

# Improving Birth Outcomes in Louisiana

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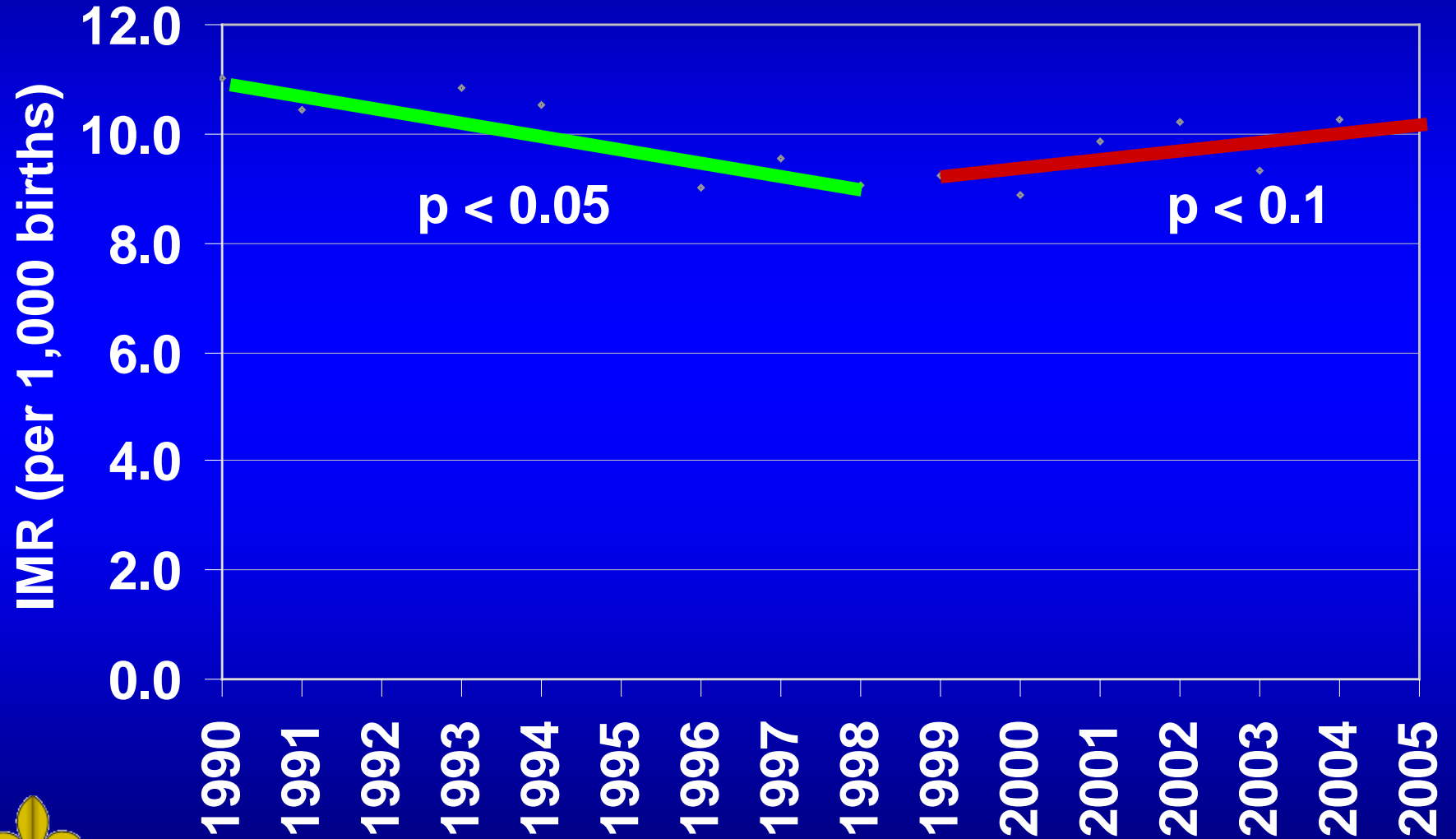
**October 14, 2008**



# Infant Mortality

	# Deaths of infants ( $\leq 1$ year of age) / 1000 live births
HP 2010 Goal	<4.5/ 1000
U.S. 2003	6.9
U.S. 2004	6.8
U.S. 2005	6.9
LA 2004 (50 <sup>th</sup> )	10.4
LA 2005 (49 <sup>th</sup> )	10.1

# Louisiana Infant Mortality Trend 1990 - 2005



Join point regression

# Louisiana Infant Mortality

## All Races, 2000-2005

Region	2000	2001	2002	2003	2004	2005
<b>1</b> (New Orleans)	<b>7.0</b>	<b>9.6</b>	<b>10.5</b>	<b>10.3</b>	<b>10.1</b>	<b>9.9</b>
<b>2</b> (Baton Rouge)	<b>8.7</b>	<b>10.3</b>	<b>9.5</b>	<b>8.0</b>	<b>10.6</b>	<b>10.7</b>
<b>3</b> (Houma)	<b>10.6</b>	<b>10.1</b>	<b>10.1</b>	<b>7.9</b>	<b>10.0</b>	<b>6.6</b>
<b>4</b> (Lafayette)	<b>8.5</b>	<b>10.1</b>	<b>10.3</b>	<b>10.2</b>	<b>9.6</b>	<b>11.9</b>
<b>5</b> (Lake Charles)	<b>8.9</b>	<b>9.7</b>	<b>9.8</b>	<b>7.1</b>	<b>7.1</b>	<b>9.2</b>
<b>6</b> (Alexandria)	<b>9.3</b>	<b>9.9</b>	<b>9.8</b>	<b>8.6</b>	<b>11.3</b>	<b>10.0</b>
<b>7</b> (Shreveport)	<b>11.7</b>	<b>11.2</b>	<b>12.7</b>	<b>9.9</b>	<b>12.0</b>	<b>12.0</b>
<b>8</b> (Monroe)	<b>12.3</b>	<b>10.1</b>	<b>12.2</b>	<b>11.9</b>	<b>11.4</b>	<b>12.8</b>
<b>9</b> (Northshore)	<b>5.9</b>	<b>7.5</b>	<b>6.8</b>	<b>8.3</b>	<b>11.2</b>	<b>6.8</b>
<b>Louisiana</b>	<b>8.9</b>	<b>9.8</b>	<b>10.2</b>	<b>9.3</b>	<b>10.4</b>	<b>10.1</b>
<b>US</b>	<b>6.9</b>	<b>6.9</b>	<b>7.0</b>	<b>6.9</b>	<b>6.8</b>	<b>6.9</b>

# Louisiana Infant Mortality

## African-American, 2000-2005

Region	2000	2001	2002	2003	2004	2005
1 (New Orleans)	9.8	12.5	12.9	13.4	12.1	12.7
2 (Baton Rouge)	12.1	13.6	13.9	12.0	14.0	13.7
3 (Houma)	14.8	13.8	18.3	10.6	16.6	9.7
4 (Lafayette)	14.9	16.7	19.6	12.8	14.4	19.7
5 (Lake Charles)	14.1	14.1	15.8	11.6	8.7	17.2
6 (Alexandria)	16.0	20.3	15.9	11.1	17.5	15.9
7 (Shreveport)	16.8	17.8	19.0	16.1	18.7	15.7
8 (Monroe)	15.8	13.2	13.2	19.8	14.6	18.3
9 (Northshore)	13.6	11.8	7.3	15.8	21.0	16.7
<b>Louisiana</b>	<b>13.2</b>	<b>14.4</b>	<b>15.0</b>	<b>13.8</b>	<b>14.7</b>	<b>15.1</b>
<b>US</b>	<b>14.1</b>	<b>14.0</b>	<b>14.4</b>	<b>14.0</b>	<b>13.8</b>	<b>13.7</b>

# Louisiana Infant Mortality

## Caucasian, 2000-2005

Region	2000	2001	2002	2003	2004	2005
1 (New Orleans)	3.4	5.1	7.4	6.1	8.1	7.3
2 (Baton Rouge)	5.8	7.3	5.3	4.7	7.6	8.4
3 (Houma)	8.7	8.3	5.8	6.9	7.2	4.8
4 (Lafayette)	5.0	6.4	5.6	9.1	7.2	7.8
5 (Lake Charles)	7.2	8.3	7.9	5.4	6.8	6.6
6 (Alexandria)	6.2	4.4	6.8	7.7	8.4	7.6
7 (Shreveport)	7.2	5.7	7.4	4.9	6.5	9.0
8 (Monroe)	9.2	7.5	11.1	5.4	8.7	8.3
9 (Northshore)	3.7	6.4	6.3	6.4	8.4	4.3
<b>Louisiana</b>	<b>5.9</b>	<b>6.5</b>	<b>6.9</b>	<b>6.4</b>	<b>7.7</b>	<b>7.1</b>
<b>US</b>	<b>5.7</b>	<b>5.7</b>	<b>5.8</b>	<b>5.7</b>	<b>5.7</b>	<b>5.7</b>

# Infant Mortality Rates

	Total	African-American	Caucasian	B/W ratio
HP 2010 goal	<4.5	--	--	--
US 2003	6.9	14.0	5.7	2.46
US 2004	6.8	13.8	5.7	2.42
US 2005	6.9	13.7	5.7	2.40
50th LA 2004	10.4	14.7	7.7	1.90
49th LA 2005	10.1	15.1	7.1	2.13

# Perinatal Periods of Risk: Methodology of Understanding Infant Mortality

- **PPOR is analysis of infant mortality**
  - Birth Weight (<1500gm vs  $\geq$ 1500 gms)
  - Time of death (fetal, neonatal, post-neonatal)
- **Identifies factors by causative groupings**
  - Maternal Health / Prematurity (Blue)
  - Prenatal Care (Pink)
  - Neonatal Care (Gold)
  - Post-neonatal Care (Green)
- **Allows targeting of highest risk areas for interventions**
  - Identification of highest death areas

**2003-2004**

Birth Weight	Fetal Deaths	Neo-natal	Post-Neonatal
500-1499 g	4.8		
1500 + g	2.1	1.6	2.9

**Total Mortality Rate  
11.4 per 1,000 (LA)**

# Perinatal Periods of Risk: Understanding Excess Mortality

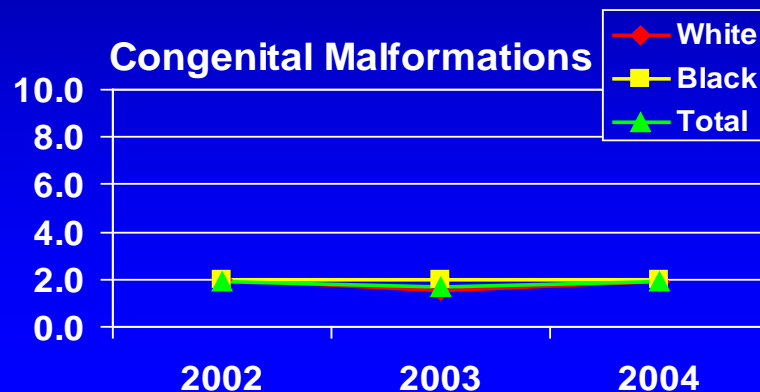
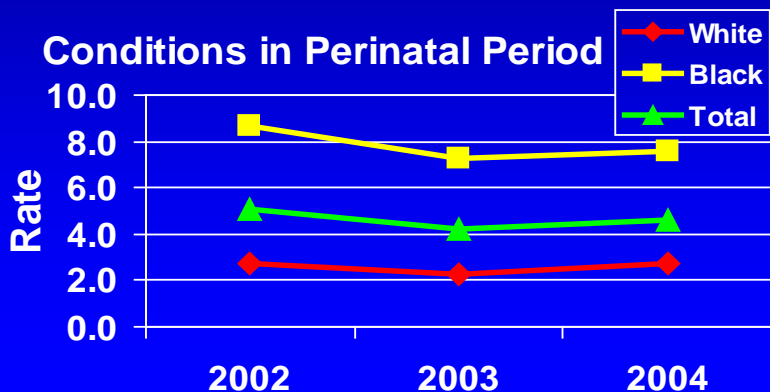
- **Method to target highest risk areas for interventions**
  - Identification of internal reference group
  - LA: White women, age  $\geq 20$ , some college
- **LA major excess mortality in 2 groups**
  - Maternal Health - 2.3 / 1000 (43% of excess)
  - Infant Health – 1.8 /1000 (34% of excess)
- **Maternal Health suggested actions**
  - Manage chronic disease / substance use
  - Manage those with prior poor outcomes
  - Infections
- **Post-neonatal Health suggested actions**
  - Infant sleep environment / SIDS
  - Injury prevention
  - Vaccination

2003-2004

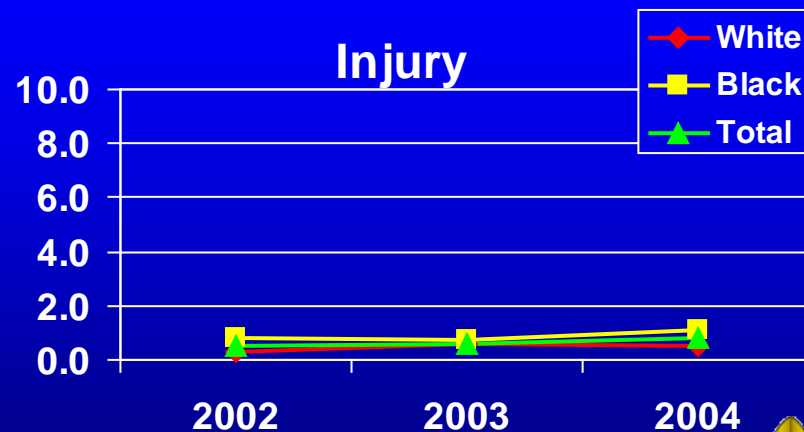
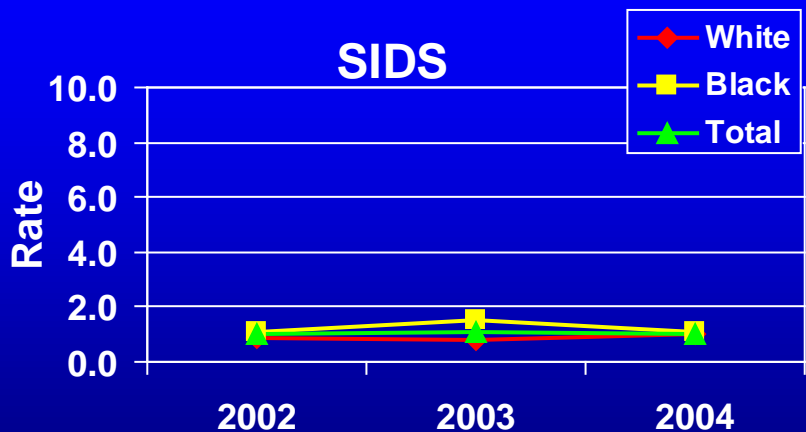
Birth Weight	Fetal Deaths	Neo-natal	Post-Neonatal
500-1499 g	2.3		
1500 + g	0.8	0.4	1.8

**Total Excess Mortality**  
5.3 per 1,000  
(Total Mortality Rate  
11.4 per 1,000)

# Causes of Infant Mortality



~45-50% related to length of gestation/ fetal growth



# Preterm Birth

**Birth prior to the 37<sup>th</sup> week of pregnancy**

- Significant problem in the U. S. and Louisiana
  - 2005 Preterm Births (PTB, 20-36 wks)
    - U.S. 12.7%
    - Louisiana 16.5% (20.6% AA, 12.7% white)
  - 2005 Very Preterm Births (VPTB, 20-31wks)
    - U.S. 2.0%
    - Louisiana 3.0%
- Rates of prematurity are increasing
- Costs of prematurity
  - Contribution to infant mortality
  - Financial costs

Healthy People 2010 Goals: PTB  $\leq$  7.6%; VPTB  $\leq$  1.1%

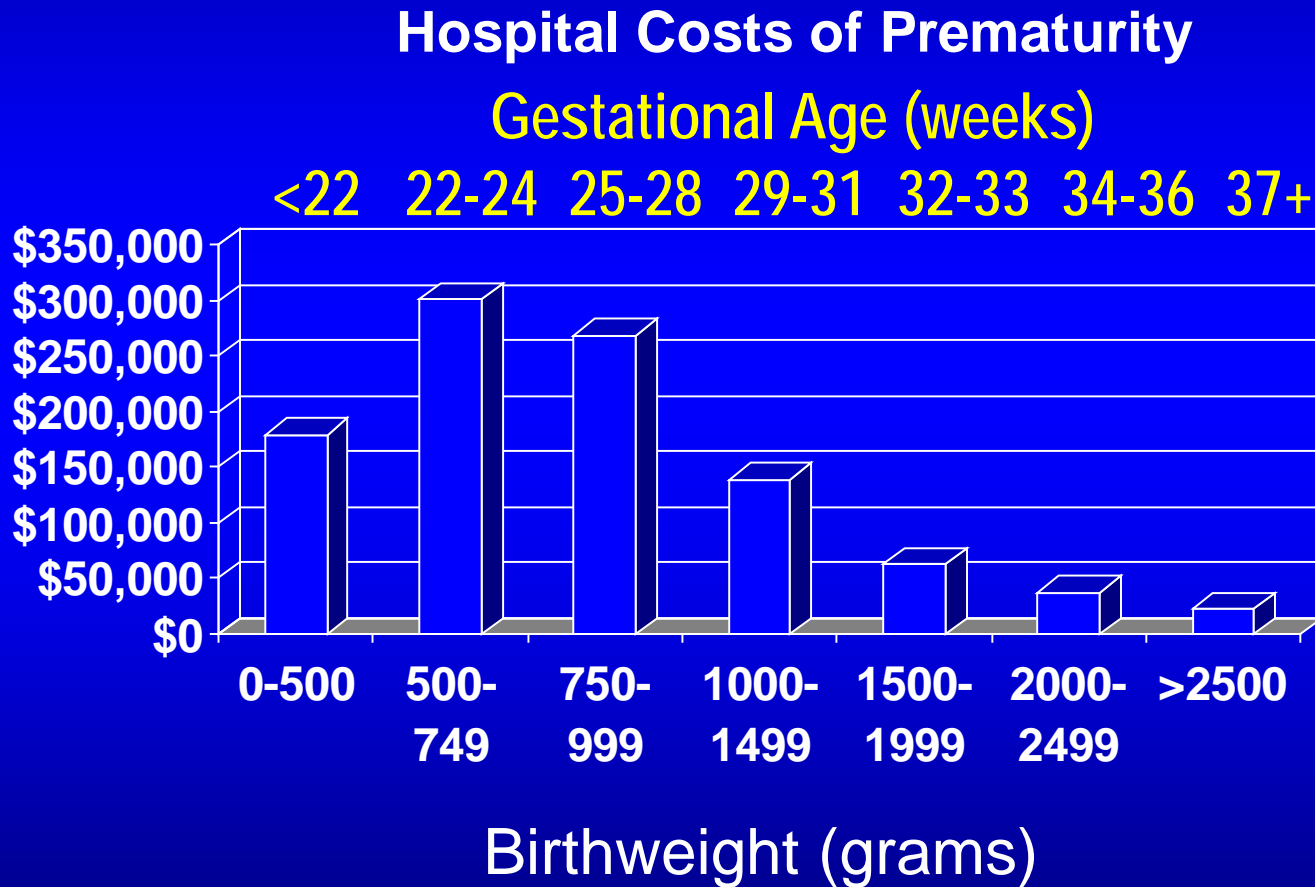


# Prematurity Generates Enormous Health Care Costs

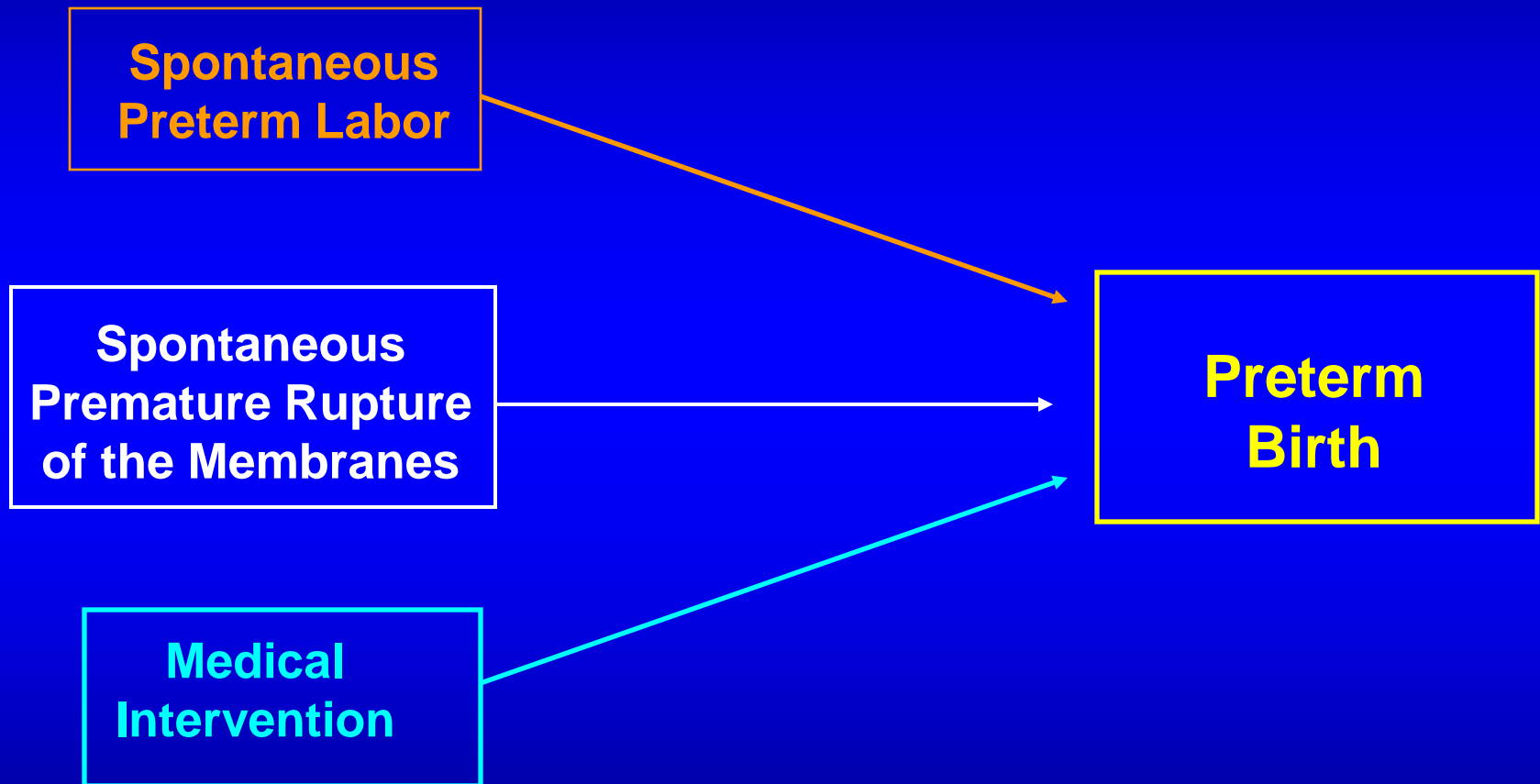
- Average newborn hospital charges: \$4,300 vs. \$58,000 for a preterm baby\*
- Total U.S. hospital charges for infant stays due to prematurity/low birth weight: \$11.9 Billion\*
- Maternity & related expenses:
  - Often the largest cost to employers' health care plans

\* Source: Agency for Healthcare Research and Quality, 2000 Nationwide Inpatient Sample  
Prepared by March of Dimes Perinatal Data Center, 2003

# Impact of Preterm / Low Birth Weight



# Types of Preterm Birth



While this suggests distinct pathways, many of the risk factors for all 3 are similar

# Pathways to Preterm Labor

- Infection / inflammation, 40%
  - Cytokine mediated
- Stress (maternal / fetal), 25%
  - CRH mediated
- Bleeding, 25%
  - Decidual, placental bleed
  - Thrombin induced activity
- Stretching (uterine distension), 10%
  - Hydraminos, multiples

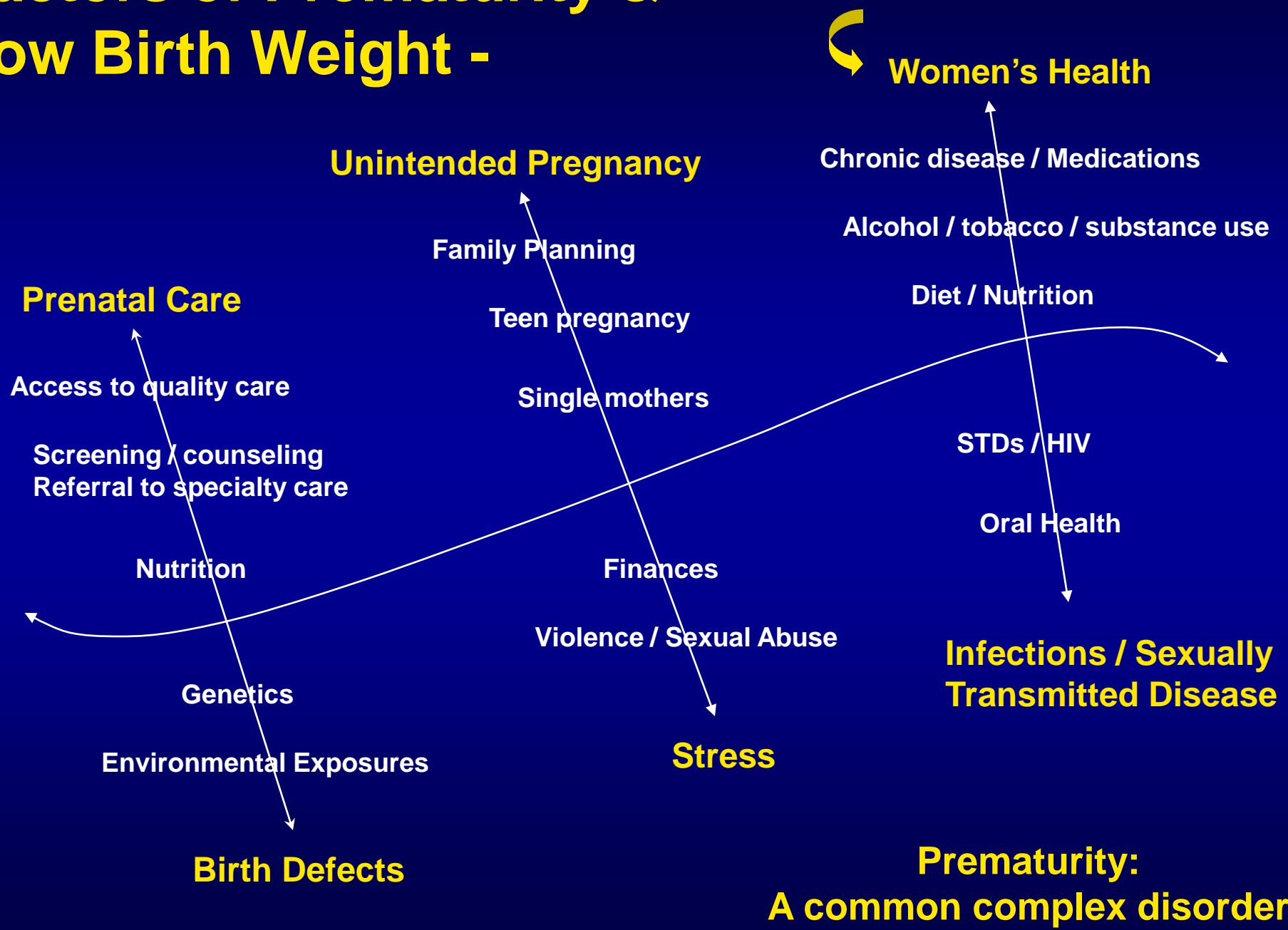
# Probability of Preterm Labor

- Any pregnancy (Louisiana) 16%
- Previous preterm birth 30%
- $\geq 2$  previous PTB 70%
- Twins 50%
- Triplets and higher 75%-95%
- Uterine malformations 30%

**Overall: Prediction of preterm birth is poor**



# Factors of Prematurity & Low Birth Weight -



**Prematurity:  
A common complex disorder**

# Women of Reproductive Age

## Louisiana Characteristics

- Access to health care for women aged 19-44 is limited
- Smoking and alcohol use high in Louisiana
- High rates of obesity and chronic diseases
- Lack of preventive wellness / preconception health information
- Less than ½ of Louisiana Pregnancies are intended

# Impact of Smoking

- Pregnant smokers compared to nonsmokers are:
  - 2.0-5.0 times as likely to experience PPRM
  - 1.2-2.0 times as likely to deliver preterm
  - 1.5-3.5 times as likely to deliver a LBW infant
- Smoking increases risk of stillbirth (RR=1.4-1.6)
  - Risk increases with increased amount smoked
- Smoking during and after pregnancy increases risk for SIDS by 3-fold

# Factors of Prematurity & Low Birth Weight -

**Unintended Pregnancy**

**Women's Health**

Chronic disease / Medications

Alcohol / tobacco / substance use

Diet / Nutrition

STDs / HIV

Oral Health

**Infections / Sexually Transmitted Disease**

Family Planning

Teen pregnancy

Single mothers

Finances

Violence / Sexual Abuse

**Stress**

**Prenatal Care**

Access to quality care

Screening / counseling  
Referral to specialty care

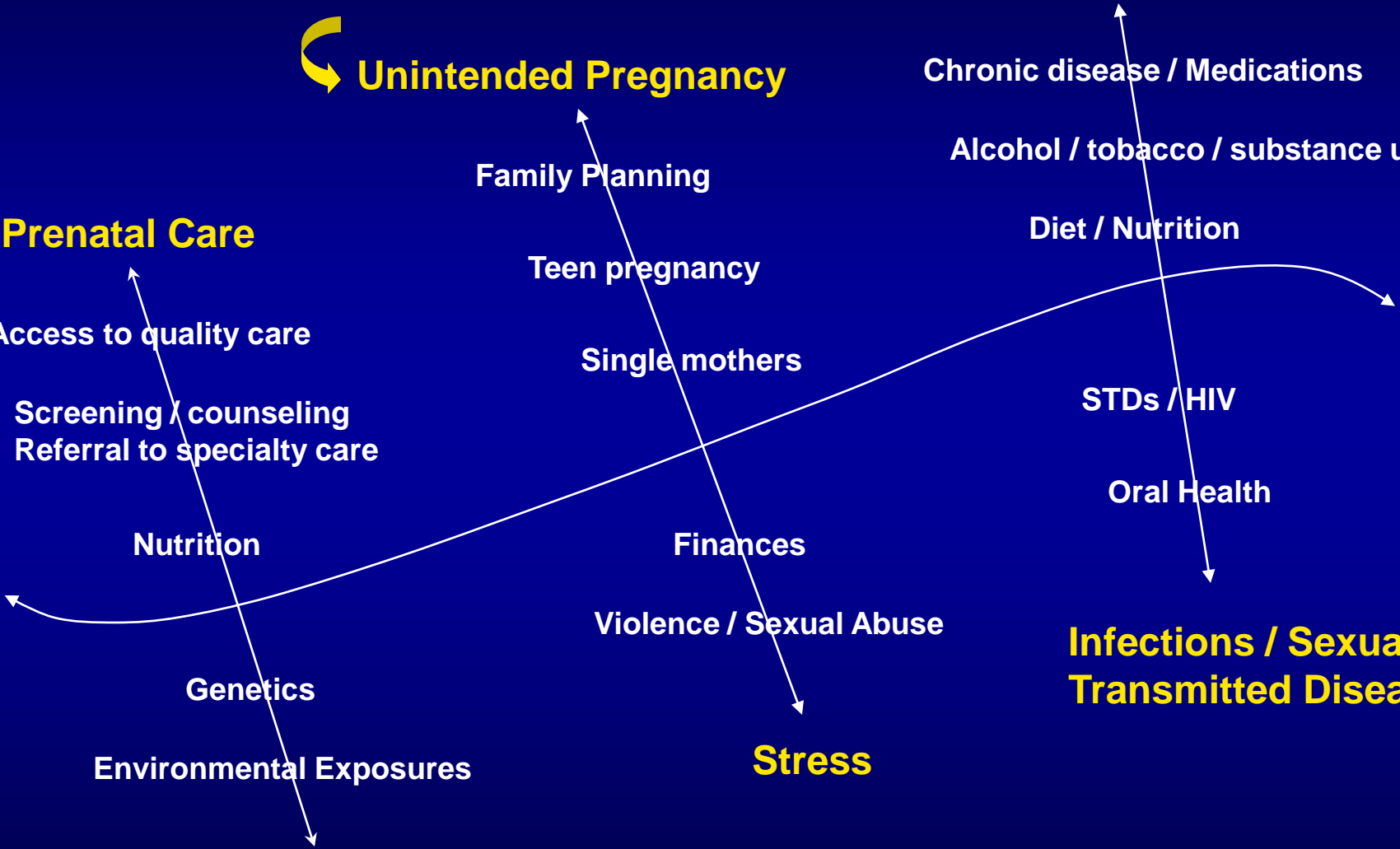
Nutrition

Genetics

Environmental Exposures

**Birth Defects**

**Prematurity:  
A common complex disorder**



# Family Planning in Louisiana

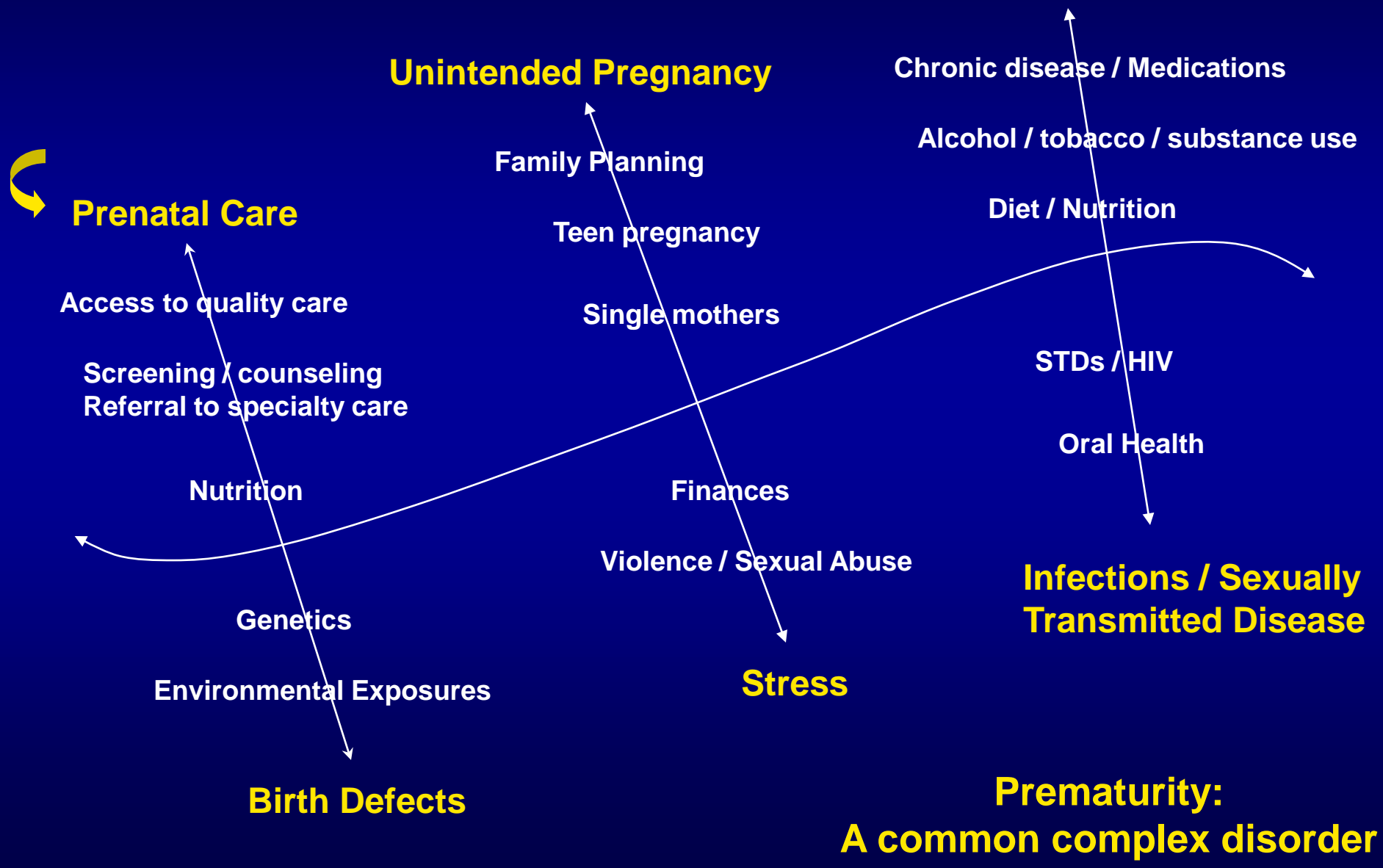
- Half of all pregnancies are unplanned
- For women under 20 years of age, 70 percent of pregnancies are unintended
- Louisiana has a Family Planning Medicaid waiver program, “Take Charge”
- Less than 1/3 of eligible women have received services through Take Charge
- Services are restricted to family planning related care
- Private provider enrollment in Take Charge is poor

# Pregnancy Spacing

## Louisiana, 2000-2002

- Women whose birth interval was < 12 months were 50% more likely to have a LBW infant, after controlling for other factors
- Factors associated with birth intervals of less than 12 months included:
  - Black (OR=1.4)
  - Less than high school education (OR=1.5)
  - Younger (age<20, OR=2.8; age<25, OR=1.9)
  - Medicaid enrolled (OR=1.4)

# Factors of Prematurity & Low Birth Weight -

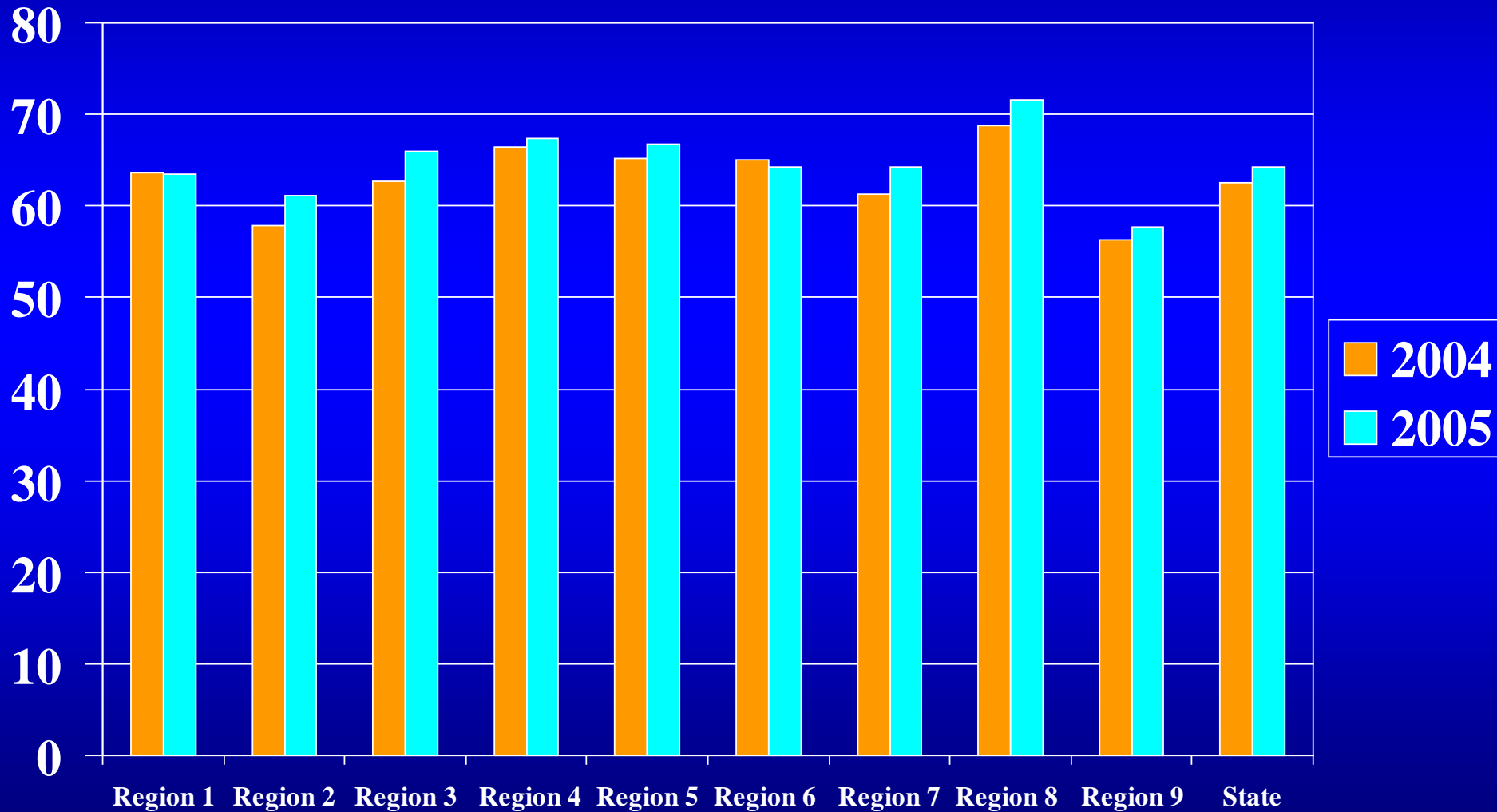


# What We Know: Prenatal Care

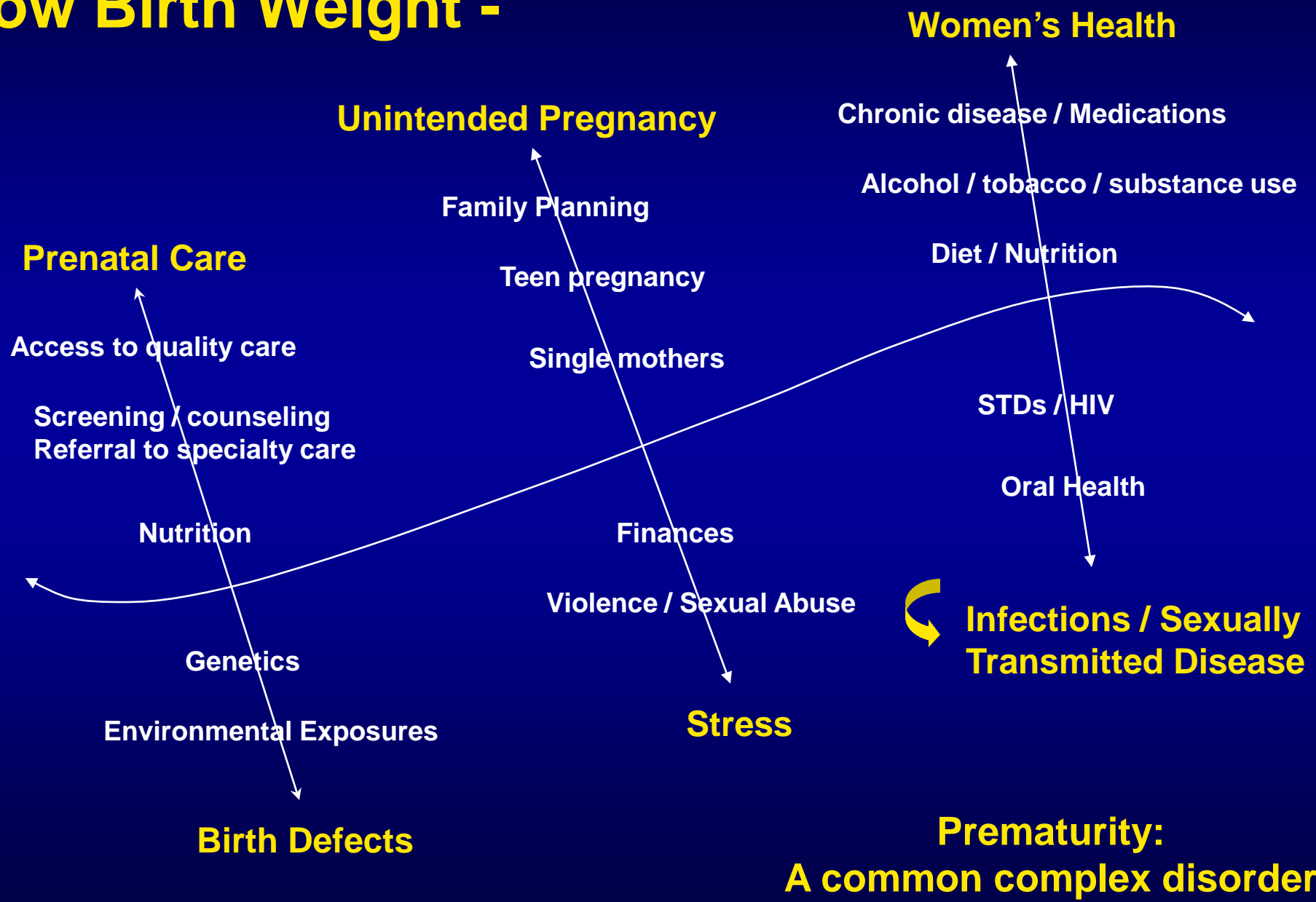
- Access and utilization of prenatal care is good in Louisiana (6<sup>th</sup> highest in U.S.), although some disparity persists
- Nine months of prenatal care cannot reverse all of the negative health factors entering the pregnancy
- The “life-course” health of a woman impacts pregnancy outcomes
- Need increased focus on health of women before and between pregnancies
- Medicaid is primary re-imbursment source for prenatal care in Louisiana

# Medicaid Deliveries

Percent in Louisiana Regions, 2004-2005



# Factors of Prematurity & Low Birth Weight -



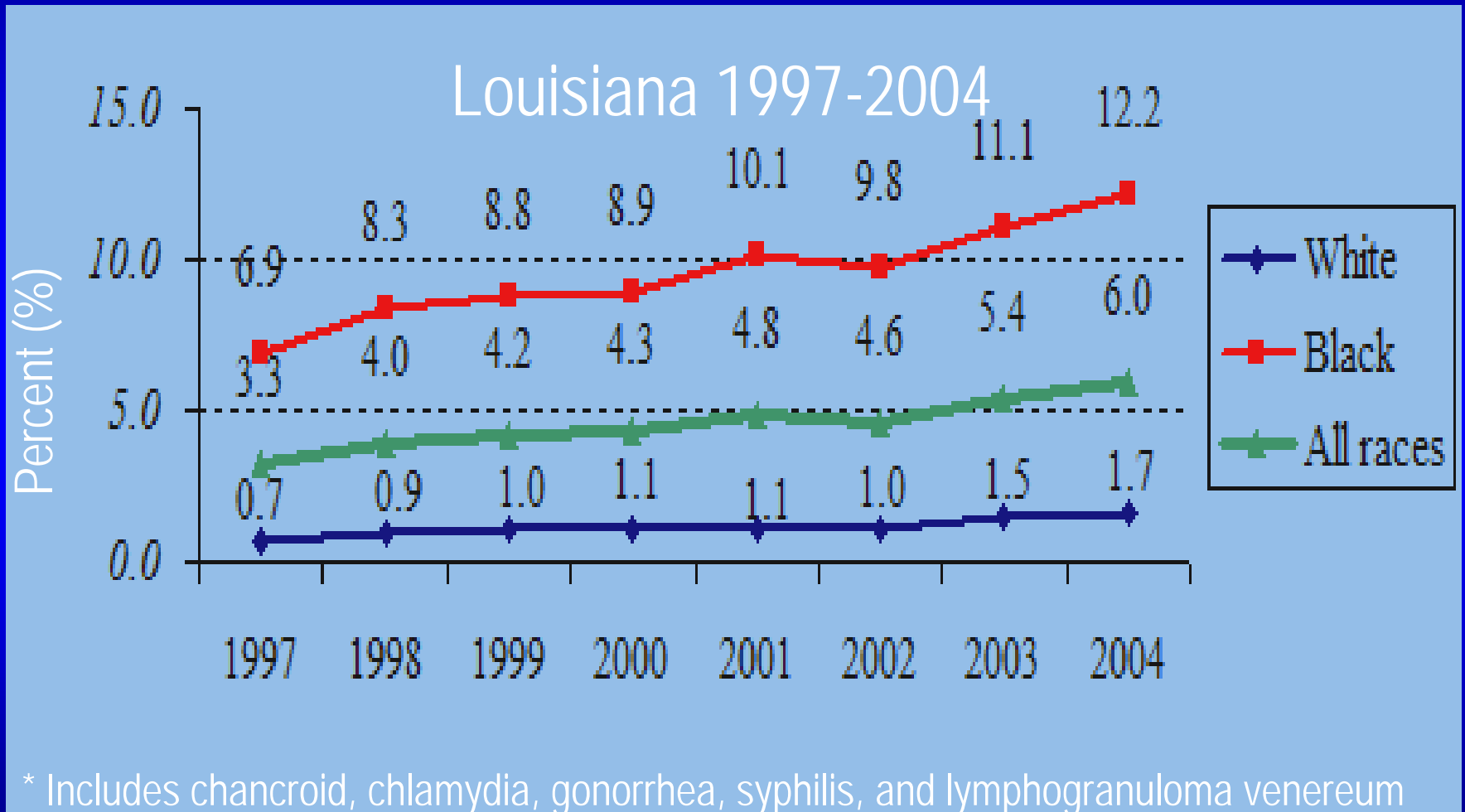
**Prematurity:  
A common complex disorder**

# Infection / Inflammation :

## The Links to Premature Births

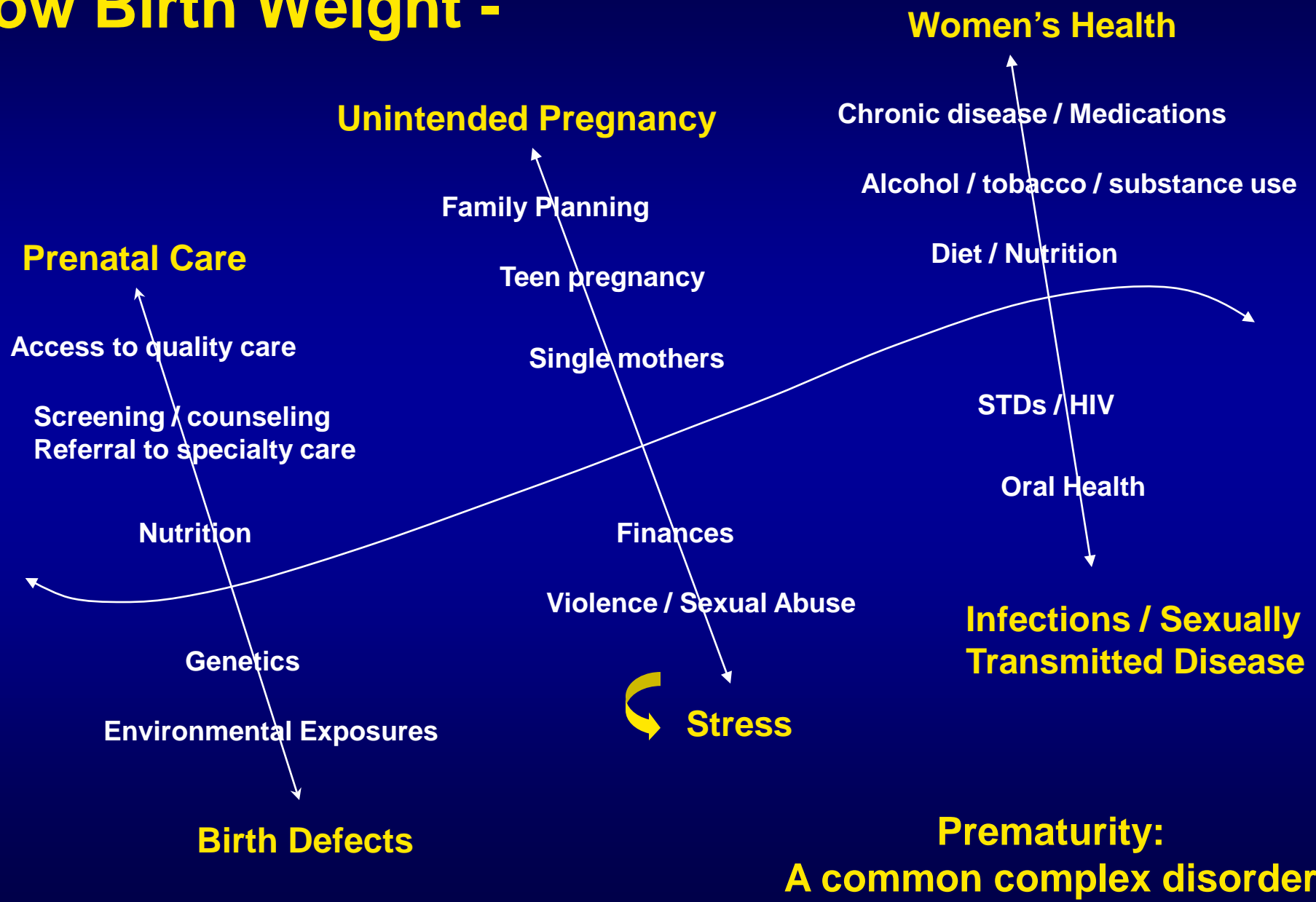
- Infection plays a large role in preterm births - accounting for at least 40%.
- Of preterm birth < 30 weeks – 80-90% related to inflammatory process
- PTB <30 weeks are those with highest infant mortality, morbidity, and cost
- STDs are the major source of infections related to prematurity
- Other sources also important in etiology
  - Group B Strep colonization
  - Periodontal disease

# Trend of STDs During Pregnancy



Increase among Black women = 0.66% annually for past 6 years

# Factors of Prematurity & Low Birth Weight -

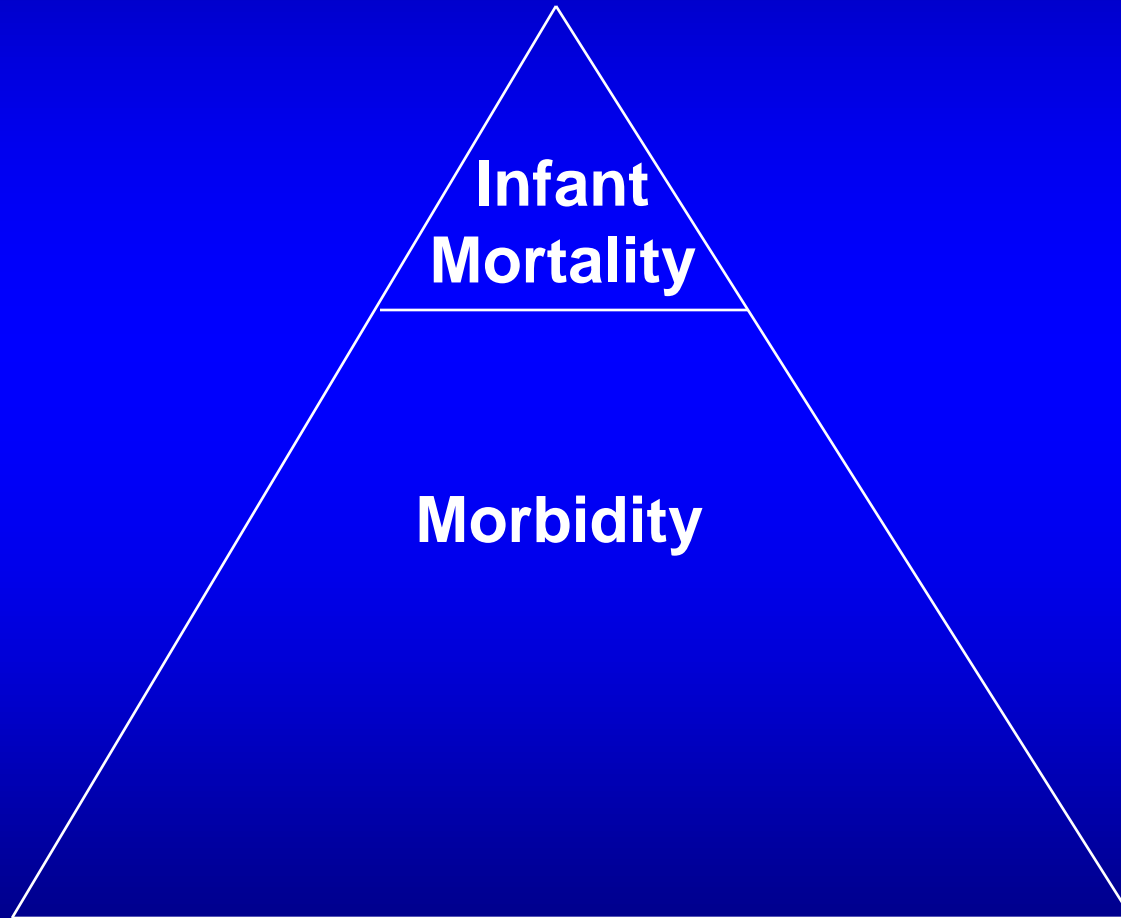


**Prematurity:  
A common complex disorder**

# Stressors in Louisiana Women: PRAMS 2004

- 52.4% of women reported household income less than \$25,000 / year
- 32.3% reported only household income was from public assistance
- 15% identified stressful life event in year prior pregnancy
- 5.1% reported physical abuse by ex-partner during pregnancy
- 4.4% reported abuse by partner during pregnancy

# Infant Mortality is Only the Tip of the Prematurity Iceberg

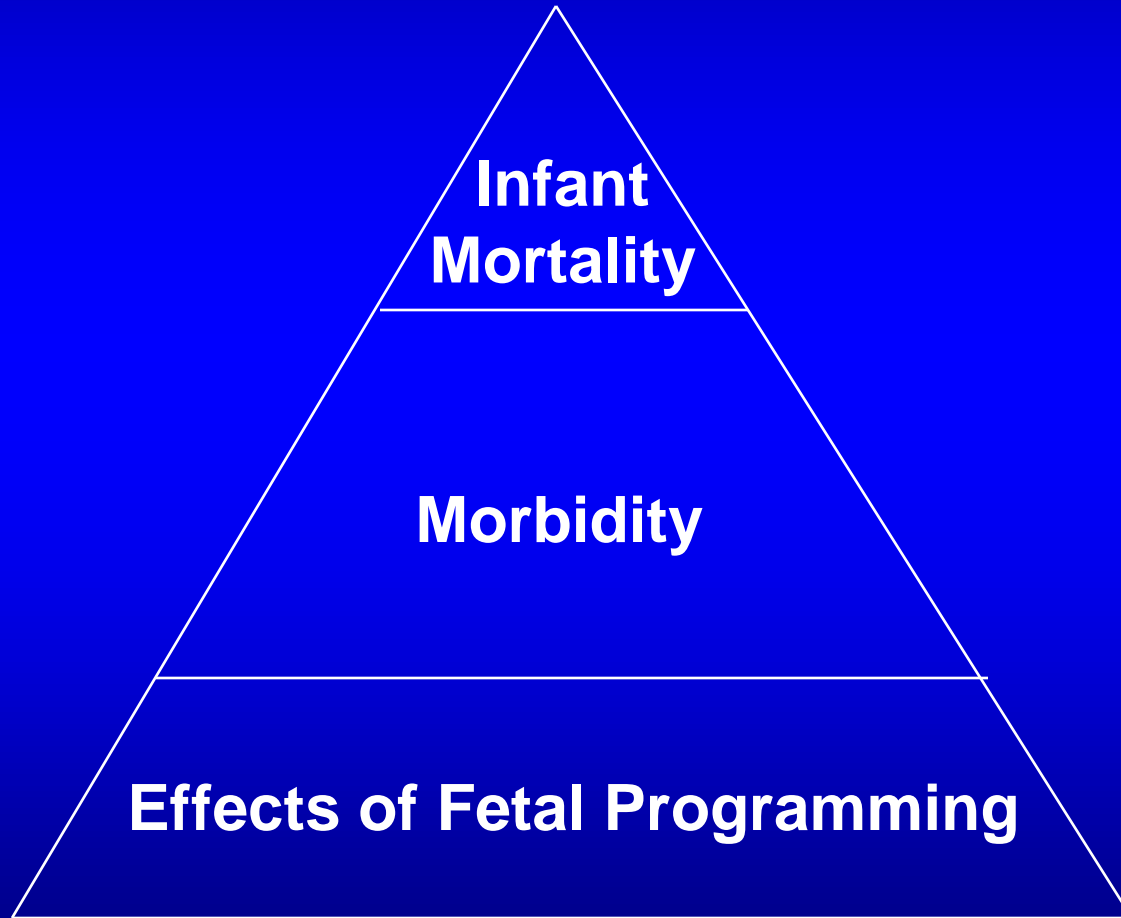


# Prematurity: Contributor to Morbidity

- Neonatal conditions associated with prematurity
  - Neurodevelopmental handicaps (CP, mental retardation)
  - Chronic respiratory problems
  - Intraventricular hemorrhage
  - Periventricular Leukomalacia
  - Infection
  - Retrolental fibroplasia
  - Necrotizing enterocolitis
  - Neurosensory deficits (hearing, visual)
- Morbidity extends in to childhood, youth and adult lives



# Infant Mortality is Only the Tip of the Prematurity Iceberg



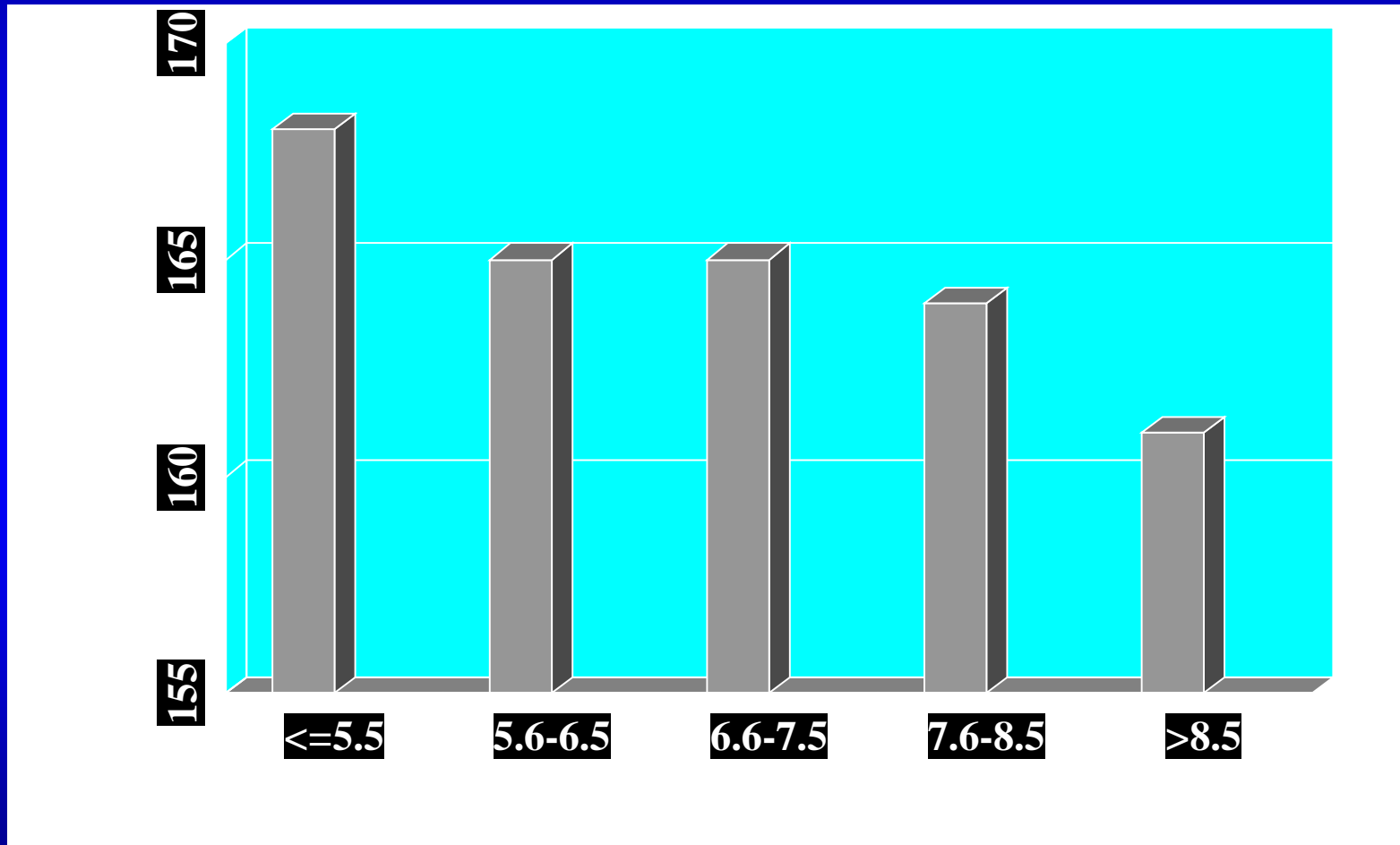
# Preterm Birth / Low Birth Weight: A Contributor to Life-long Morbidity

- In-utero exposures to stress and maternal illness can “re-set” fetal homeostasis that can persist into adulthood, termed “fetal programming”
- Low birth weight infants– increased subsequent life risk for cardiovascular disease, hypertension, diabetes
- Prenatal risks for childhood obesity – maternal diabetes, poor maternal nutrition
- “Fetal programming” may increase risk of generational preterm delivery



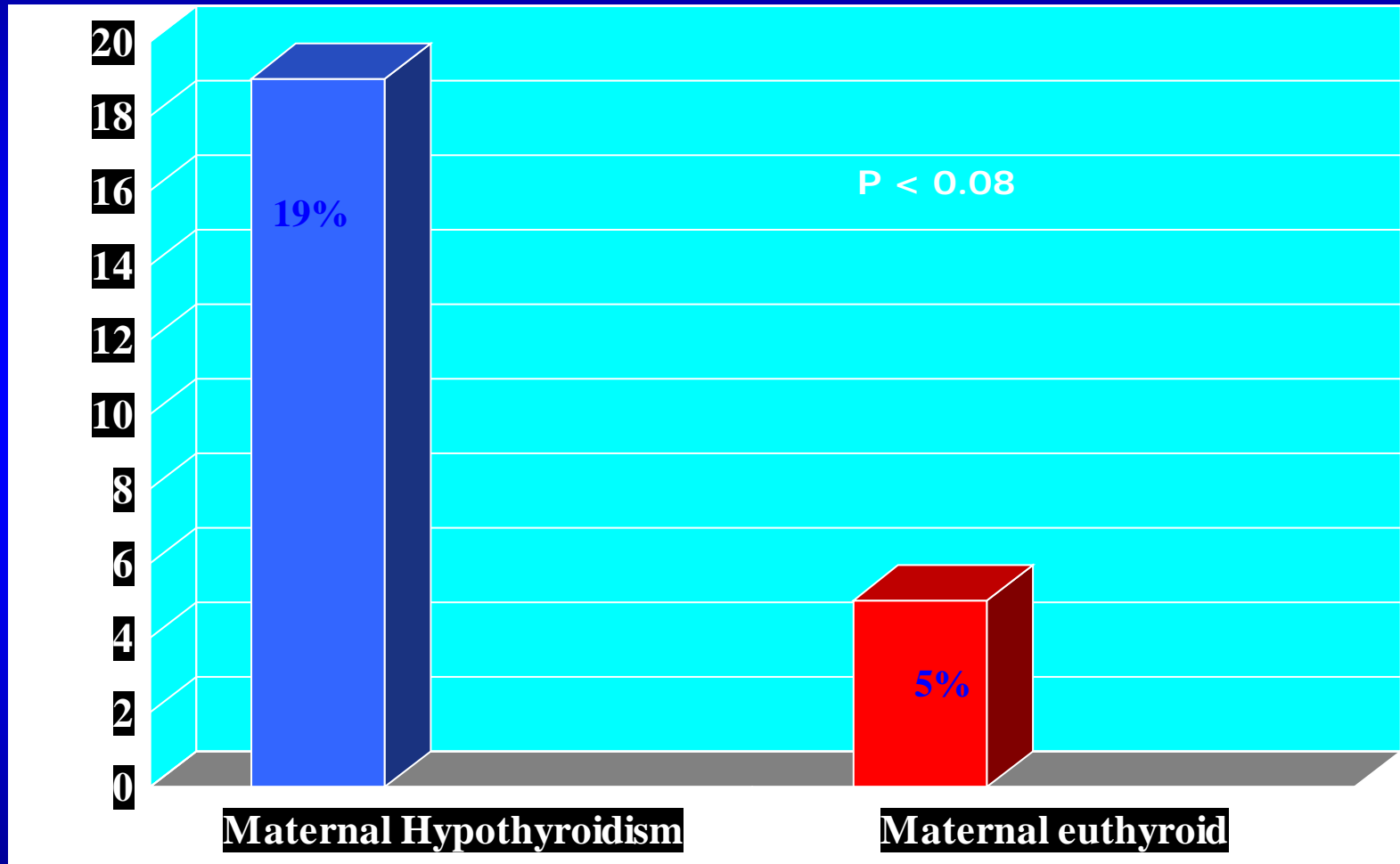
# Barker Hypothesis

## Birth Weight and Future Hypertension



Law CM, de Swiet M, Osmond C, Fayers PM, Barker DJP, Cruddas AM, et al. Initiation of hypertension in utero and its amplification throughout life. Br Med J 1993;306:24-27.

# Maternal Hypothyroidism & Child IQ



Haddow JE, Palomaki GE, Allan WC, et al. Maternal thyroid deficiency during pregnancy and Subsequent neuropsychological development of the child. N Engl J Med 1999;341:549-55.

# Components of Preconceptional Care Recommendations, MMWR, April 2006

1. Individual responsibility across the lifespan
2. Consumer awareness
3. Preventive visits
4. Interventions for identified risks
5. Interconception care
6. Prepregnancy checkup
7. Health insurance coverage for low income women
8. Public health programs and strategies
9. Research
10. Monitoring improvements

# Preterm Births in Louisiana, 2000-04

- Louisiana linked PRAMS-birth data, 2000-2004
- Data limited to singletons, 24+ weeks gestation, white / black race only
- Gestational age from birth certificate
  - 24-31 weeks (very preterm birth, VPTB)
  - 32-36 weeks (moderate preterm birth, MPTB)
- Univariate and bivariate statistics used to assess distributions and relationships with preterm birth



# Preterm Births, 2000-2004

## Modifiable Factors

Variable	Reference	VPTB		MPTB	
		OR	95% CI	OR	95% CI
Hypertension (Yes)	No	<b>1.5</b>	<b>(1.2, 1.9)</b>	<b>1.8</b>	<b>(1.5, 2.2)</b>
Partner abuse –bef/dur (Yes)	No	1.2	(0.9, 1.6)	<b>1.6</b>	<b>(1.1, 2.1)</b>
Low weight gain	Norm/over	<b>2.0</b>	<b>(1.6, 2.7)</b>	1.2	(0.96, 1.5)
APNCU (Kottelchuck Index)					
Inadequate	Inter/Adeq	<b>2.6</b>	<b>(1.7, 4.0)</b>	<b>4.5</b>	<b>(3.1, 6.6)</b>
Pregnancy Spacing					
<12 mos	24-<48 m	<b>3.6</b>	<b>(2.1, 6.0)</b>	<b>2.7</b>	<b>(1.4, 5.0)</b>
12-<24 mos	24-<48 m	0.9	(0.6, 1.3)	1.3	(0.9, 1.8)
48+ mos	24-<48 m	<b>1.8</b>	<b>(1.2, 2.8)</b>	1.0	(0.7, 1.3)
Never	24-<48 m	0.9	(0.2, 3.1)	0.8	(0.3, 2.4)

# Preterm Births, 2000-2004

## Non-Modifiable Factors

Variable	Reference	VPTB		MPTB	
		OR	95% CI	OR	95% CI
Black Maternal Race	White	<b>2.9</b>	<b>(2.2, 3.8)</b>	<b>1.4</b>	<b>(1.2, 1.7)</b>
Previous Preterm birth by parity					
No previous pregnancy	Prev-term	2.9	(0.8, 10.3)	1.8	(0.6, 5.2)
Previous –preterm	Prev-term	<b>4.3</b>	<b>(3.0, 6.4)</b>	<b>3.5</b>	<b>(2.6, 4.6)</b>
Prior fetal or infant loss (Yes)	No	<b>2.1</b>	<b>(1.6, 2.8)</b>	1.3	(1.0, 1.6)



# Repeat Preterm in Louisiana

- Louisiana Vital Records linked with Medicaid program data
- First time, singleton Louisiana resident births occurring in 1999-2001 identified
- Linked with subsequent births occurring within next 4 years to same mother
- Analysis limited to women with 2<sup>nd</sup> live birth
- Outcomes were all preterm birth (PTB, 20-36 wks) and very preterm birth (VPTB, 20-31 weeks)



# Repeat Preterm Birth: Relationship Between First and Second Birth Event

<b>Birth EGA – All PTB</b>	<b>Number</b>	<b>Percent</b>
Initial Birth – PTB	8461	10.8
Subsequent PTB, given 1 <sup>st</sup> PTB and having 2 <sup>nd</sup> pregnancy	1076	<b>31.6</b>

<b>Birth EGA – VPTB only</b>	<b>Number</b>	<b>Percent</b>
Initial Birth – VPTB	1806	2.3
Subsequent VPTB, given 1 <sup>st</sup> VPTB and having 2 <sup>nd</sup> pregnancy	101	<b>14.3</b>



# Factors Associated with Repeat Preterm Birth:

Among women with second birth event, N=34,741

Variable	All PTB Odds Ratio (95% CI)	VPTB Odds Ratio (95% CI)
Race (ref: white)		
African American	<b>1.5 (1.4, 1.6)</b>	<b>2.3 (1.9, 2.7)</b>
Other	0.9 (0.7, 1.2)	0.9 (0.4, 1.8)
Age (ref: 30-34)		
<20	<b>1.4 (1.2, 1.6)</b>	ns
20-24	<b>1.3 (1.1, 1.5)</b>	ns
25-29	1.1 (0.9, 1.3)	ns
>35	1.0 (0.8, 1.4)	ns
Education (ref: >12)		
<12	<b>1.4 (1.2, 1.5)</b>	<b>1.5 (1.2, 1.9)</b>
12	1.1 (1.0, 1.2)	1.1 (0.9, 1.3)

# Factors Associated with Repeat Preterm Birth:

Among women with second birth event, N=34,741

Variable	All PTB Odds Ratio (95% CI)	VPTB Odds Ratio (95% CI)
Medicaid (ref: not Medicaid)	ns	1.3 (1.0, 1.5)
Prenatal Care Entry (ref: 1st)		
2 <sup>nd</sup> Trimester	ns	<b>1.3 (1.1, 1.6)</b>
3 <sup>rd</sup> Trimester	ns	0.9 (0.5, 1.5)
No Prenatal Care	ns	1.5 (0.8, 2.8)
Pregnancy Spacing (ref: 24+mo)		
<12 months	<b>3.4 (3.0, 3.9)</b>	<b>4.5 (3.5, 5.8)</b>
12-14 months	<b>1.7 (1.5, 1.9)</b>	<b>1.8 (1.4, 2.4)</b>
15-17 months	<b>1.4 (1.3, 1.6)</b>	<b>1.6 (1.3, 2.1)</b>
18-20 months	<b>1.2 (1.1, 1.4)</b>	1.3 (1.0, 1.7)
21-23 months	<b>1.2 (1.1, 1.4)</b>	1.1 (0.8, 1.5)

# Factors Associated with Repeat Preterm Birth:

Among women with second birth event, N=34,741

<b>Variable</b>	<b>All PTB Odds Ratio (95% CI)</b>	<b>VPTB Odds Ratio (95% CI)</b>
Weight gain < 10 pounds	<i>1.3 (1.2, 1.5)</i>	<i>2.2 (1.1, 1.4)</i>
Maternal diabetes and/or hypertension	<i>2.4 (2.1, 2.7)</i>	<i>1.8 (1.3, 2.4)</i>
Initial PTB (ref: no PTB)	<i>3.7 (3.4, 4.0)</i>	--
Initial VPTB (ref: no VPTB)	--	<i>6.3 (4.9, 8.0)</i>



# Effective Interventions to Prevent Preterm Births

- Planning the pregnancy
- Optimal management of chronic conditions (diabetes, asthma, hypertension, depression)
- Treating infections (STIs, UTIs, periodontal disease)
- Achieving optimal nutrition / weight
- Consume folic acid
- Managing stress
- Ensure up-to-date immunizations
- Avoid teratogens
- Genetic screening and counseling

# Effective Interventions to Prevent Preterm Births

- Early, comprehensive, accessible prenatal care
- Educate all pregnant women about preterm labor signs and symptoms
- Screen and treat all UTIs and STIs
- Identify cigarette smokers and intervene
- Assess for alcohol use and intervene
- Identify illicit substance users and intervene
- Address mental health needs
- Assess for domestic violence and intervene

# Promising Research Directions

- Progesterone study – 17 alpha HP (high risk by history)
  - Multisite US, Meis, et, al MFMU-NICHD (preliminary)
    - ↓ by ~ 30%
  - da Fonesca (preliminary)
    - ↓ by 50%+
- Clotting abnormalities (Thrombophilia) - Yale
  - Genetic
  - Can screen
  - Can treat
- Stress research - CDC, MOD (PERI), Others
- Folic Acid –MFM, 2008: Women who took FA for  $\geq 1$  year prior conception with 70% reduction in PTB < 28 weeks

# Current Efforts to Prevent Preterm Birth

Birth Weight	Fetal Deaths	Neo-natal	Post-Neonatal
500-1499 g	<b>Nurse Family Partnership</b> <b>Take Charge, Family Planning Waiver</b> <b>Substance Use / Depression / IPV screening</b> <b>Folic Acid (Pre- / Inter-conception Care)</b>		
1500 + g	<b>Access to care - Medicaid</b>	<b>Hospital Levels of Care</b>	<b>Child Health Injury Prevention / SIDS education Program</b>

Louisiana Perinatal Commission, Louisiana FIMR Network, and Child Death Review benefit all cells

**Blue:** Maternal Health / Prematurity  
**Gold:** Neonatal Care

**Pink:** Prenatal Care  
**Green:** Infant Health

# Improving Birth Outcomes in Louisiana - Summary

- Goal
  - Reduce adverse birth outcomes, especially preterm birth and low birth weight
  - Eliminate racial disparity in birth outcomes
- Strategy
  - Improve the health of women before and between pregnancies
  - Assure that women of childbearing age receive the health care services to allow them to enter pregnancy in optimal health

# Improving Birth Outcomes in Louisiana - Summary

## Target population:

- Women who have had a prior adverse outcome (preterm birth, stillbirth)
- Women with chronic medical conditions
  - Diabetes, Hypertension
  - HIV
  - Hypothyroidism
  - Seizure disorders
  - Mental illness
- All women of reproductive age

# Mechanism to Improve Birth Outcomes in Louisiana

- Take Charge Expansion
  - Medicaid is predominate re-imburement source during pregnancy and well accepted by patients / providers
  - Current Take Charge program appears limited by restrictions on services
  - Initially target expansion to cover identified high risk groups
  - Later expansion to cover all women of reproductive age
- Provider Service Network

# Opportunity for Louisiana

- Improve health status
  - infant mortality rates
  - overall health of future generations
- Recognize opportunity to put mechanism in place
- Consolidate components to provide a medical home / comprehensive medical and mental health care
  - Medicaid, Take Charge, providers
- Results
  - 2 to 5 years

# Improving Birth Outcomes in Louisiana

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