterm birth is defined as any live birth occurring <37 completed weeks gestation

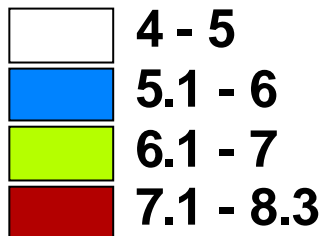
Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 1993, & 2000-2003

# Percent of Births Born to Women with Diabetes\* by Area Development District; Kentucky, 2004\*\*

**Kentucky: 6.1%**



## Percentage



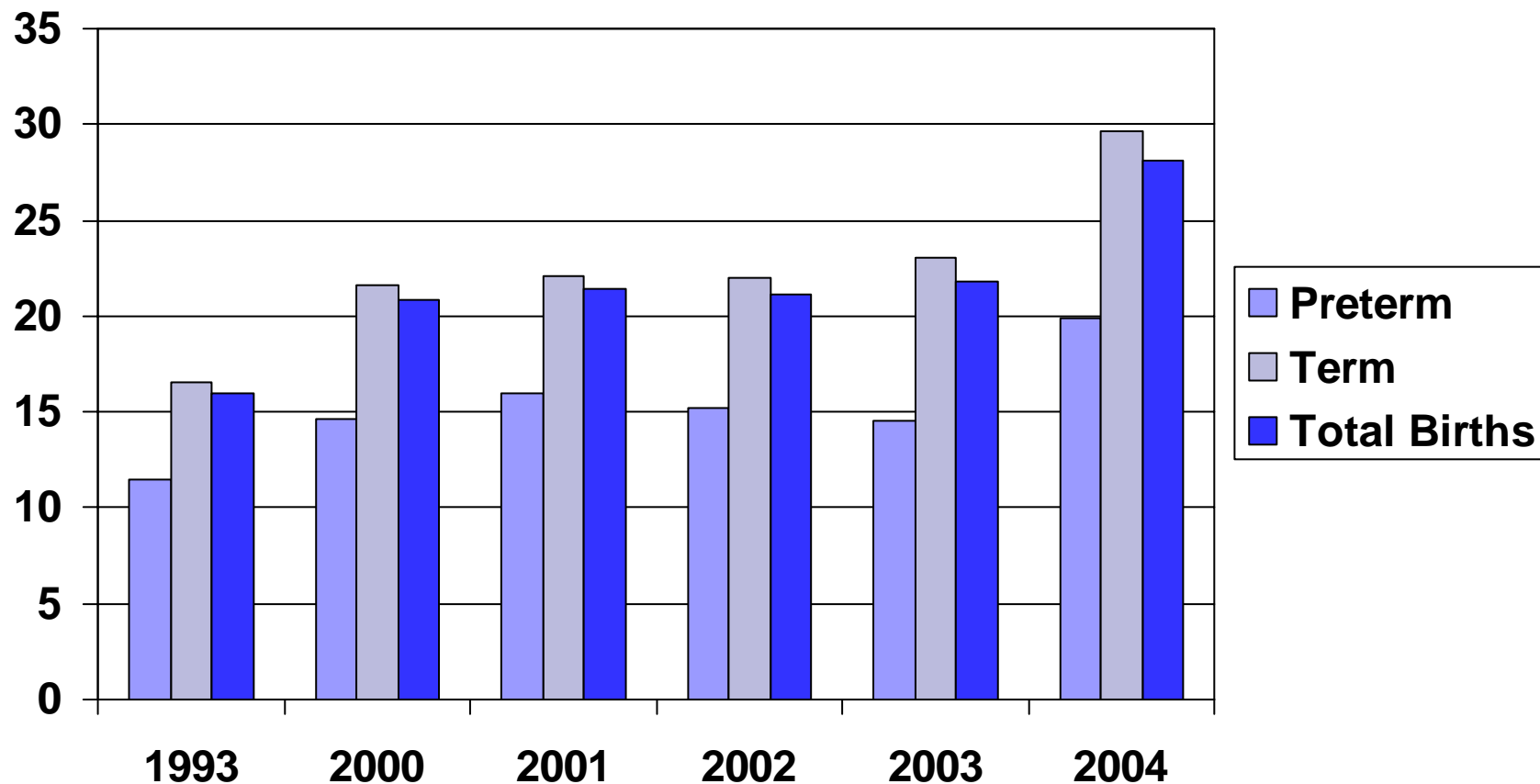
\*Note: Includes both gestational and pre-existing diabetes

\*\*2004 data is preliminary and numbers could change

Area Development District is based on the mother's county of residence at time of birth

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 2004

# Percent of Preterm\* and Term Births that were Induced; Kentucky, 1993, & 2000-2004\*\*



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

\*\*2004 data is preliminary and numbers could change

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 1993, & 2000-2004

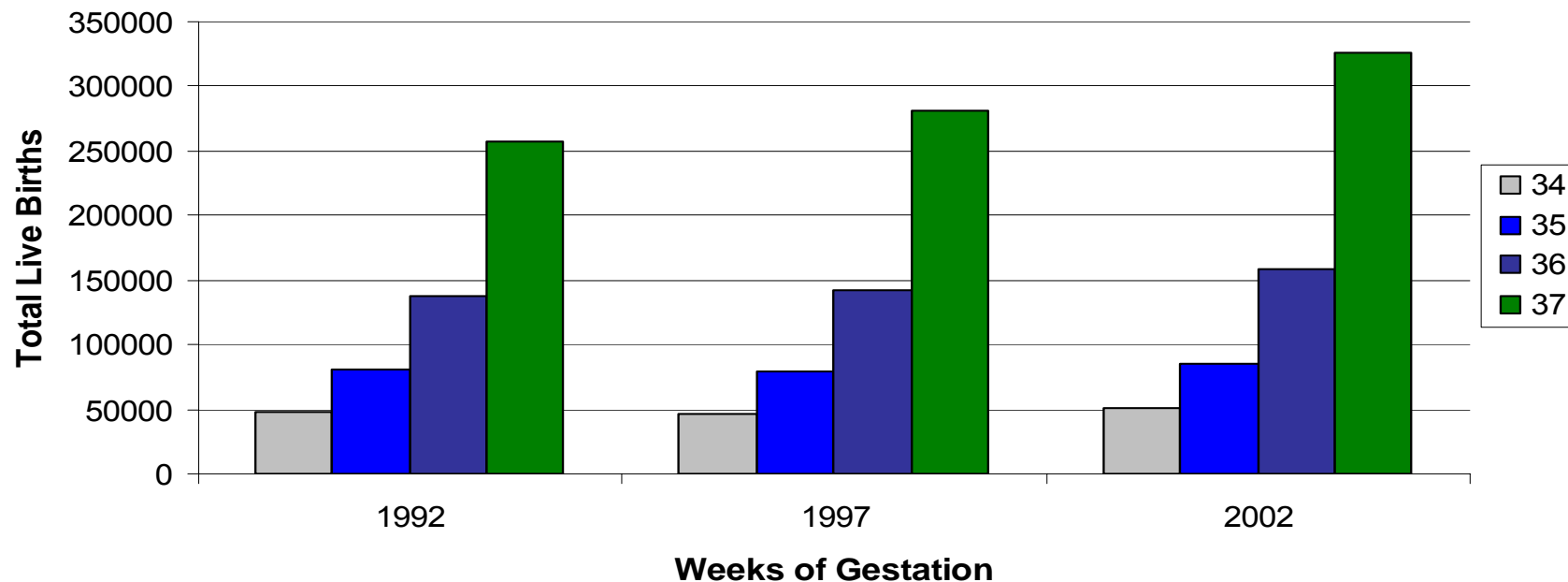


# Major Categories of Risk for Preterm Birth

- Unintended pregnancy
- Extremes of Maternal Age
- Maternal Race
- Multiple Gestations
- C-section delivery
- Gestational age 34, 35,36 weeks

# US Late Preterm Live Births

Near Term Data





# Prematurity Paradigm Shift

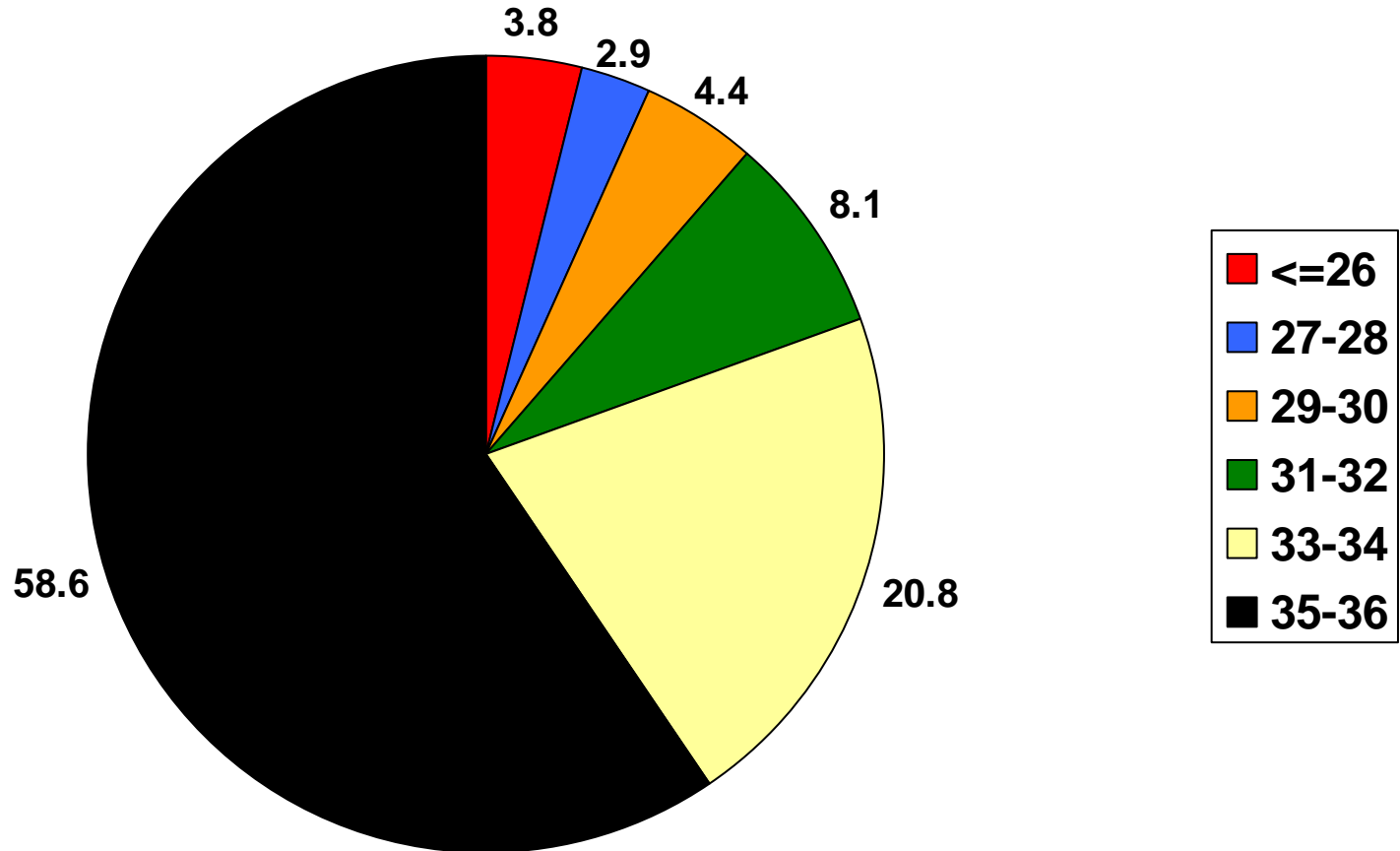
## ■ Old Paradigm

- “Every day we gain for that baby in the womb is of benefit to the baby” [unless it is a hostile environment]

## ■ New Paradigm

- “Once the baby gets to 28/32/34 weeks, it will be all right.”

# Percent of Live Births that were Preterm\* by Gestational Age; Kentucky, 2003

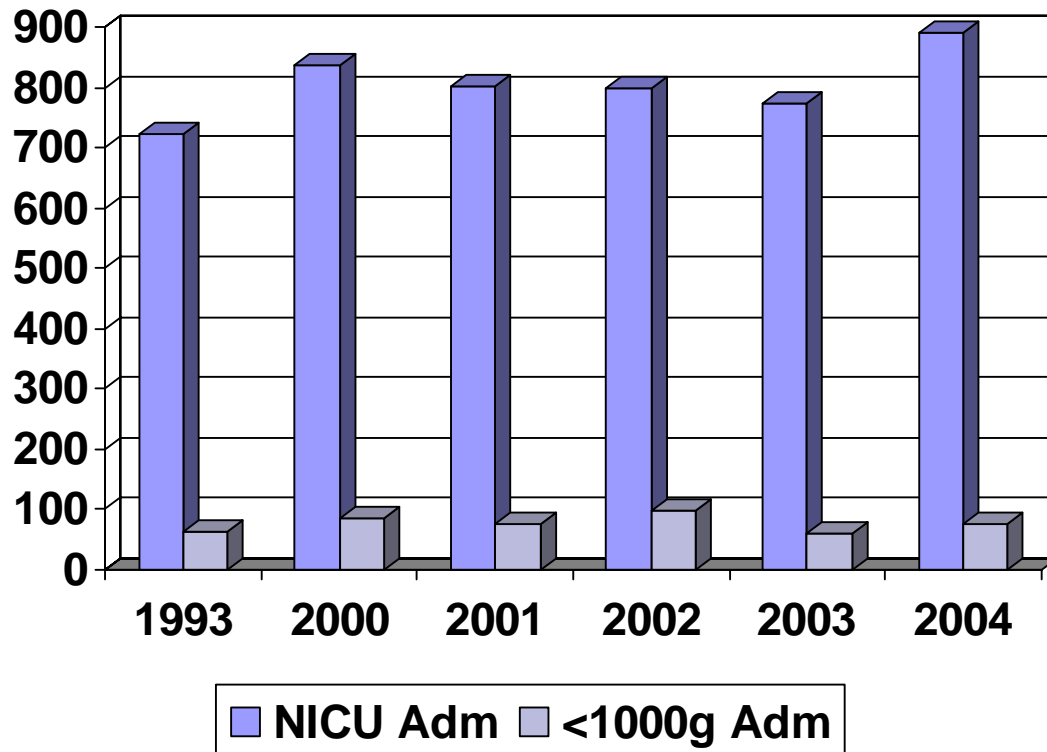


\*Preterm birth is defined as any live birth occurring <37 completed weeks gestation  
Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 2003

# The “Late Preterm” Infant is still Premature

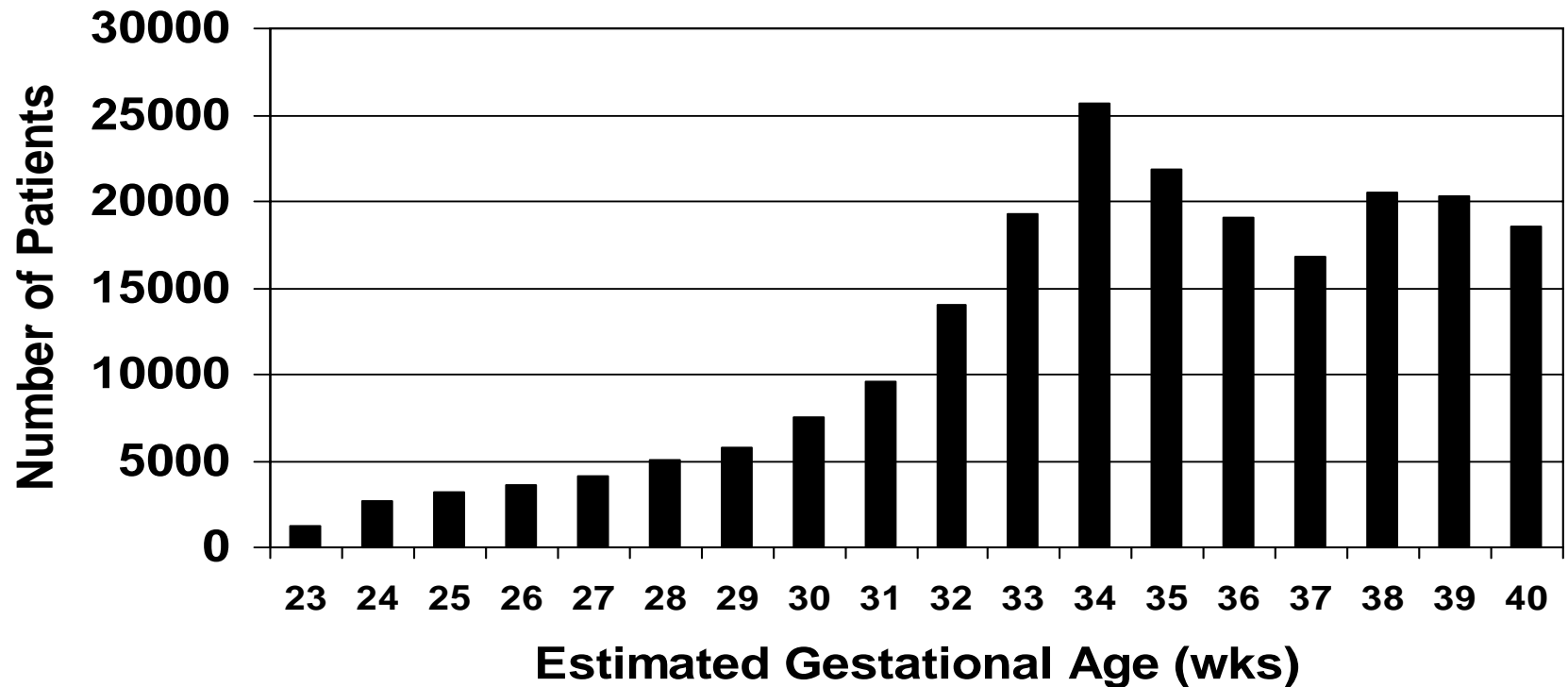
- Late Preterm infants (34 0/7 – 36 6/7 weeks gestation) are increasing nationwide and in Kentucky
- In Kentucky, 52% of late preterm infants were delivered by c-section, a much higher rate than term infants; this puts the baby at increased risk for respiratory distress, poor transition, and respiratory failure
- Late Preterm infants typically receive routine care in well-baby nurseries and are presumed low risk; they are often ignored until illness is more advanced and overtly symptomatic.
- Late Preterm infants are initially much more likely than term infants to have:
  - Temperature Instability
  - Hypoglycemia
  - Respiratory distress
  - Hyperbilirubinemia
  - Feeding problems
  - NICU admission
- Most of the preterm babies admitted to NICUs are the “late preterm” infants
- Most of the babies on ventilators in NICU’s are “late preterm” infants
- Many of the sickest babies in NICU’s are the late preterm infants with Persistent Pulmonary Hypertension of the Newborn and require extreme care such as Nitric Oxide, high frequency ventilators, ECMO

# NICU admissions, Kosair Children's Hospital

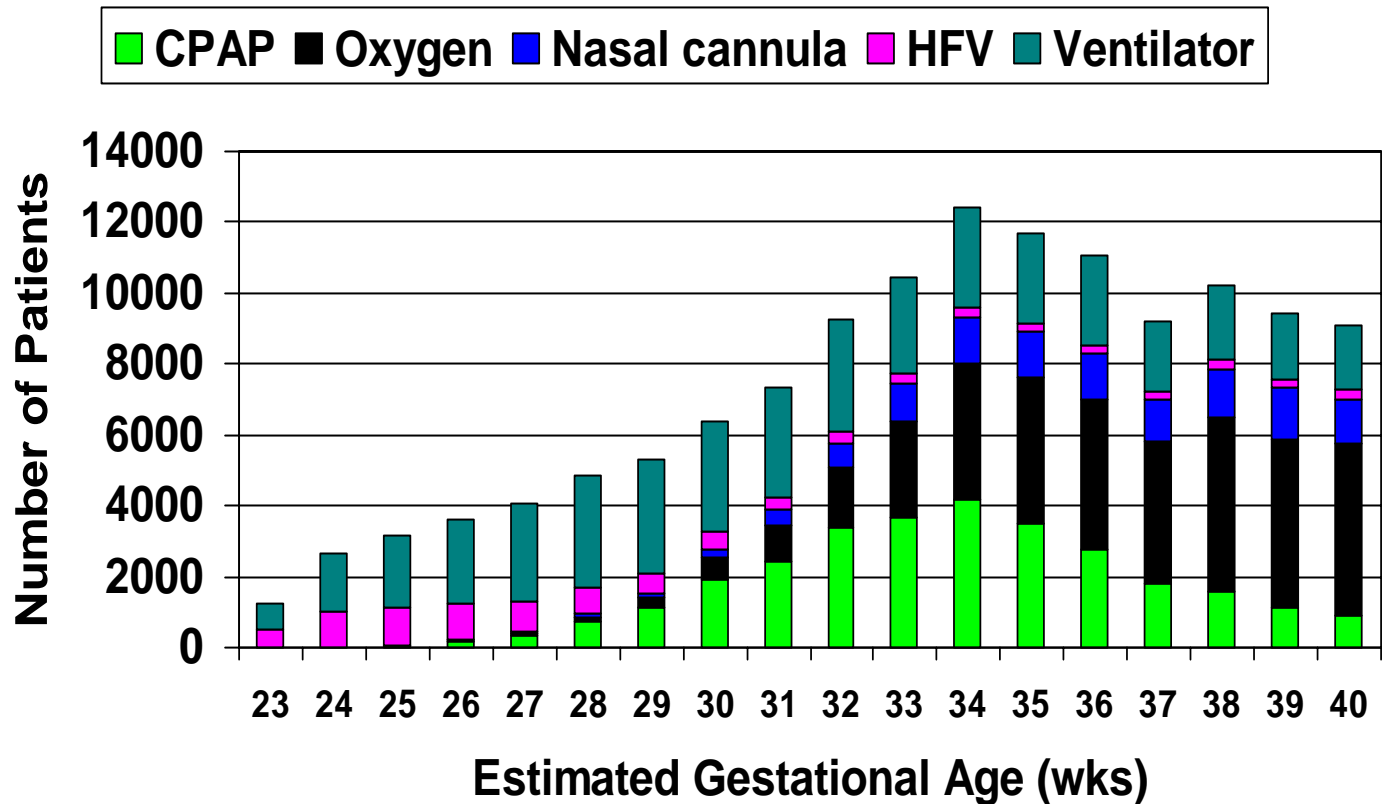


# Number of Patients

(by EGA)



# Patients with Respiratory Support (by EGA)

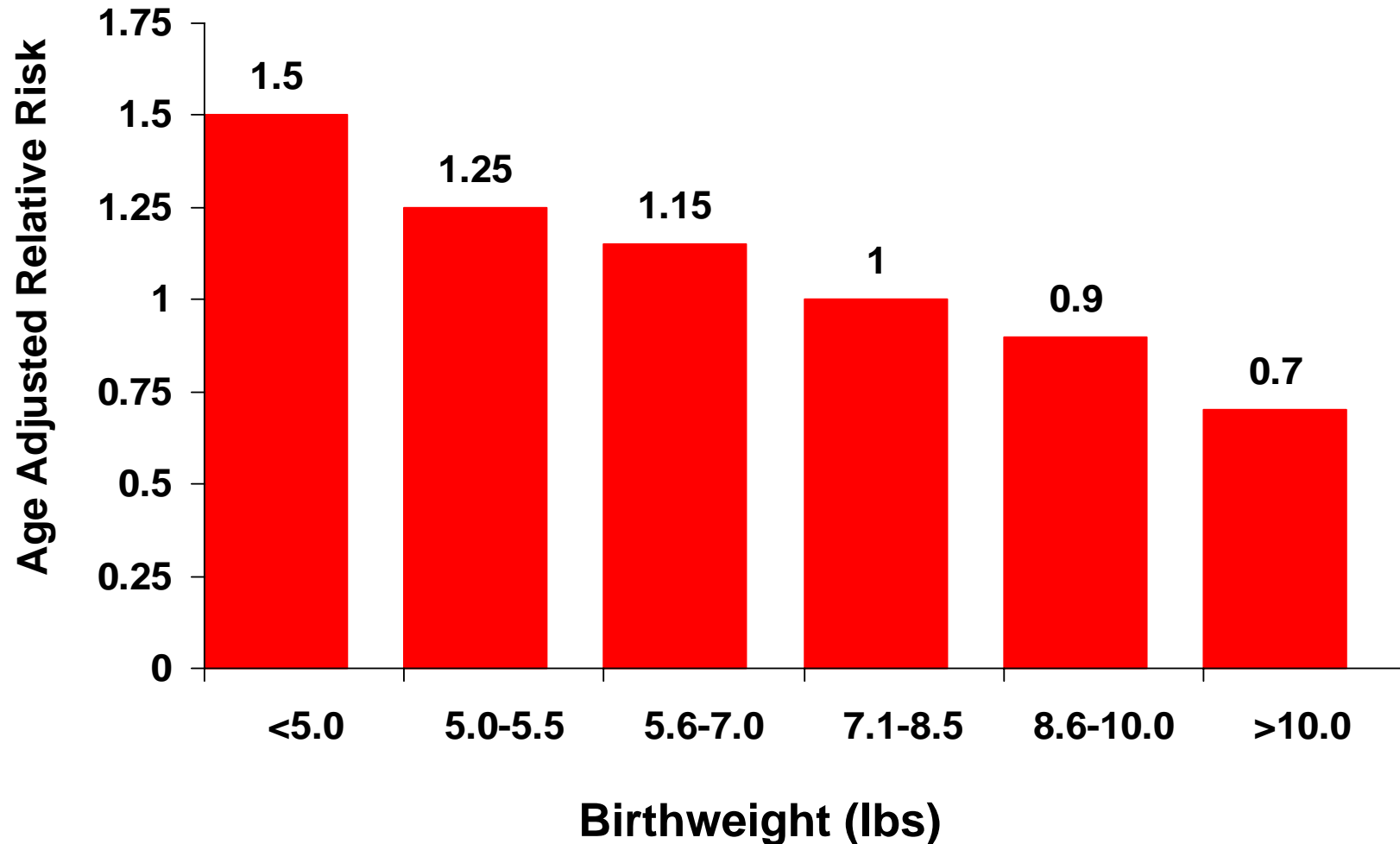


# Late Preterm Infants: Other morbidity

- Late Preterm infants have twice the risk of dying as a full term baby
- Late Preterm Infants are more likely to be re-hospitalized as infants than a full term baby.
- Most of the babies with kernicterus (brain damage) from jaundice were late preterm infants
- The brain of a late preterm infant is 30% smaller than the brain of a full term infant
- Late Preterm infants are twice as likely to die of SIDS as full term infants
- Limited knowledge about neonatal outcomes, but studies suggest increased morbidity and mortality in many systems.
- Prematurity has consequences for long term health issues

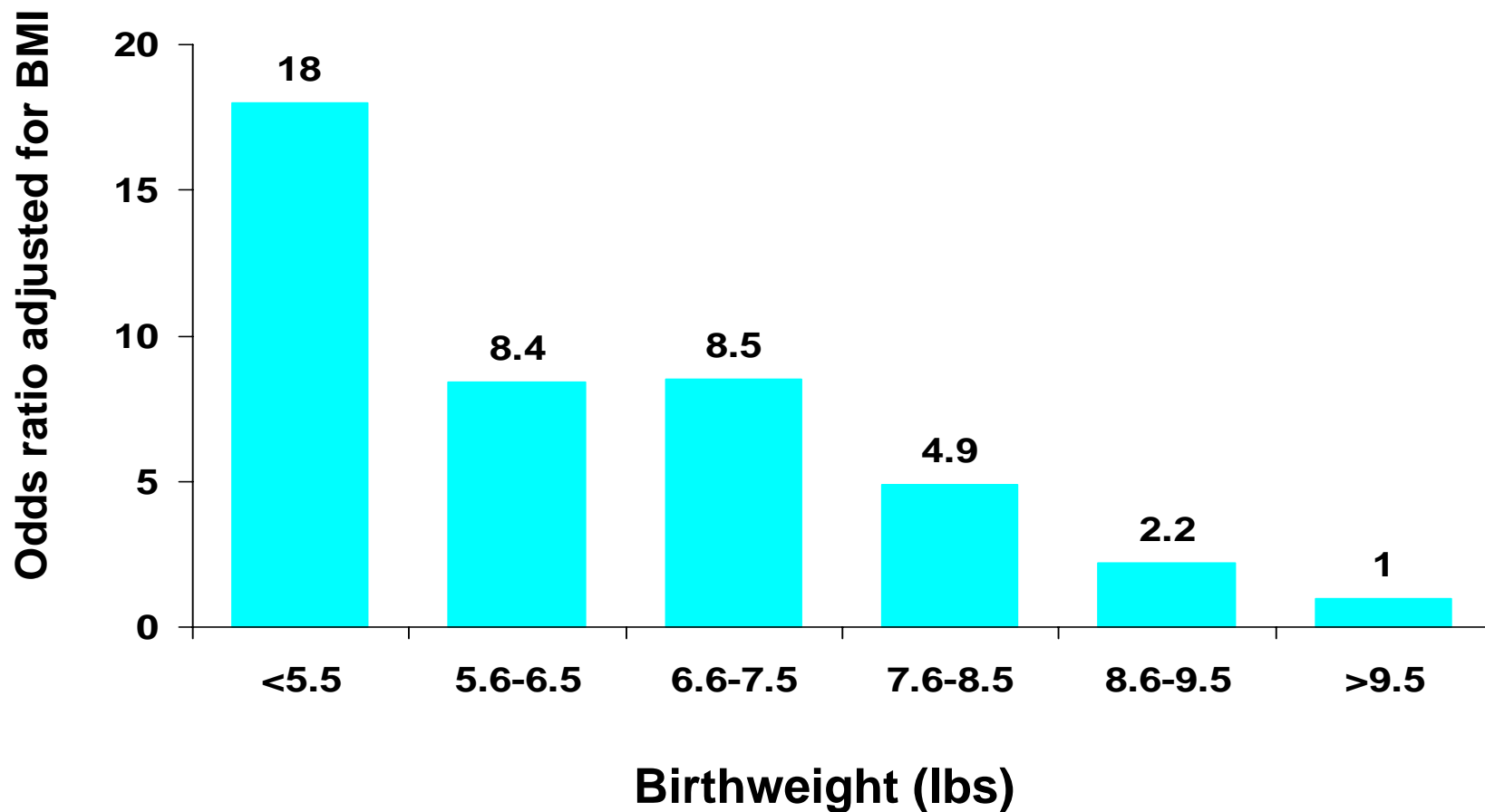
# Birth Weight and Coronary Heart Disease

## Barker Hypothesis



# Birth Weight and Insulin Resistance Syndrome

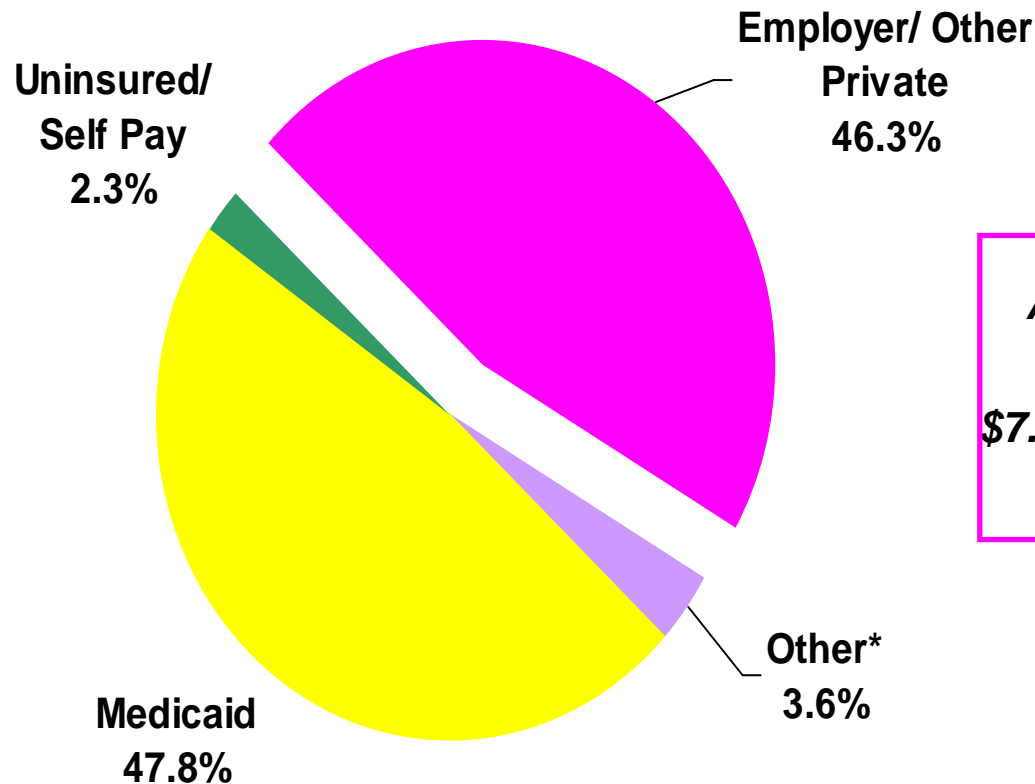
Barker Hypothesis



# Costs of Prematurity

- ❑ **Immediate and long term health effects on the infant and stress to family**
- ❑ **Financial cost to family**
- ❑ **Financial costs to society**
  - Prematurity is responsible for more than \$15 billion dollars in health care costs annually in the US [MOD Peristats]
  - Prematurity leads to many chronic medical conditions costing health care dollars
  - Maternity and newborn care is often the single largest cost to many companies' health benefit plans

# Percent of Hospital Charges for Prematurity 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.***

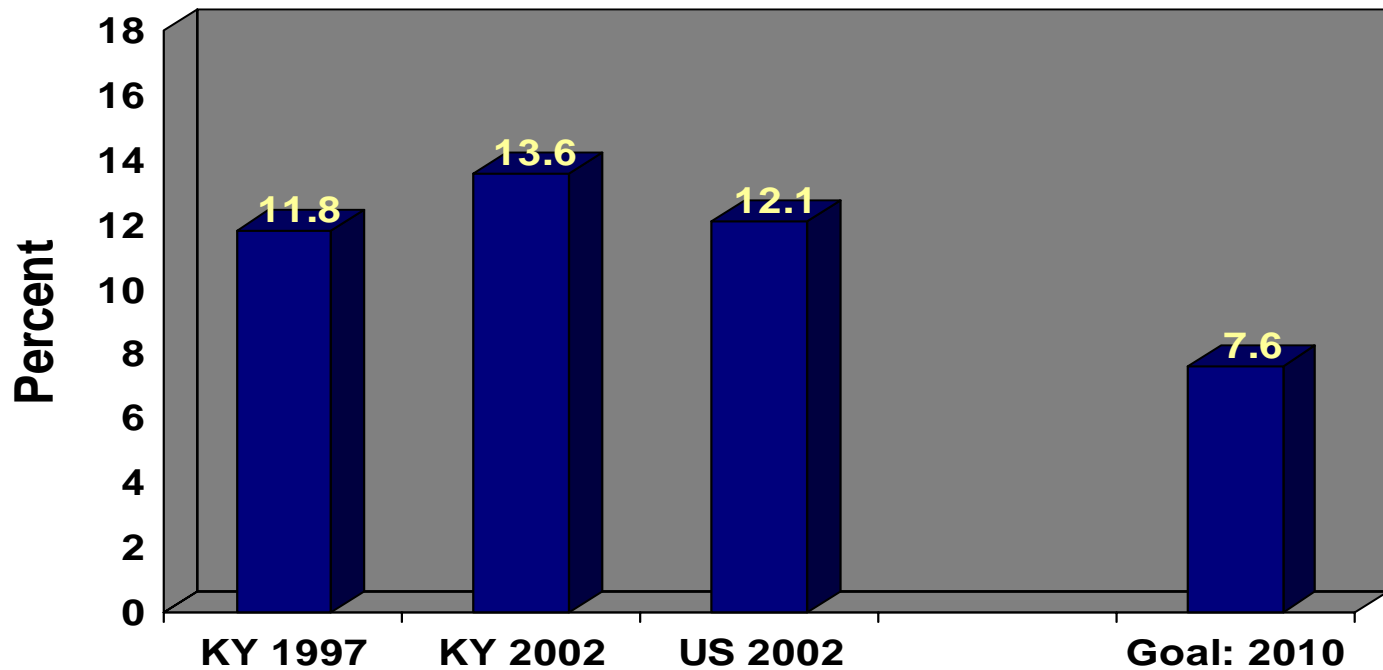
\*Includes Medicare

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

# Cost Associated With Prematurity in Kentucky

- Total NICU charges related to preterm birth was **\$174,085,722** for calendar year 2004 with average charges ranging from \$10,600-\$80,000 (KY Hospital Discharge Database, 2004)
- Total amount paid by KY Medicaid for prematurity related initial hospitalization stays for calendar year 2004: **\$7,452,810.57** (KY Medicaid Claims Database, 2004)
- Medicaid paid out more than 10X as much for the care of babies 35-36 weeks (late preterm infants) as they did for babies <26 weeks (micropremies).

# Healthy People 2010 Goal: Prematurity Rate

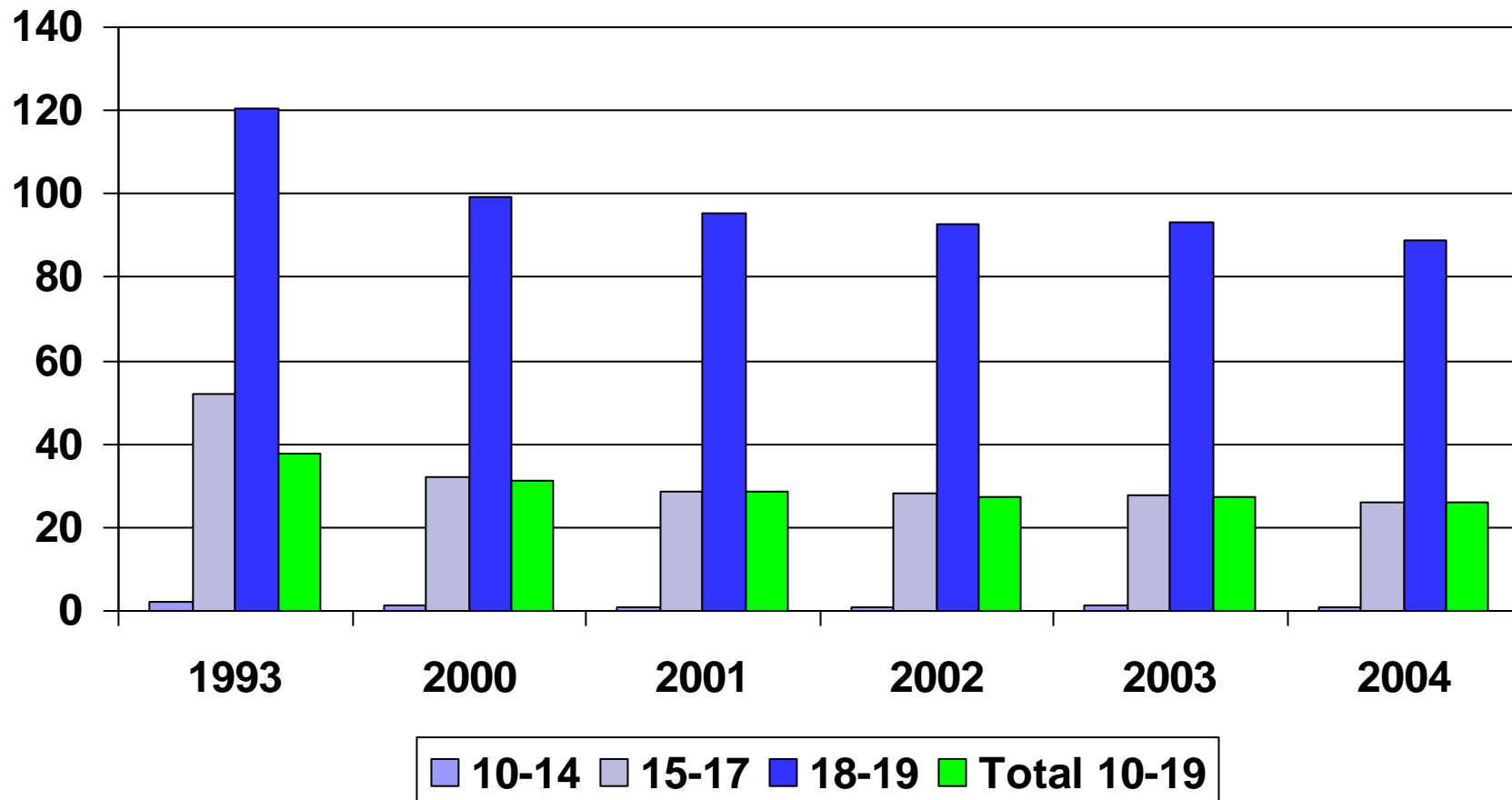




# Positive Perinatal Trends in Kentucky

- Teen Pregnancy rates decreasing
- Health Care Coverage for pregnant women good
- Early Prenatal Care
- Infant Mortality
- Programs for prematurity prevention

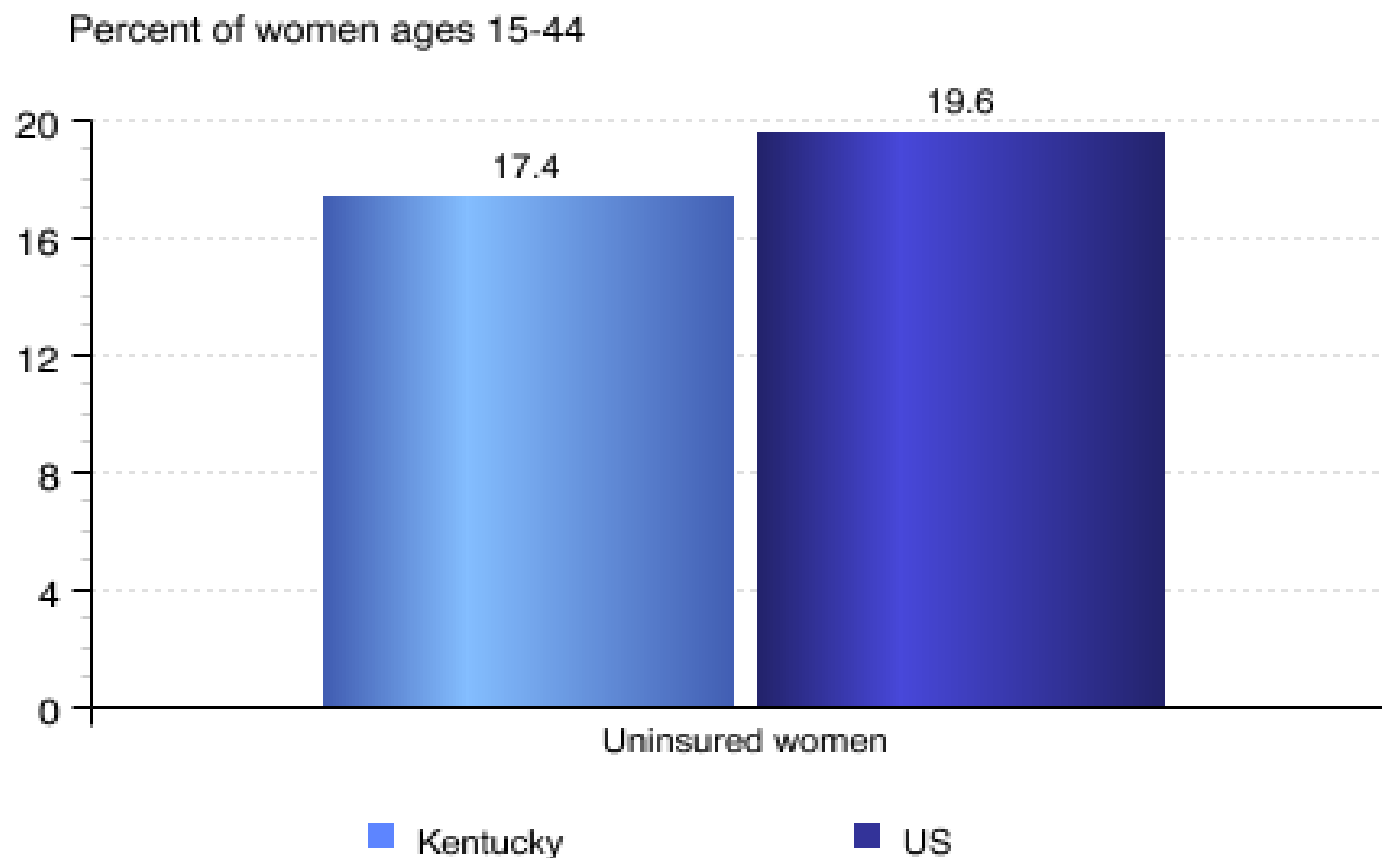
# Estimated Pregnancy Rates\* Among Teens Aged 10-19; Kentucky, 1993, & 2000-2004\*\*



\*Spontaneous miscarriages are not included in the pregnancy rates; Rates are per 1,000 female population per specified age group

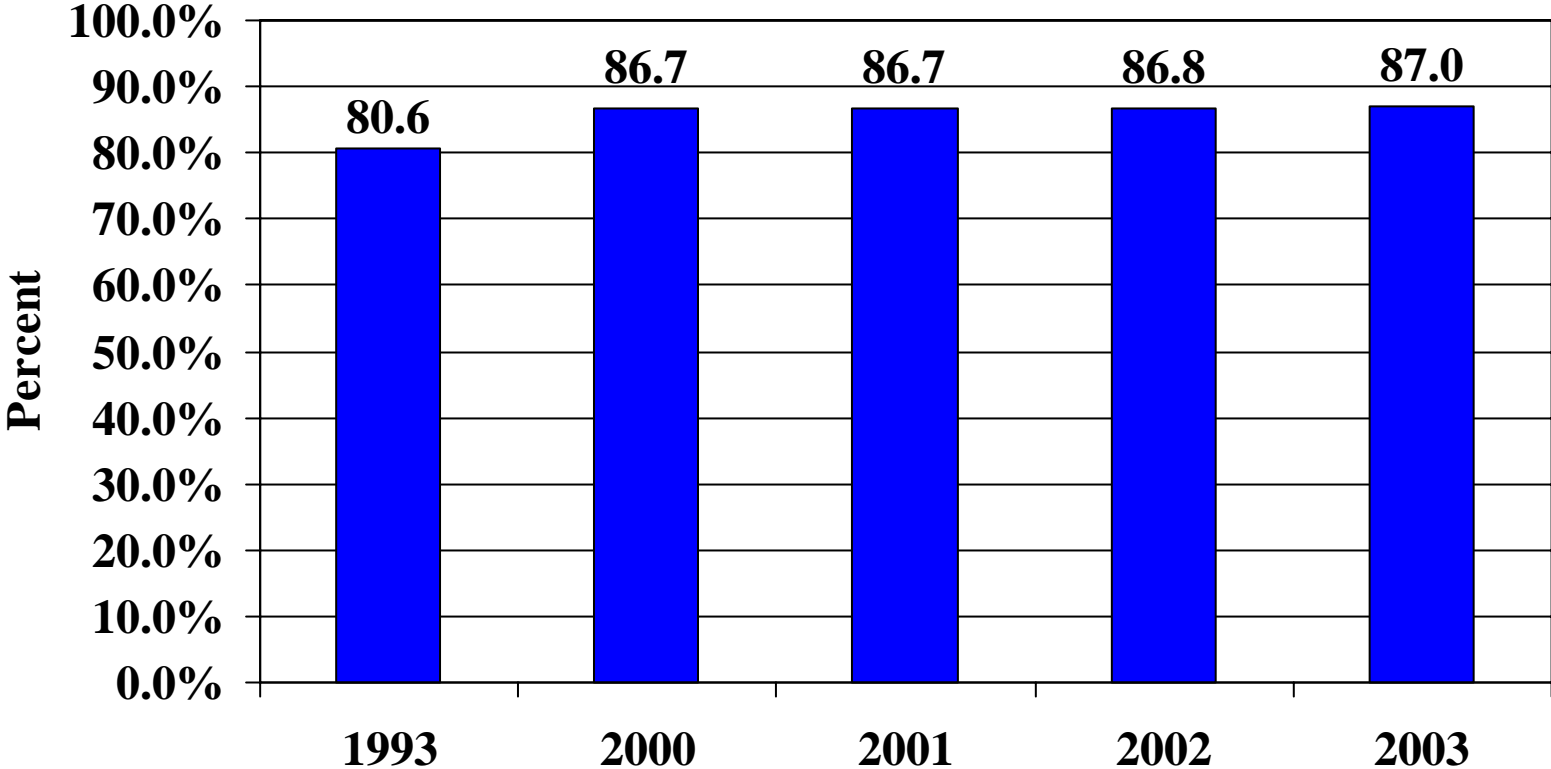
\*\*2004 data is preliminary and numbers could change  
 Data Source: Kentucky Vital Statistics files, Live Birth, Stillbirth and Abortion files, 1993, & 2000-2004

# Percent of Women in Kentucky Aged 15-44 Without Health Insurance; Kentucky & U.S., 2001-2003



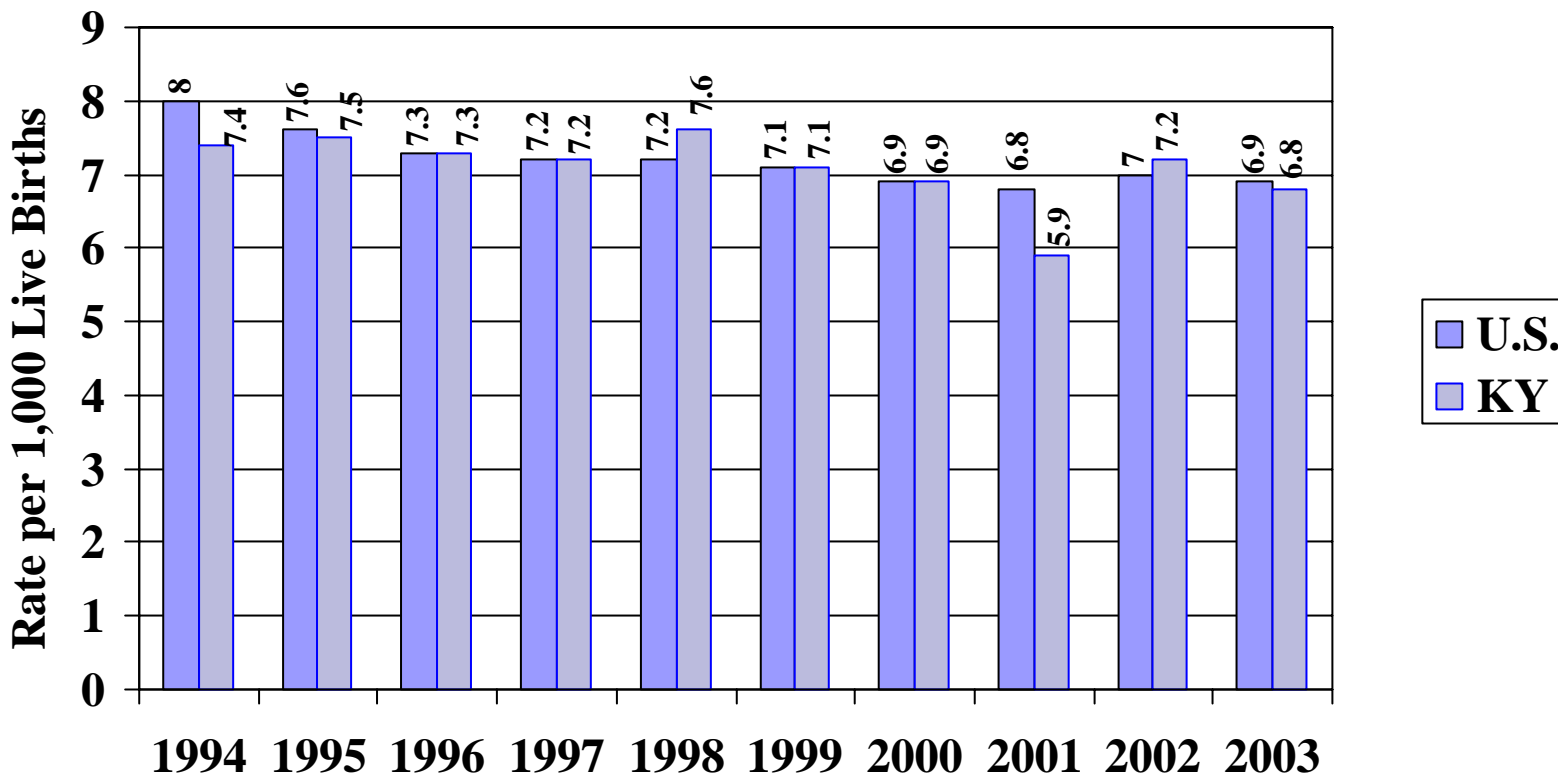
Copyright March of Dimes, 2004

# Kentucky Women Receiving Prenatal Care Beginning in the First Trimester



Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 1993, & 2000-2003

# Infant Mortality Rates per 1,000 Live Births; United States and Kentucky, 1994-2003




Rates are per 1,000 live births

Source: National Vital Statistics System; Deaths, Final  
Data for 2003; & Kentucky Vital Statistics Files, Death  
Certificate Files, 1994-2003

# Kentucky Programs for Prematurity Prevention

- Prenatal Coverage up to 185% of poverty level with Medicaid/KCHIP
- Oral Health programs for pregnant women
- FIMR [Fetal-Infant Mortality Review] Programs
- Healthy Babies PR Campaign [KidsNow]
- Folic Acid Partnership
  - In 2001, 39.6% of Kentucky women of childbearing age reported taking Folic acid daily; in 2004, that rose to 45.6%
- HANDS PROGRAM



# Health Access: Nurturing Development Services [HANDS]

- Largest home visitation program in the country
- For first time mothers; begins prenatally
- Recipients of HANDS Services:
  - Had prenatal care in first trimester more frequently than cohort group
  - Had better weight gains and longer gestations
  - Had lower rates of prematurity, lower LBW, and lower VLBW than cohort group

# HANDS Positive Pregnancy Outcomes

## ■ **PREMATURITY**

- Teen mothers who had 16 or more HANDS visits were half as likely to deliver premature infants than the comparison group.
- Teen mothers who participated in HANDS during their first trimester were more than three times LESS likely to deliver prematurely

## ■ **LOW BIRTH WEIGHT:**

- Teen moms who received 11-15 home visits before the birth of their baby had LBW rates of 5.5% v.s. a statewide comparison group of teen mothers of 9.3%

## ■ **VERY LOW BIRTH WEIGHT:**

- Percent of VLBW infants to moms in the program decreased as the number of HANDS visits increased; VLBW rate was 0.32% when teen moms received 16 or more visits; 0.66% among mothers who received 11-15 visits; in the statewide comparison group who did not received HANDS visits, 1.61% of babies were VLBW.
- NO VLBW infants were born to mothers who participated in HANDS during their first trimester.

## ■ **INFANT MORTALITY:**

- the Infant Mortality rate for HANDS participants in 2002 was 1.6%, compared to 6.4% IMR statewide cohort.



# Other challenges in Kentucky

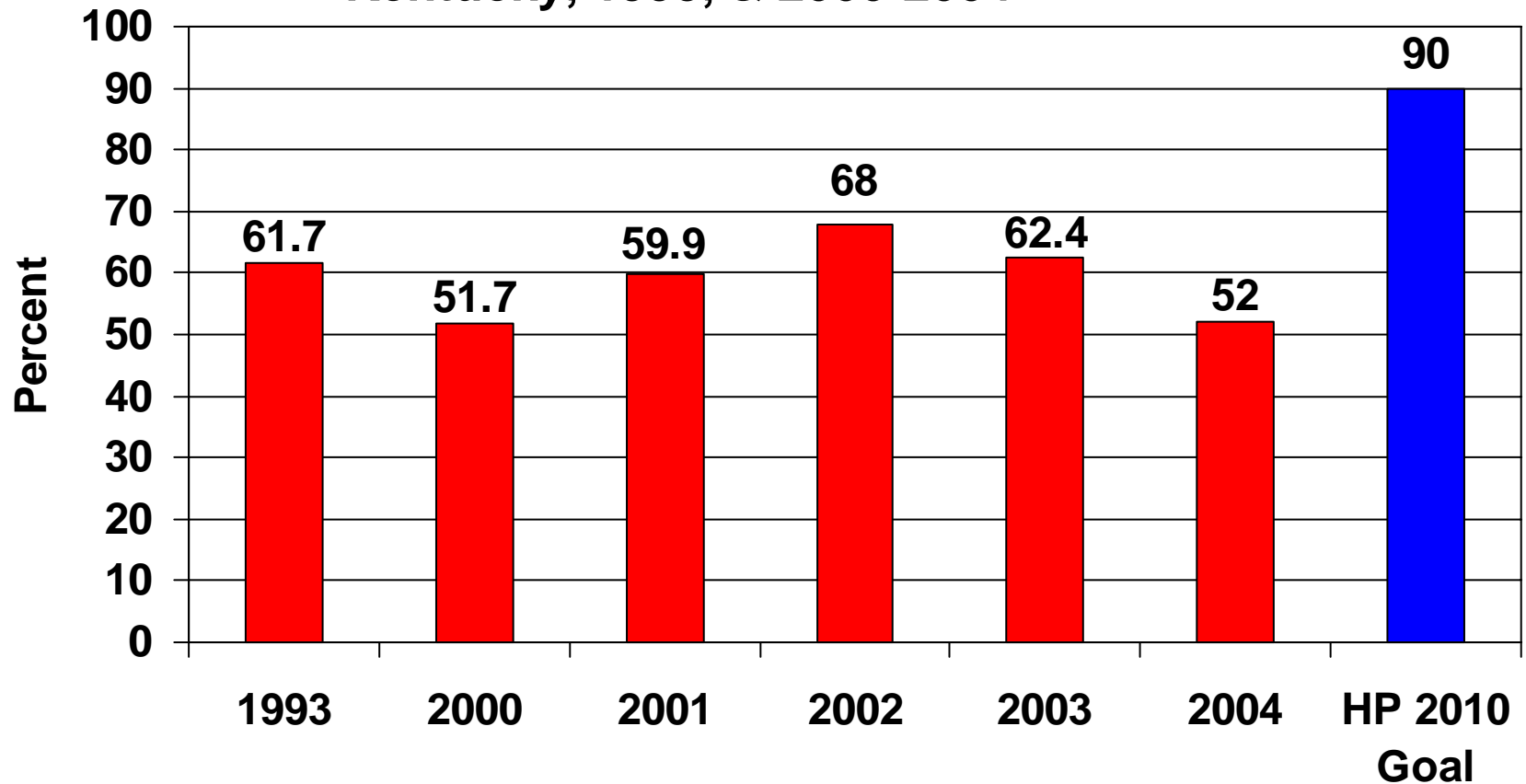
- De-regionalization
- Smoking in pregnancy
- Lack of state-wide quality measures
- Lack of awareness of problems of “late preterm” infants, both among the public and health care professionals



Evidence based approach:

- **Regionalized Perinatal/Neonatal Care:** ameliorates prematurity-associated morbidity and mortality by ensuring that most preterm infants are delivered at a NICU with appropriate facilities and trained personnel.
  - Maternal transport for high risk pregnancy is preferred
  - Babies <1500 gm have better outcomes when cared for in NICU with avg. daily census >15 [Leapfrog data]
  - Babies with congenital anomalies have better outcomes when cared for in NICU with avg. daily census >15 [Leapfrog data]

# Percent of VLBW\* Infants [<1500gm] Delivered at Hospitals with Level II or Level III NICU's Kentucky, 1993, & 2000-2004\*\*



\*Very Low Birth weight is defined as any live birth weighing <1500 grams at birth

\*\*2004 data is preliminary and numbers could change

Note: High Risk Facility includes Level II and III hospitals

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 1993, & 2000-2004

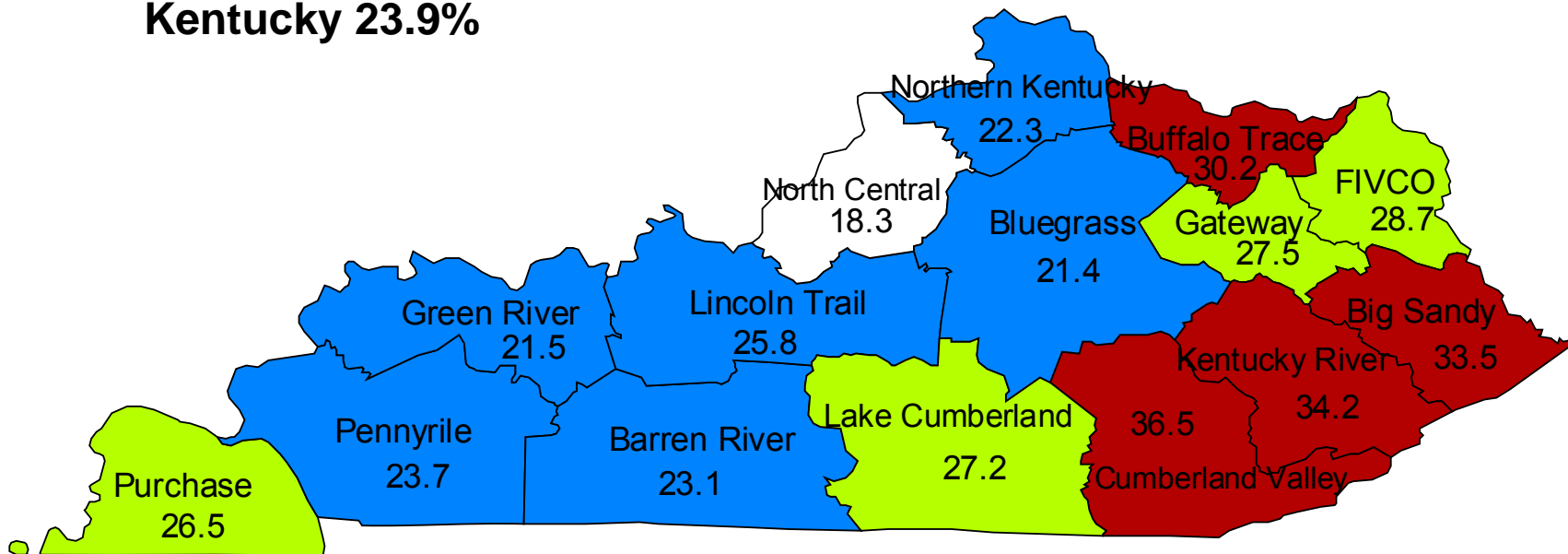
**HK 2010 Goal: 90%**

# Smoking in Pregnancy

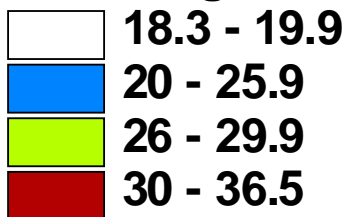
- Kentucky has the second highest percentage of women who smoke during pregnancy KY 24%, US 11%
- Some counties in Kentucky show rates as high as 46% for smoking during pregnancy
- Despite decreased smoking rates we now see across the state, smoking during pregnancy has not declined in Kentucky.
- New DPH smoking quit line has counselors trained to deal with pregnant smokers: 1-800-QUIT-NOW

# Percent of Women who Smoked during Pregnancy by Area Development District; Kentucky, 2003

Kentucky 23.9%



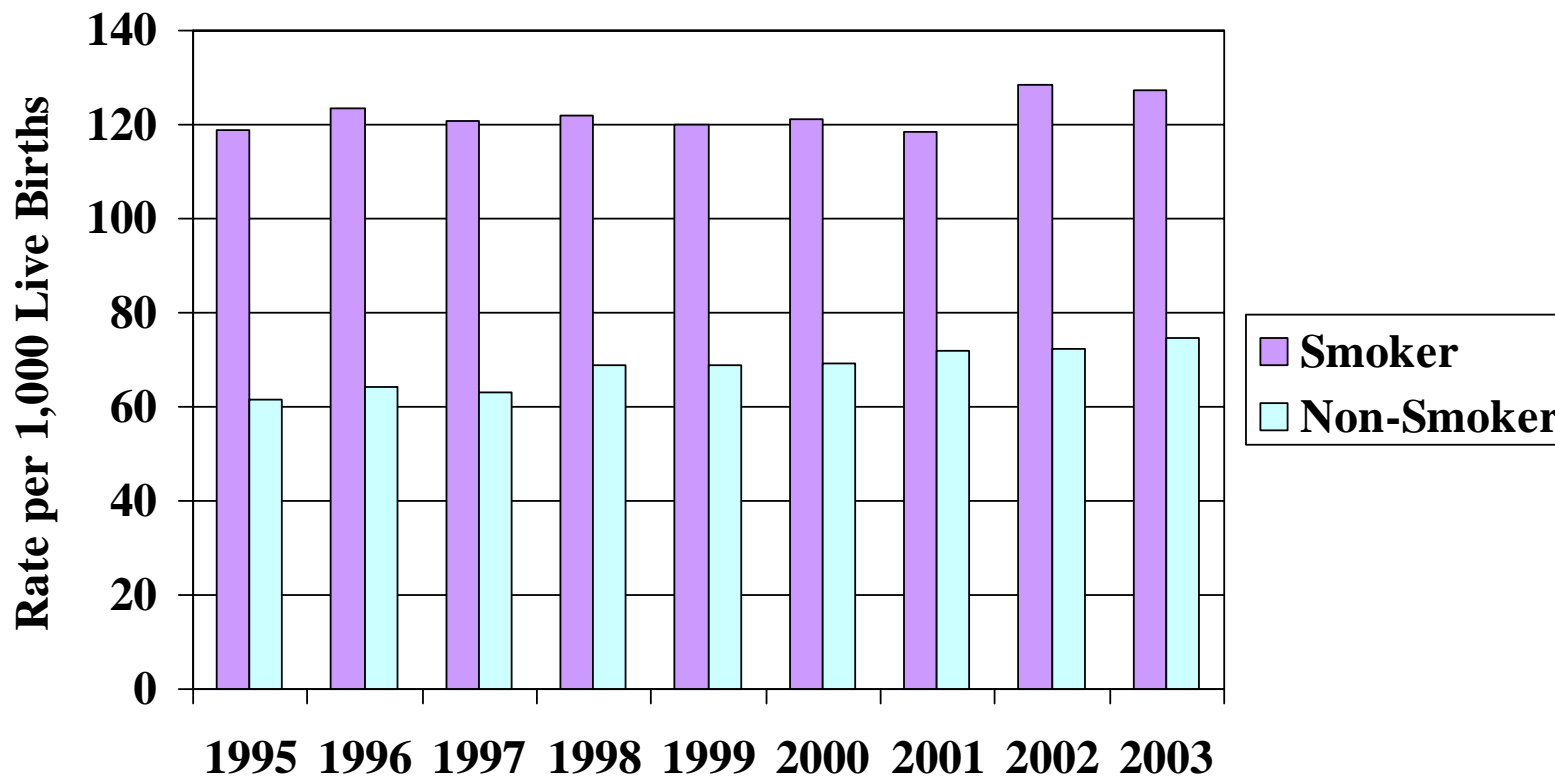
## Percentage



Area Development District is based on Mother's county of residence at time of birth

Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 2003

# Smoking During Pregnancy in Kentucky and Rates of Low Birth Weight\*

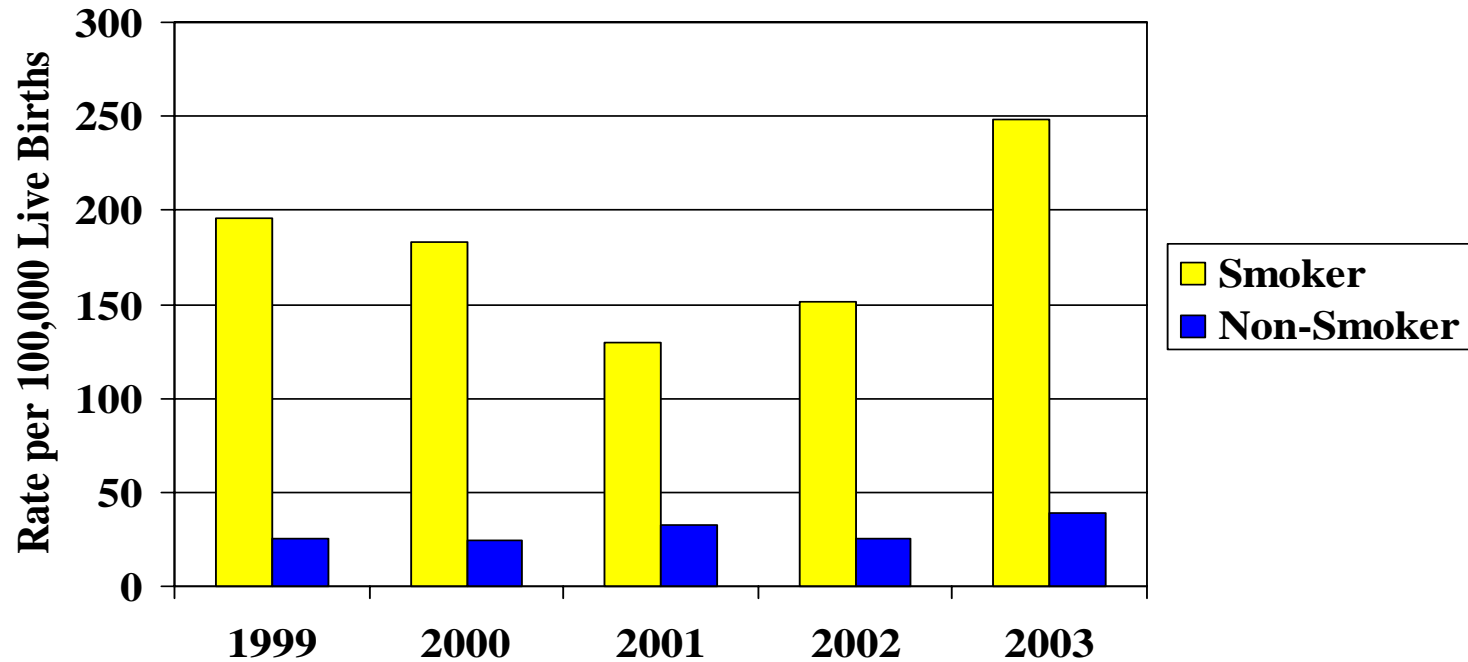


\*Low Birth Weight is defined as any infant weighing <2500 grams at birth

\*\*Rates are per 1,000 live births

Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 1995-2003

# Smoking During Pregnancy in Kentucky and Infant Mortality Rate\* Due to SIDS



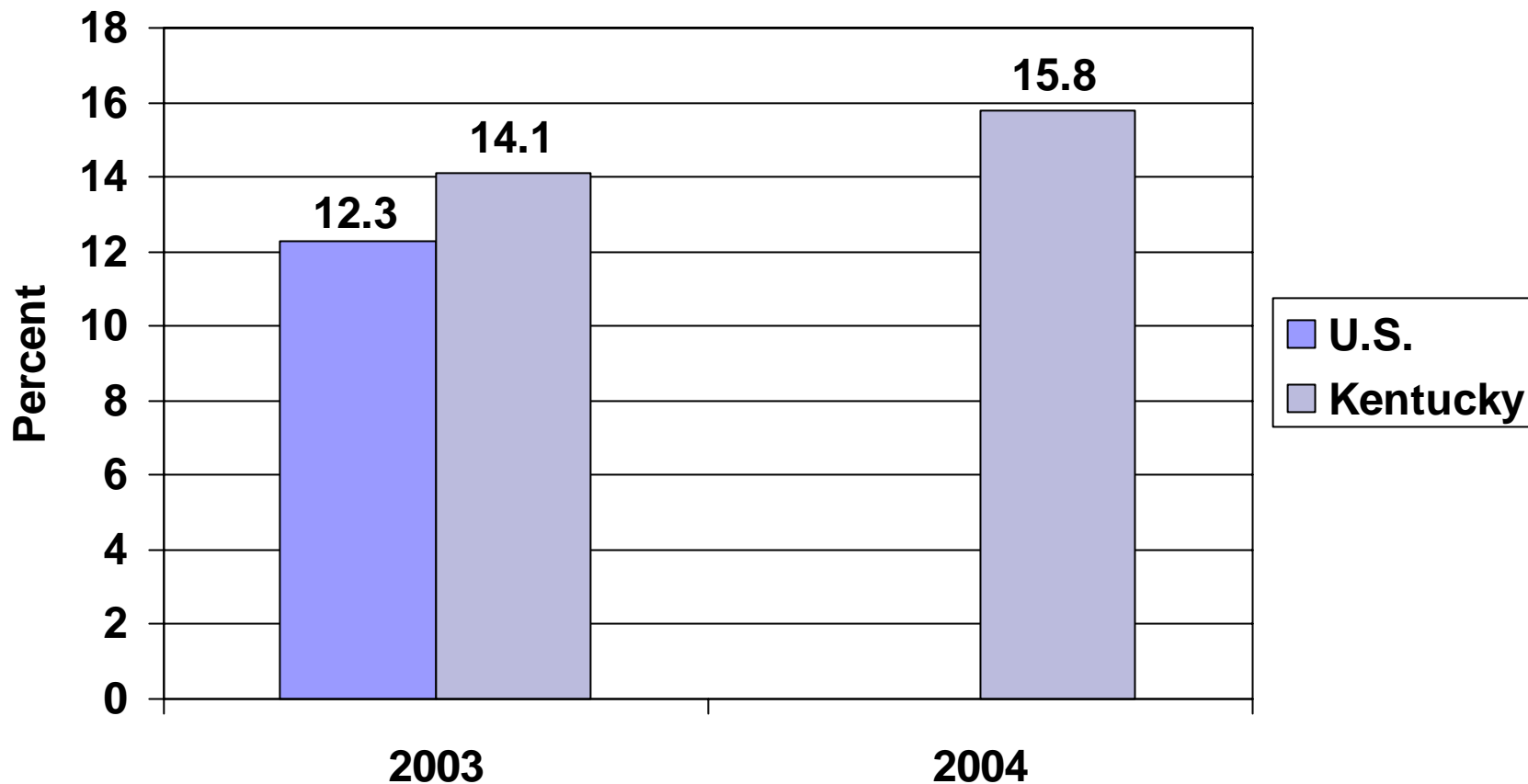
\*Rates are per 1,000 Live Births by Smoking Status

SIDS deaths are based on the ICD9 code 798.0 & ICD10 code R95

Source: Kentucky Vital Statistics Files; Linked Live Birth and Death Certificate Files; 1999-2003

Note: Death Certificates that could not be linked to a birth certificate were excluded from the analysis

# Percent of Live Births that were Preterm\*; U.S. and Kentucky, 2003 & 2004\*\*

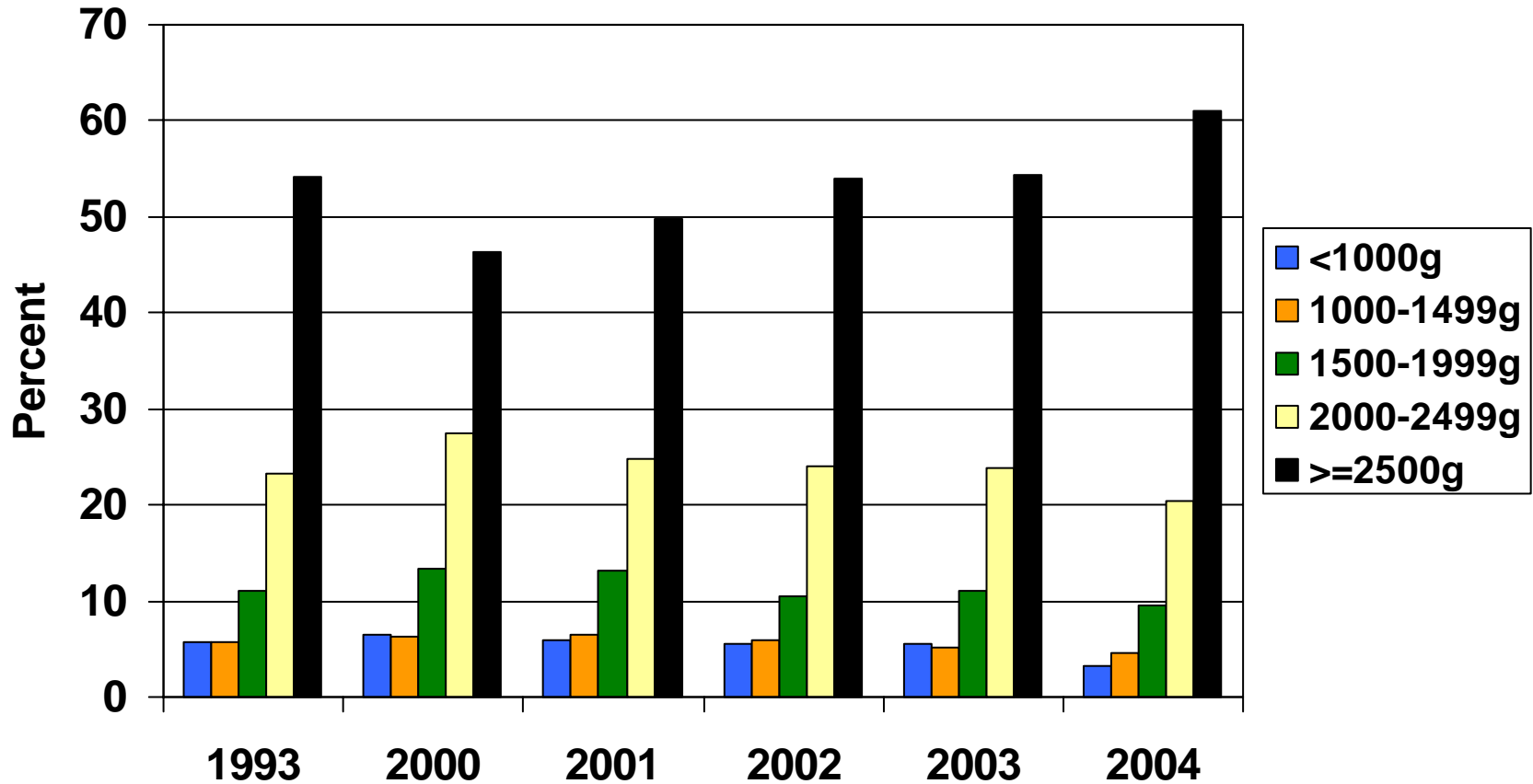


\*Preterm birth is defined as any live birth occurring <37 completed weeks gestation

\*\*2004 data is preliminary and numbers could change

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 2003 & 2004; National Center for Health Statistics; Births Final Data, 2003

# Percent of Live Births that were Preterm\* by Birth Weight; Kentucky, 1993, & 2000-2004\*\*

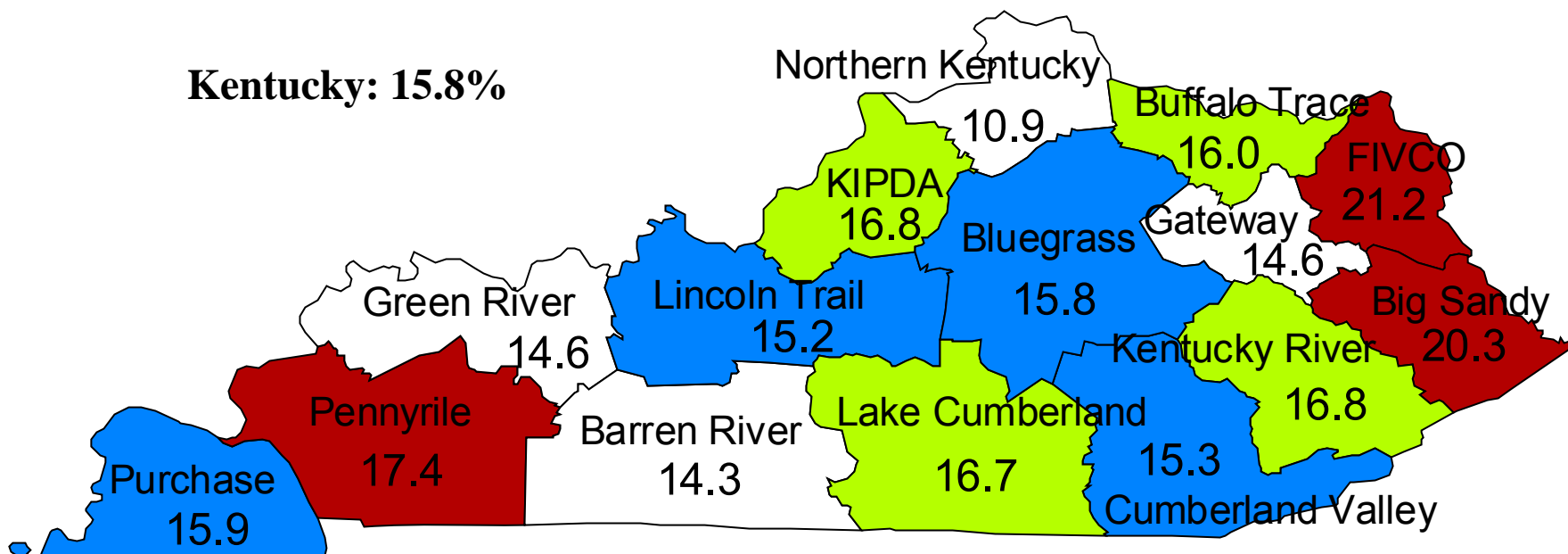


\*Preterm birth is defined as any live birth occurring <37 completed weeks gestation

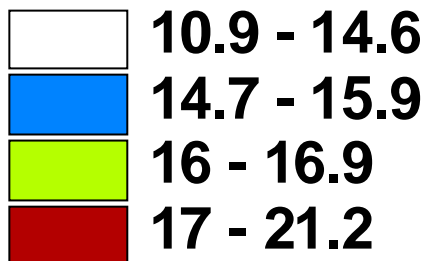
\*\*2004 data is preliminary and numbers could change

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate files, 1993, & 2000-2004

# Percent of Live Births to Kentucky Residents that were Preterm\* by Area Development District; Year 2004\*\*



## Percentage



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

\*\*2004 data is preliminary and numbers could change

Note: Area Development District is based on the Mother's county of residence at time of birth

Data Source: Kentucky Vital Statistics Files, Live Birth Certificate Files, 2004

# Resources on Prematurity

## **Health Professional Education Program on Prematurity**

This web-based course on Prematurity with free CEU's/CME's is available at the Kentucky Perinatal Association web site:

<http://www.kentuckyperinatal.com>

click on the Education tab

## **National March of Dimes**

<http://www.marchofdimes.com/prematurity> - fact sheets, patient and provider information on prematurity

<http://www.marchofdimes.com/peristats> - huge repository of data on births already analyzed for state and county level comparisons, HP 2010 goals, risk factors for prematurity, infant mortality, and other perinatal concerns

**Kentucky March of Dimes website:** <http://www.marchofdimes.com/kentucky>