

***The Life Course Perspective  
in relation to  
Maternal Child Health Nutrition***



**Partners in Excellence  
for Leadership in MCH Nutrition**

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# Life Course Perspective

Framework to:

1. Understand & explain
2. Improve

Health & Health Disparities

# Objectives for Today

1. Name at least three major ideas that are part of a life course perspective and provide at least one nutrition-related situation that illustrates each of the major ideas.
2. Describe how nutrition during pregnancy, infancy and the pre/inter pregnancy period impacts lifelong health.
3. Apply the life course perspective to work in state and local health agencies.
4. Describe how life course approaches can be used to advocate for an essential role for WIC in advancing the health of the population.

# Healthy People 2020: Overarching Goals

- Attain **high-quality, longer lives** free of preventable disease, disability, injury, and premature death.
- Achieve health **equity, eliminate disparities**, and improve the health of all groups.
- Create social and physical **environments** that promote good health for all.
- Promote quality of life, healthy development, and healthy behaviors **across all life stages**.

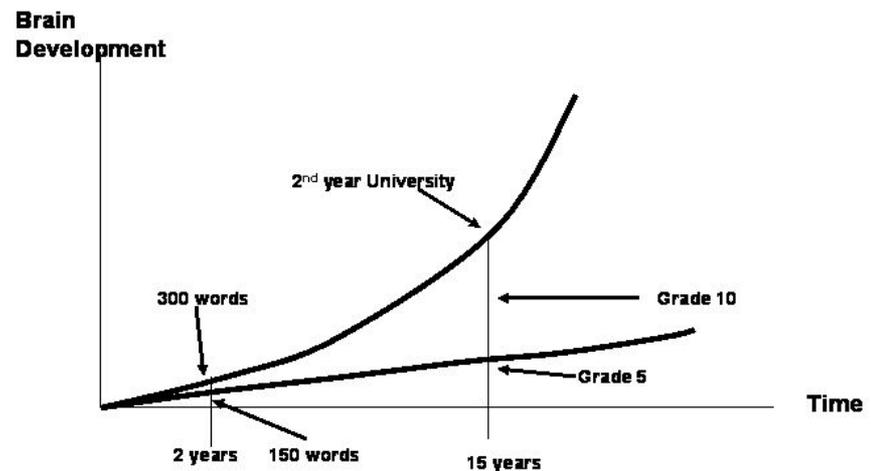
| Stage of Growth or Reproduction | Individual-Level Interventions   | Policy-Level Interventions  |
|---------------------------------|--|---|
| Fetal                           | Encourage maternal smoking cessation.<br>Prevent and treat maternal diabetes.<br>Prevent excessive and inadequate maternal weight gain.  | Advocate for policies that assure that all pregnant women have access to culturally competent, high-quality medical care.<br>Support policies that deter tobacco use and limit exposure to second-hand smoke, such as bans on smoking in public places.   |
| Infant                          | Assure access to lactation consultants.<br>Provide ongoing, developmentally appropriate information about the introduction of complementary foods and the infant-caregiver feeding relationship.   | Establish hospital policies that have been shown to increase initiation and duration of breastfeeding.<br>Advocate for family-friendly work and child-care environments that provide flexible schedules and equipment, space, and support for mothers to nurse or express milk.   |
| Child                           | Provide information about feeding relationships, and the importance of regular family meals and snacks, daily physical activity, and limiting sedentary behaviors, such as television viewing.   | Advocate for child-care and school environments that support healthful eating by providing only health-promoting foods in settings that encourage their consumption.<br>Advocate for child-care and school environments that support physical activity throughout the day by encouraging active transportation to school, recess time, and high-quality physical education. |
| Puberty                         | Implement a comprehensive school health education curriculum for children and adolescents that includes nutrition, physical activity, and limiting sedentary behavior and tobacco use.   | Support changes in communities that make it easier and safer for all youth to be physically active as part of their daily lives.<br>Support changes in communities that make it easier for all youth to have access to health-promoting foods.  |
| Pregnancy                       | Provide ongoing individual support for appropriate physical activity, energy intake, and dietary adequacy during pregnancy.  | Establish worksite policies that encourage consumption of health-promoting foods in meetings, cafeterias, and break rooms.<br>Support policies that encourage active transportation to work, shopping, and other community destinations.  |
| Lactation                       | Assure access to lactation consultants.<br>Screen for postpartum depression and provide opportunities to join support groups.  | Establish policies that support breastfeeding mothers in hospitals, worksites, and child care.  |
|                                 | <p><b>Advocate for food assistance and education programs that prevent food insecurity, increase access to health-promoting foods, and provide nutrition education. These programs include:</b></p> <ul style="list-style-type: none"> <li>Food Stamp Program</li> <li>National School Lunch and Breakfast Programs</li> <li>Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)</li> <li>Child and Adult Care Food Program</li> <li>Expanded Food and Nutrition Education Program</li> <li>Summer Food Service Program</li> </ul> |   |

# Key Parts of the Framework

# 4 Basic Life Course Concepts

1. Today's experiences and exposures determine tomorrow's health.
2. Health **trajectories** are particularly affected during critical or sensitive periods.

Trajectory: a path, progression, or line of development



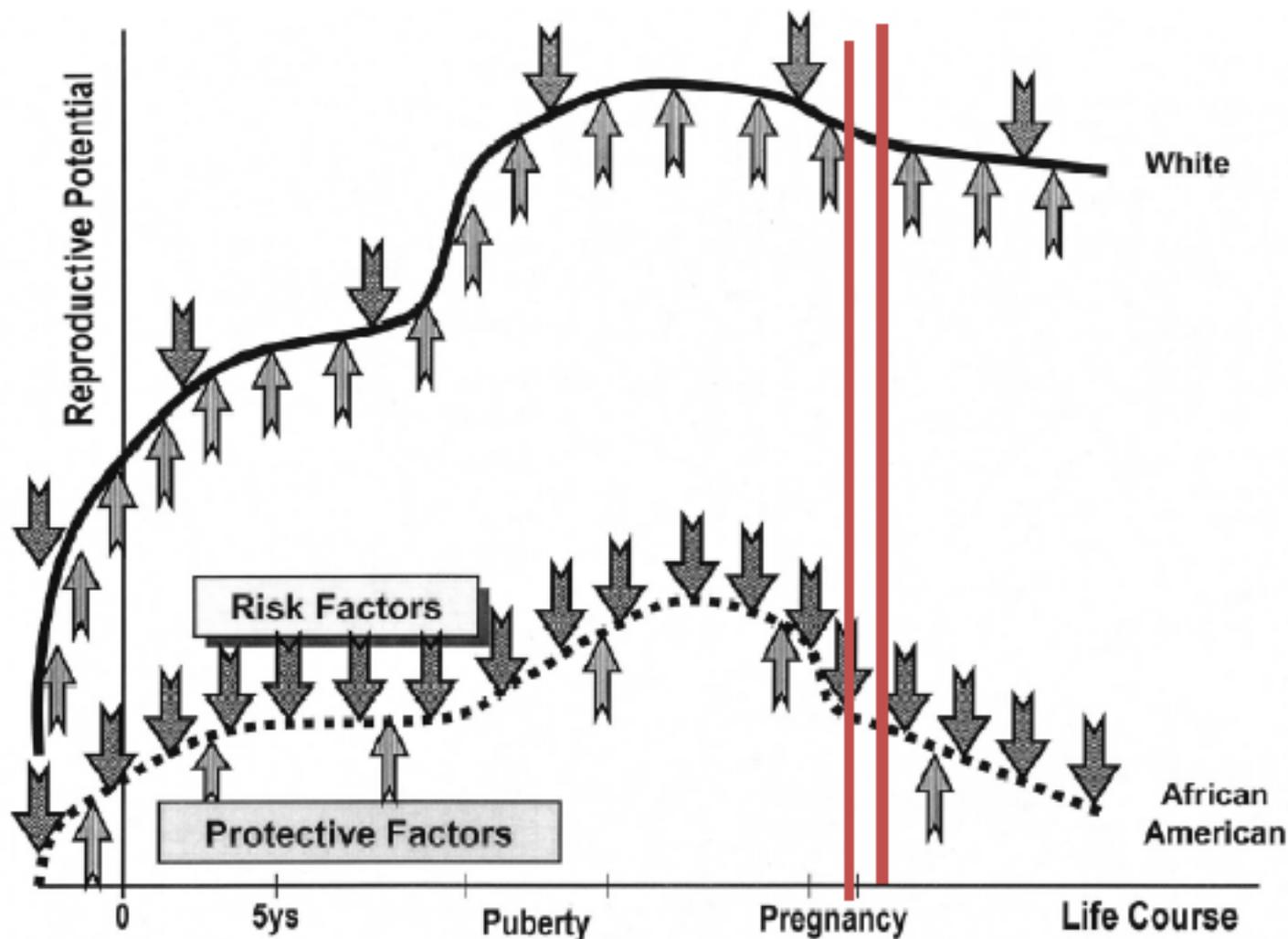
# 4 Basic Life Course Concepts

3. The broader environment – biologic, physical, and social – strongly affects the capacity to be healthy.
4. Inequality in health reflects more than genetics and personal choice.

# Risk & Protective Factors

- Add up over time → cumulative
- Offer opportunities for WIC intervention

# Life Course Perspective



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

# Lifelong Development/ Lifelong Intervention

*“...even for those whose trajectories seem limited, risk factors can be reduced and protective factors enhanced, to improve current and subsequent health and well-being.”*

Fine and Kotelchuck, 2010:

# T<sub>2</sub> – E<sub>2</sub>

- **Timeline:** today's exposures influence tomorrow's health
- **Timing:** health trajectories are particularly affected during critical periods
- **Environment:** the broader community environment strongly affects the capacity to be healthy
- **Equity:** inequality in health reflects more than genetics and personal choice

# Improving Population Health

For mothers &  
children:

- Reduce Risks
- Increase Protective Factors



Better  
health  
throughout  
life

# Nutrition & the Life Course Framework

# Timeline: Nutritional Factors and Development of Obesity

- Maternal Weight before Pregnancy
  - Strong predictor for childhood obesity
  - Obese women have higher rates of LGA births
  - High energy intake early in life affects fat cell development and brain's ability to regular appetite
  - Obese child → more likely to become obese adult



# Timeline: Nutritional Factors and Development of Obesity



- Breastfeeding as Protective Factor
  - Breastmilk contains 6 bioactive proteins and hormones involved in appetite, energy balance and growth
  - Support regulation of infant's energy intake and metabolism
  - Breast-fed babies have greater ability to self-regulate energy intake
  - May impact likelihood to develop obesity

# Timeline: Nutritional Factors and Chronic Disease Development

- Early Growth affects Later Chronic Disease Development
  - Fetal origins hypothesis – Barker
  - Malnutrition during fetal life, infancy and early childhood leads to permanent changes in structure and function of organs and body systems
  - Developmental changes in kidneys - reduction in number of nephrons

# Timeline: Nutritional Factors and Chronic Disease Development

- Early Growth affects Later Chronic Disease Development continued...
  - Increased appetite into adulthood
  - Increased risk of hypertension due to mismatch when environment changes from one of deprivation to one of excess

# Timing: Critical Nutrients during Critical Periods of Development

## *Example: Essential Fatty Acids (EPA, DHA)*

- Preconception
  - Improved embryo morphology
- Pregnancy
  - Important structural components of cell membranes, central nervous system, retinal cell membranes
  - Increased length of gestation, more AGA birthweights
- Infancy
  - Improved visual and cognitive development, maturity in sleep patterns, motor activity in infants



# Timing: Critical Nutrients during Critical Periods of Development

- Infancy: Zinc
  - Essential for protein synthesis, cell division and human growth
  - Deficiencies result in impaired immune function, neurosensory disorders, growth retardation, short stature and delayed puberty

# Timing: Critical Nutrients during Critical Periods of Development

- Infancy: Breastmilk
  - Decreases in perinatal mortality and morbidity
  - Associated with decreased prevalence of chronic diseases in later life such as asthma, obesity and Type 2 diabetes

# Timing: Critical Nutrients during Critical Periods of Development

- Early Childhood: Iron
  - High requirement in first 2-3 years of life due to rapid brain growth
  - Anemia (low hemoglobin) as high as 15% among US preschoolers
  - Deficiencies result in poor performance on measures of psychomotor and cognitive development

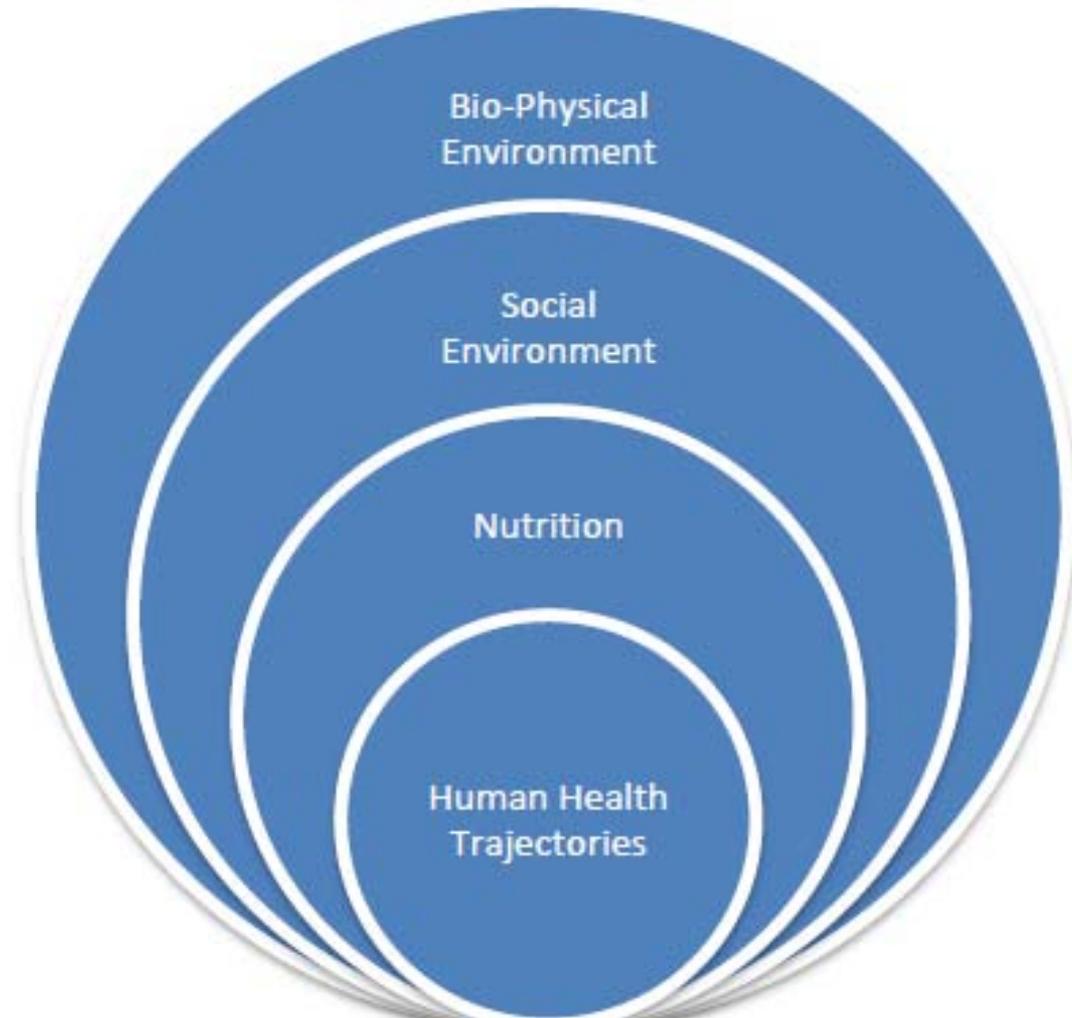
# Timing: Critical Nutrients during Critical Periods of Development

- Adolescence: Calcium
  - Time of rapid growth – skeletal system accumulates half of adult mass during this time
  - Calcium and vitamin D intake during adolescence can have impact on bone health in adult years
  - Low calcium intake among obese adolescents associated with increased risk of hypertension

# Environment

- Social, economic and cultural environments impact nutritional intakes in homes, schools and communities
- Social determinants of health and interactions of people with environment affect the potential to shape diets consumed over time and across generations –affects on health outcomes
- During childhood, supportive nutrition environments important to ameliorate earlier nutritional insults and protect against risk of obesity

# Effect of “Environments” on Human Health Trajectories



# Environment: Nutritional Health Effects

- Home Environment
  - Family meals important to children's food-related decision-making patterns and parental dietary role modeling
  - Quality and frequency of meal times affects development of childhood obesity (risk/protective)



# Environment: Nutritional Health Effects

- Home Environment: Family Meals
  - Adolescents: participation in family meals leads to more committed learning and higher self-esteem
  - Exhibit lower rates of high-risk behaviors (e.g., tobacco and drug use)

# Environment

- School Environment
  - National School Breakfast and Lunch Programs influence children's dietary intake and related behaviors
  - Nutrition education in the classroom/school wellness policies support healthful food choices throughout day and at home
  - Ensure access and availability to quality foods – help maintain food security



# Equity

- Food Insecurity
  - Association between obesity and food insecurity
  - Pregnancy: associated with pregravid obesity, higher gestational weight gain, gestational diabetes
  - Children: report poor health, experience depression, anemia, lower achievement in school
  - Hunger in childhood associated with lower educational attainment and household income as adults

# Equity

- **Breastfeeding Initiation**
  - Substantial racial and economic disparities among rates of initiation and continuation at 6 months
  - By income groups: proportion of African-American children breastfed 10-17% lower than that of white children.

# Equity

- **Breastfeeding Initiation**

- By race: proportion of children ever breastfed 23-26% higher among those in highest income category compared to lowest

- Reasons for disparities:

- 1) Differential distribution of free formula in hospitals;

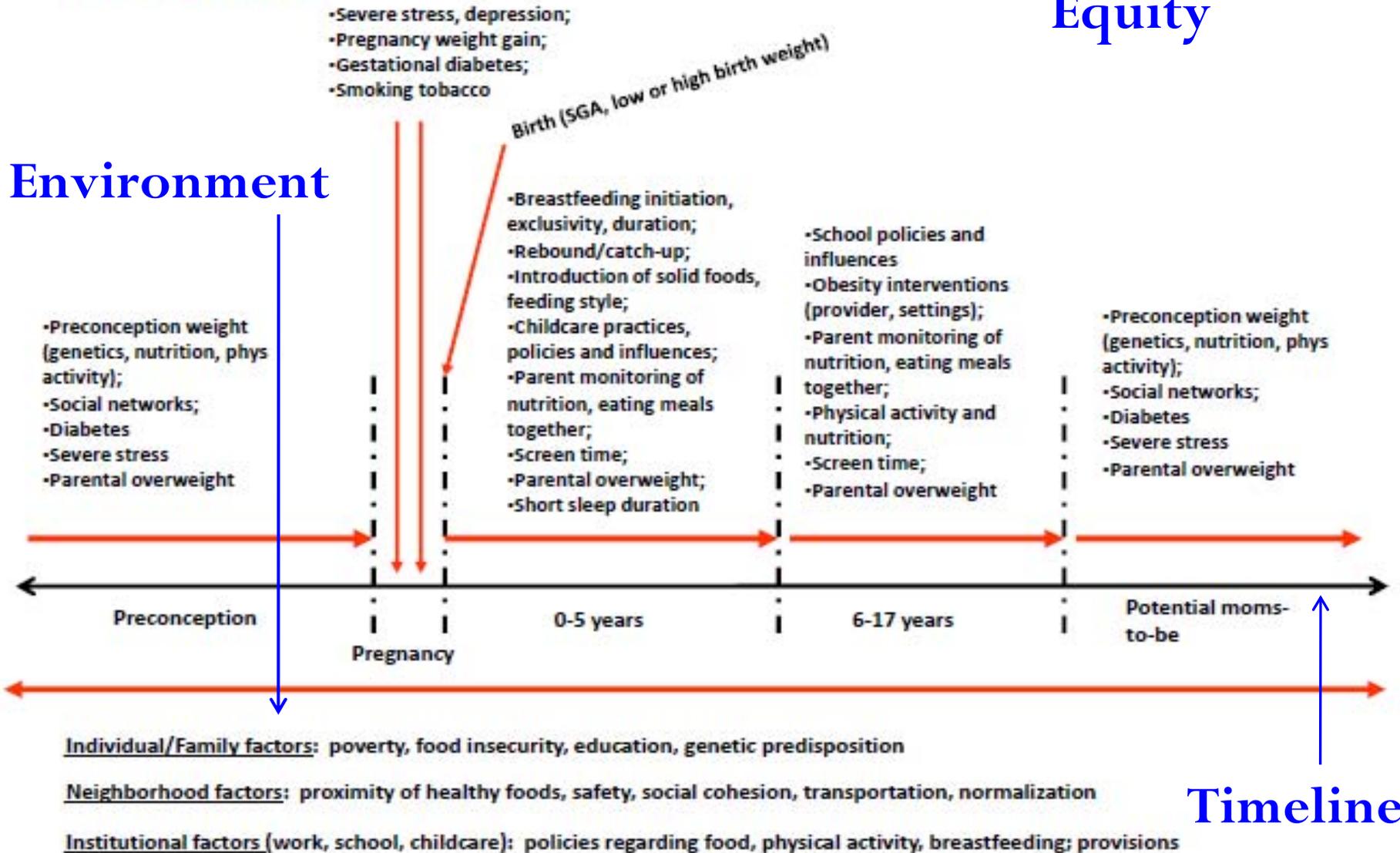
- 2) Women returning to work without supportive environments;

- 3) Influence of fathers or other family members

# Risks and Protective Factors for Childhood Obesity

Timing  
Equity

Environment



Timeline

# Summary

- Nutrient adequacy important throughout life course
- Healthy foods essential for good pregnancy outcomes for mothers and infants and for optimal growth and development in childhood
- Set stage for improved health and quality of life in later adulthood and for future generations

# Summary

- Environmental access to health-promoting foods and nutrients protects during critical periods (timing) and assures optimal nutrition early in life to protect lifelong health (timeline)

# WIC and the Life Course Framework

# T2 - E2 and WIC

- Timing: WIC serves mothers and children at the most sensitive times.
- Equity: WIC serves the most vulnerable families
- Timeline: benefits of WIC persist across the lifespan
- Environment: WIC brings healthy foods into communities.

# WIC Matters...

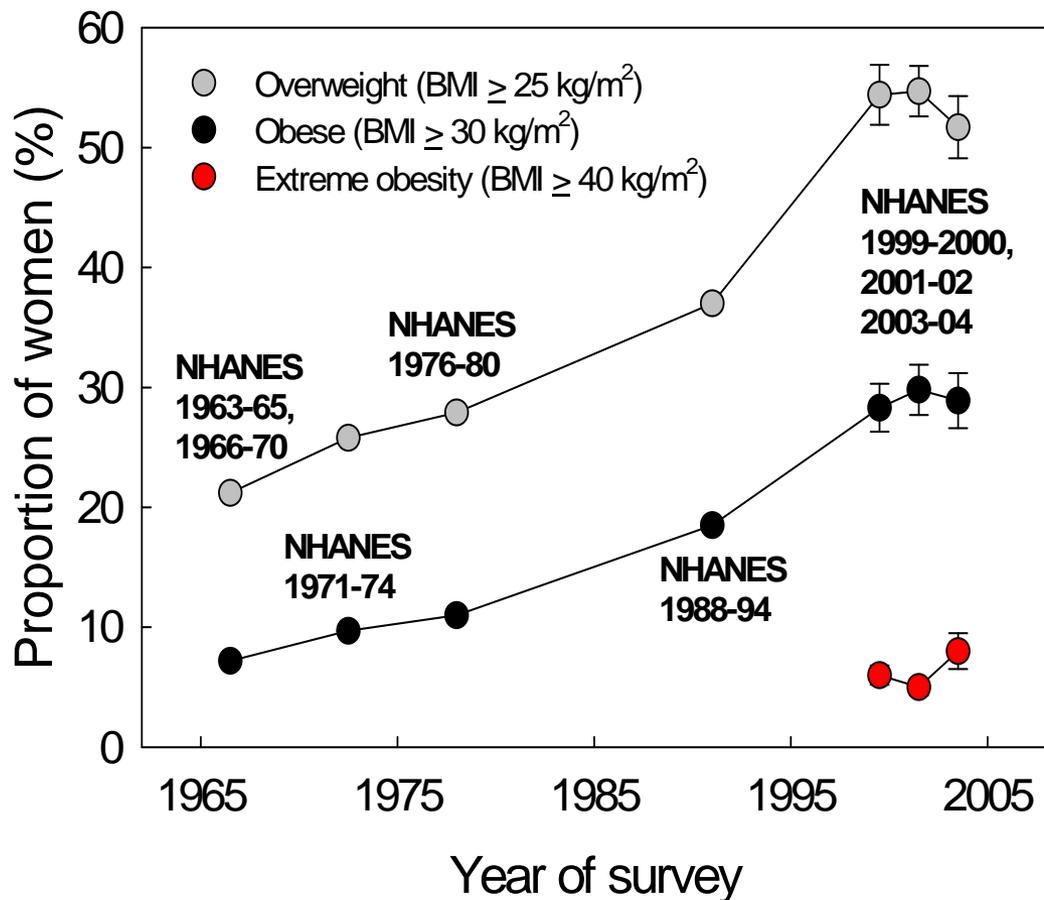
1. WIC reduces fetal deaths and infant mortality.
2. WIC reduces low birth weight rates and increases the duration of pregnancy.
3. WIC improves the growth of nutritionally at-risk infants and children.
4. WIC decreases the incidence of iron deficiency anemia in children.
5. WIC improves the dietary intake of pregnant and postpartum women and improves weight gain in pregnant women.

# WIC Matters, cont.

6. Pregnant women participating in WIC receive prenatal care earlier.
7. Children enrolled in WIC are more likely to have a regular source of medical care and have more up to date immunizations.
8. WIC helps get children ready to start school: children who receive WIC benefits demonstrate improved intellectual development.
9. WIC significantly improves children's diets

# WIC Serves High Risk Populations During Critical Periods

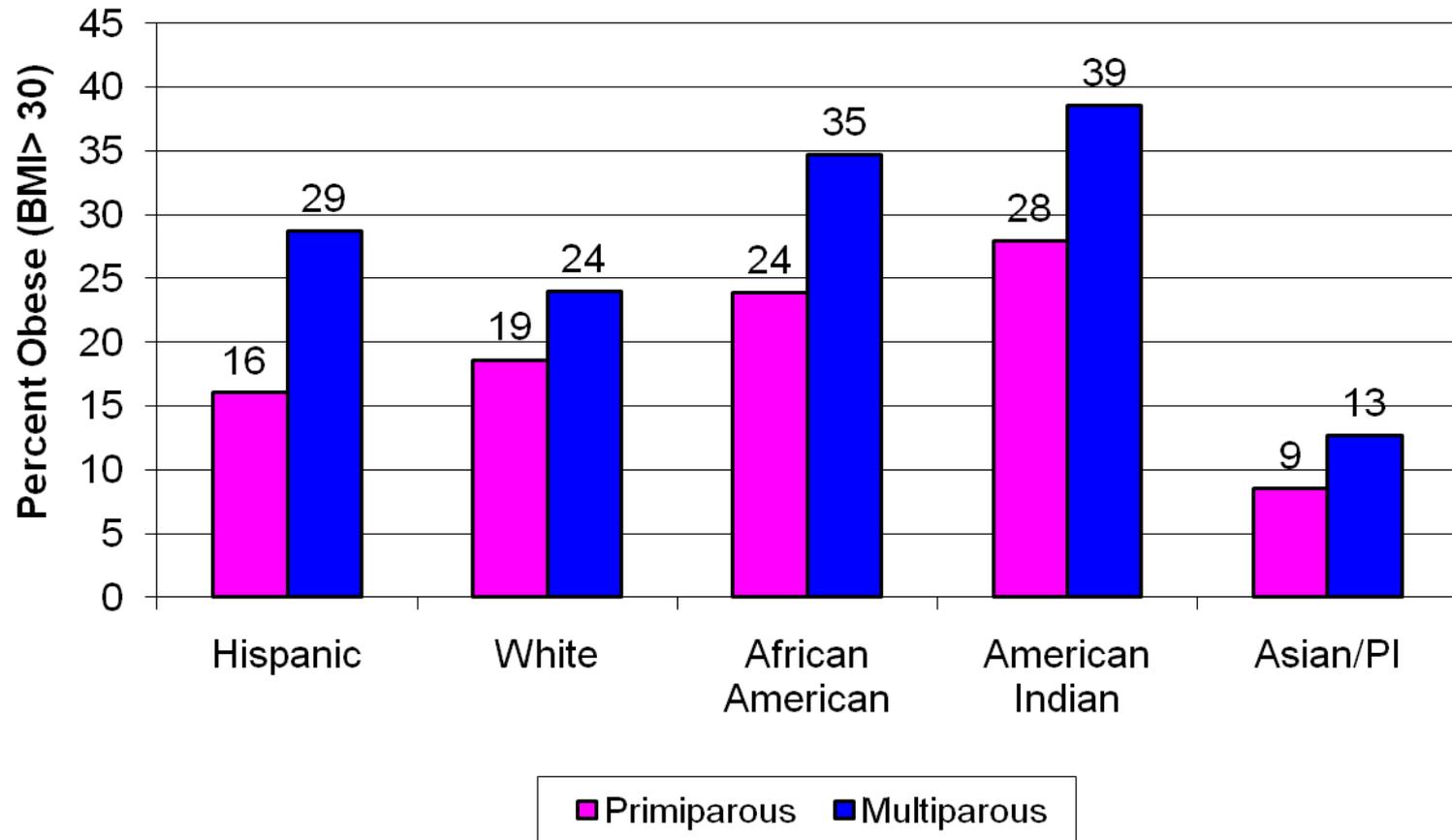
# Prevalence of Overweight, Obesity and Extreme Obesity among U.S. Women Aged 20-39 Years



From: *Health, United States, 2005* and Ogden CL, *et al.*  
*JAMA* 2006;**295**:1549.

\*Ages 20-35 through NHANES 1988-94

# Obesity by Parity and Race/Ethnicity 2003-2005



# Trends in Gestational Weight Gain

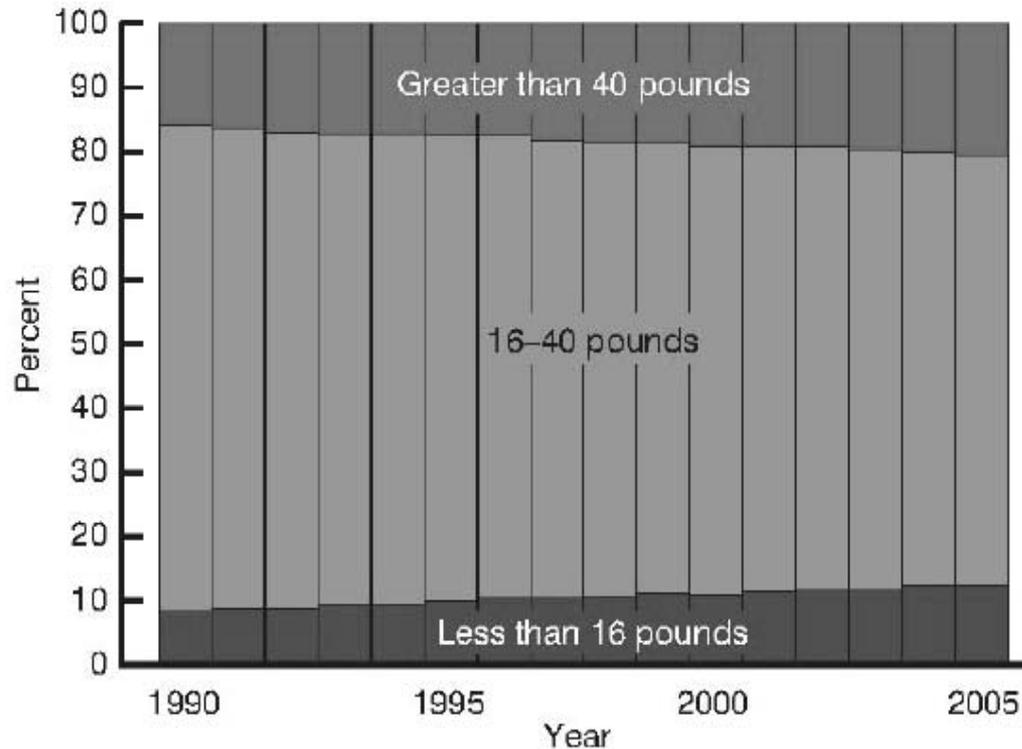
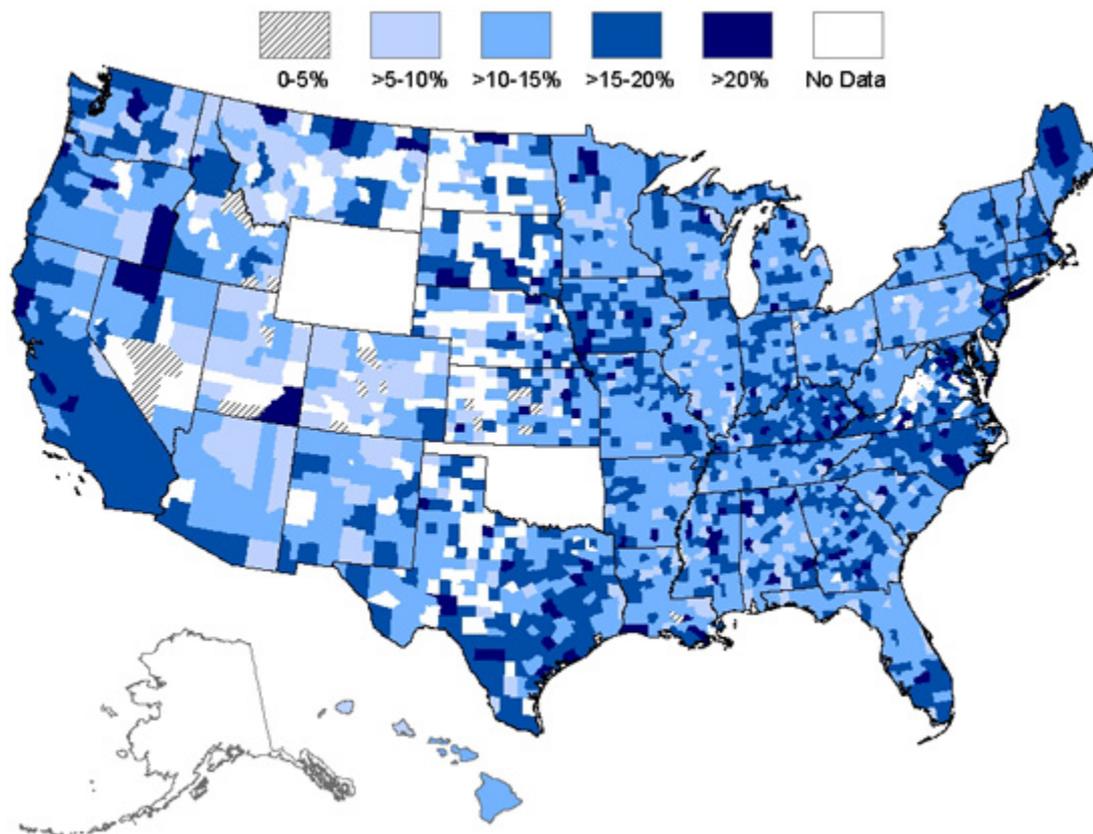


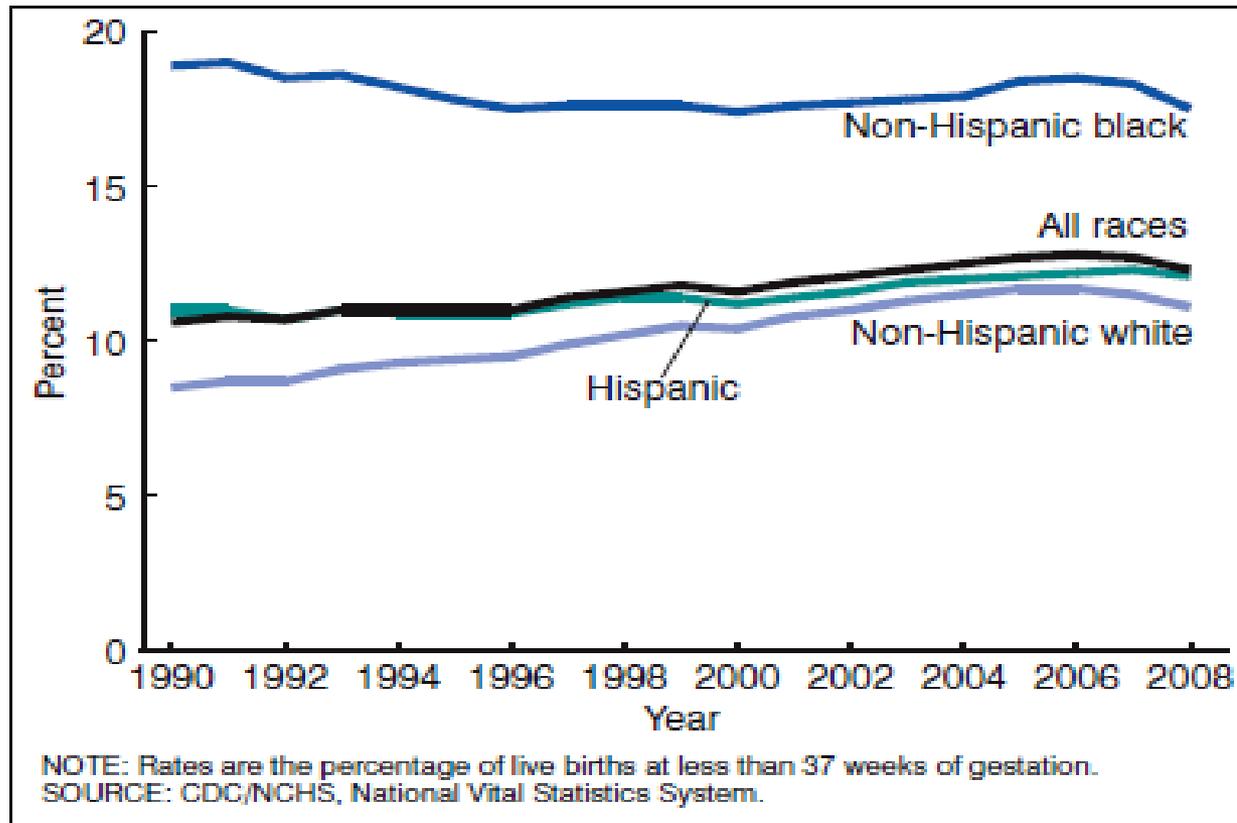
FIGURE 2-3 Weight gain during pregnancy for singleton term births in the United States, 1990-2005.

NOTES: California does not report weight gain in pregnancy. Term is  $\geq 37$  weeks' gestation.

SOURCE: NCHS, 2007a.

# 2007-2009 County Obesity Prevalence Among Low-Income Children Aged 2-4 years

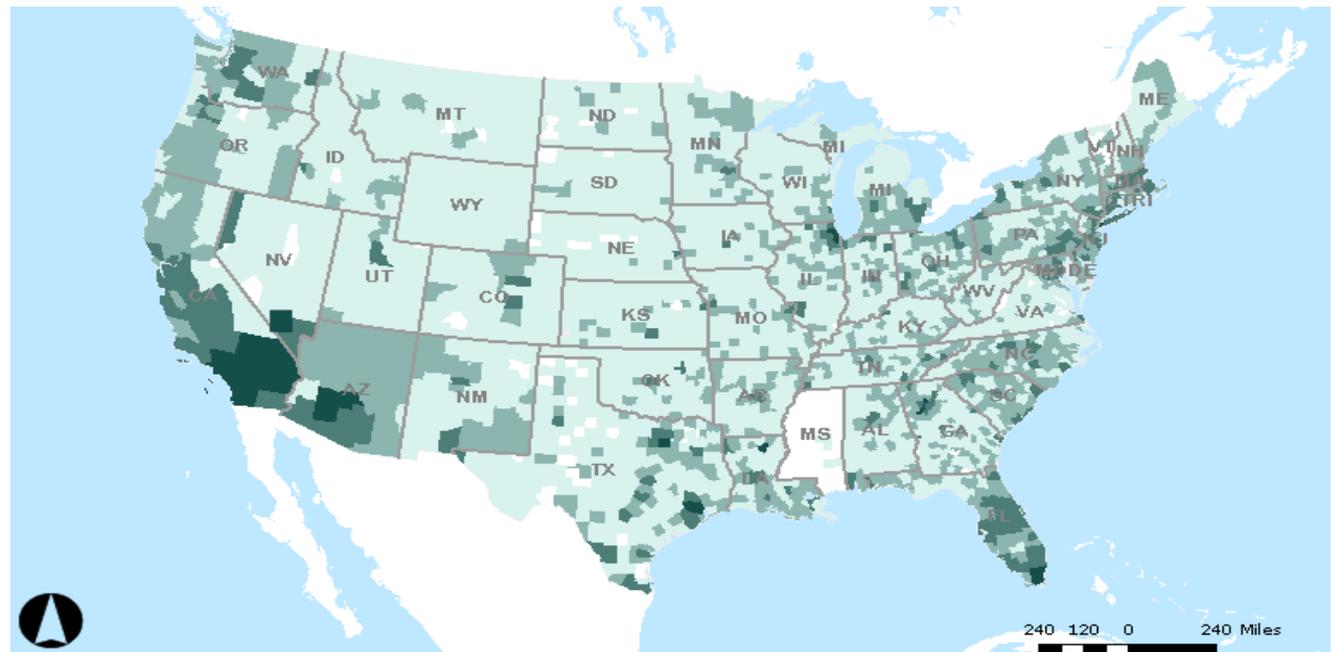




**Figure 4. Preterm birth rates by race and Hispanic origin of mother: United States, final 1990–2006 and preliminary 2007 and 2008**

# WIC has the Reach and Scope to Make a Difference

- Over 9 million clients in 2010
- About half of the infants in some states



■ \$351.00 - \$1,000,000.00

■ \$1,000,000.01 -  
\$5,000,000.00

■ \$5,000,000.01 -  
\$50,000,000.00

■ \$50,000,000.01 -  
\$341,651,253.80



# WIC Improves Food Security

Timing, Timeline, Environment,  
Equity

Herman et al, The effect of the WIC program on food security status of pregnant, first-time participants. Family Economics and Nutrition Review, 2004:1;21-30

# Food Insecurity/Hunger Associated with....

- Inadequate intake of key nutrients; poor physical and mental health in adults and depression in women;
- Overweight and weight gain (especially among women from marginal and low food security households)
- Adverse health outcomes for infants and toddlers; behavior problems in preschool-aged children;
- Lower educational achievement in kindergarteners;
- Depressive disorder and suicidal symptoms in adolescents.

# WIC Participation & Food Security

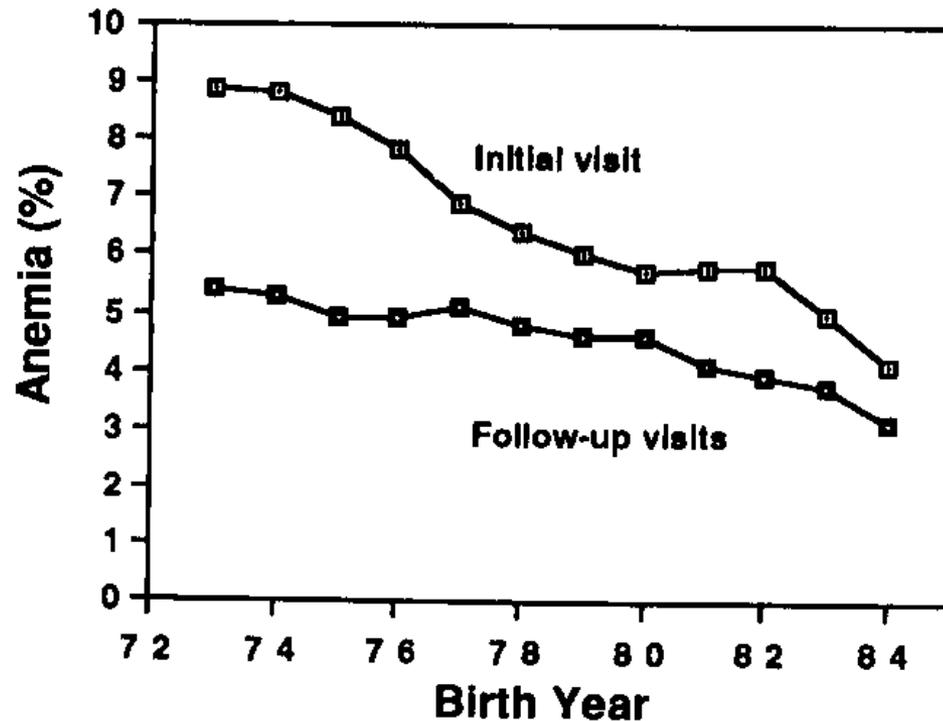
- Initial food insecurity with hunger; additional WIC visits reduce the risk of food insecurity.
- *“Earlier and longer WIC participation may improve household food security status, particularly of vulnerable groups.”*

Metallinos-Katsaras et al. A longitudinal study of WIC participation on household food insecurity. *Matern Child Health J*, 2011.

# WIC Improves Iron Deficiency Anemia

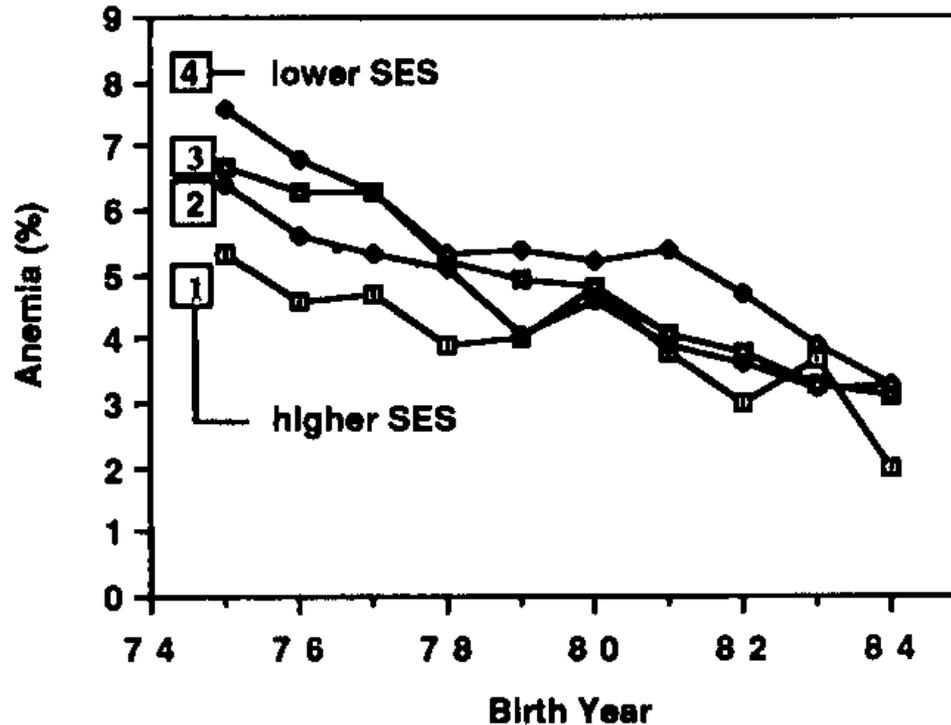
Timing, Timeline, Equity

# WIC Improves Iron Deficiency Anemia



**FIG. 2.** Comparison of anemia trends of non-WIC and WIC children based on data from the CDC Pediatric Nutrition Surveillance System, 1976–1985. (Reproduced from ref. 3 by permission of *JAMA*, © 1987, American Medical Association.)

# Equity



**FIG. 4.** Comparison of trends in prevalence of anemia for children in four socioeconomic status (SES) groups from the Tennessee WIC program. Group 1 represents high SES and group 4 represents low SES. (Reproduced from ref. 3 by permission of *JAMA*, © 1987, American Medical Association.)

# WIC Improves Breastfeeding

Timing, Timeline, Equity

# AHRQ: Positive Maternal Outcomes

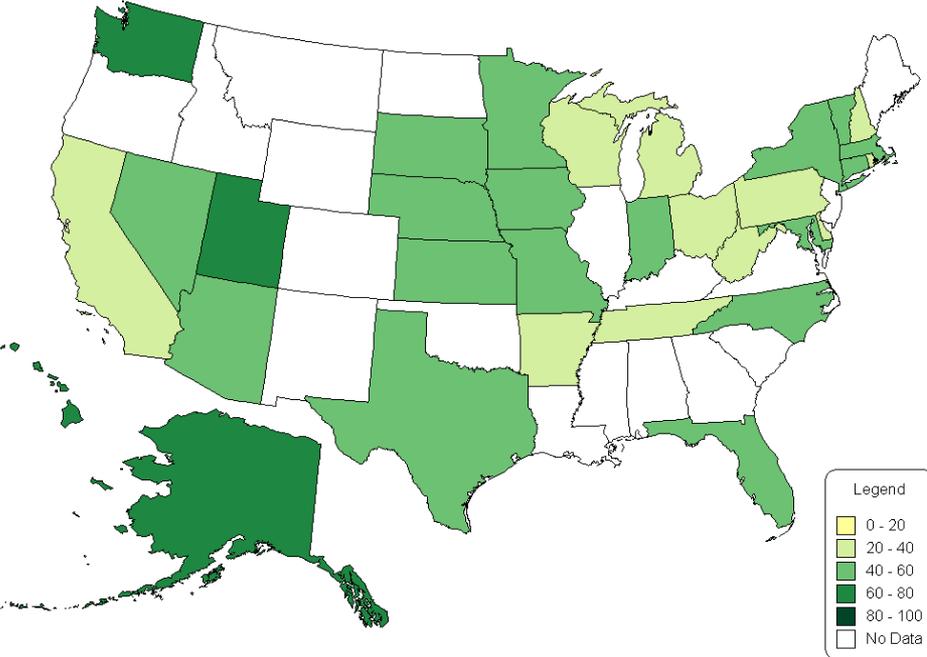
|   | % less in BF |
|---|--------------|
| Maternal Type II Diabetes (reduction in risk per year of lactation) | 4, 12%       |
| Postpartum depression   | association  |
| Breast cancer (reduction per year of lactation)                     | 4.3, 28%     |
| Ovarian cancer  | 21%          |

# AHRQ: Positive Findings for Infants

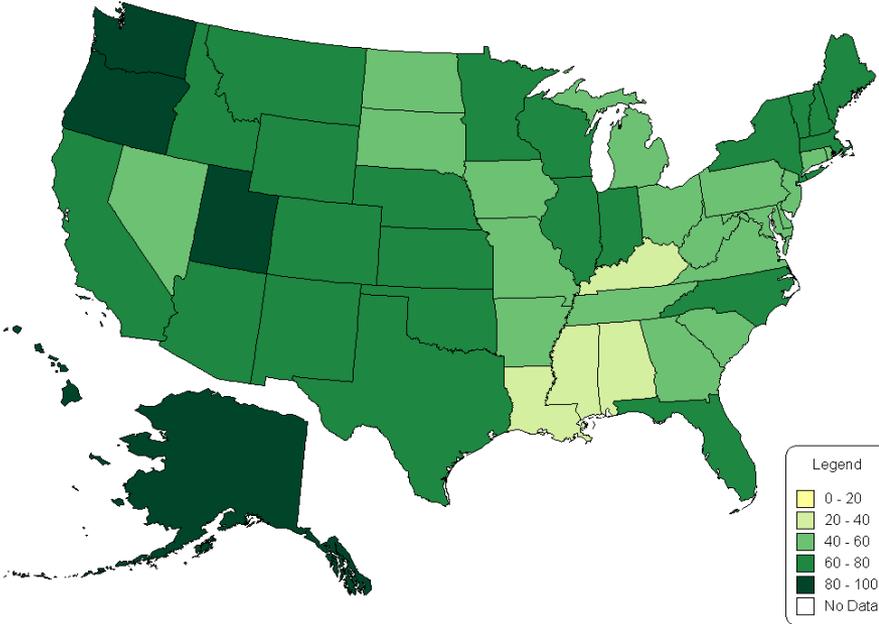
|  | % less in BF |
|--|--------------|
| Acute otitis media (exclusive BF 3-6 mos.)           | 50%          |
| Atopic dermatitis (exclusive BF 3 mos)               | 42%          |
| GI infection (infants breastfeeding)                 | 64%          |
| Lower respiratory tract diseases                     | 72%          |
| Asthma (in young children) – no family hx, family hx | 27%, 40%     |
| Obesity  | 4, 7, 24%    |
| Type I diabetes                                      | 19, 27%      |
| Type 2 diabetes                                      | 39%          |
| Childhood leukemia                                   | 15, 19%      |
| Sudden Infant Death Syndrome                         | 36%          |
| Necrotizing enterocolitis                            | 4-82%        |

# WIC Breastfeeding Initiation Rates

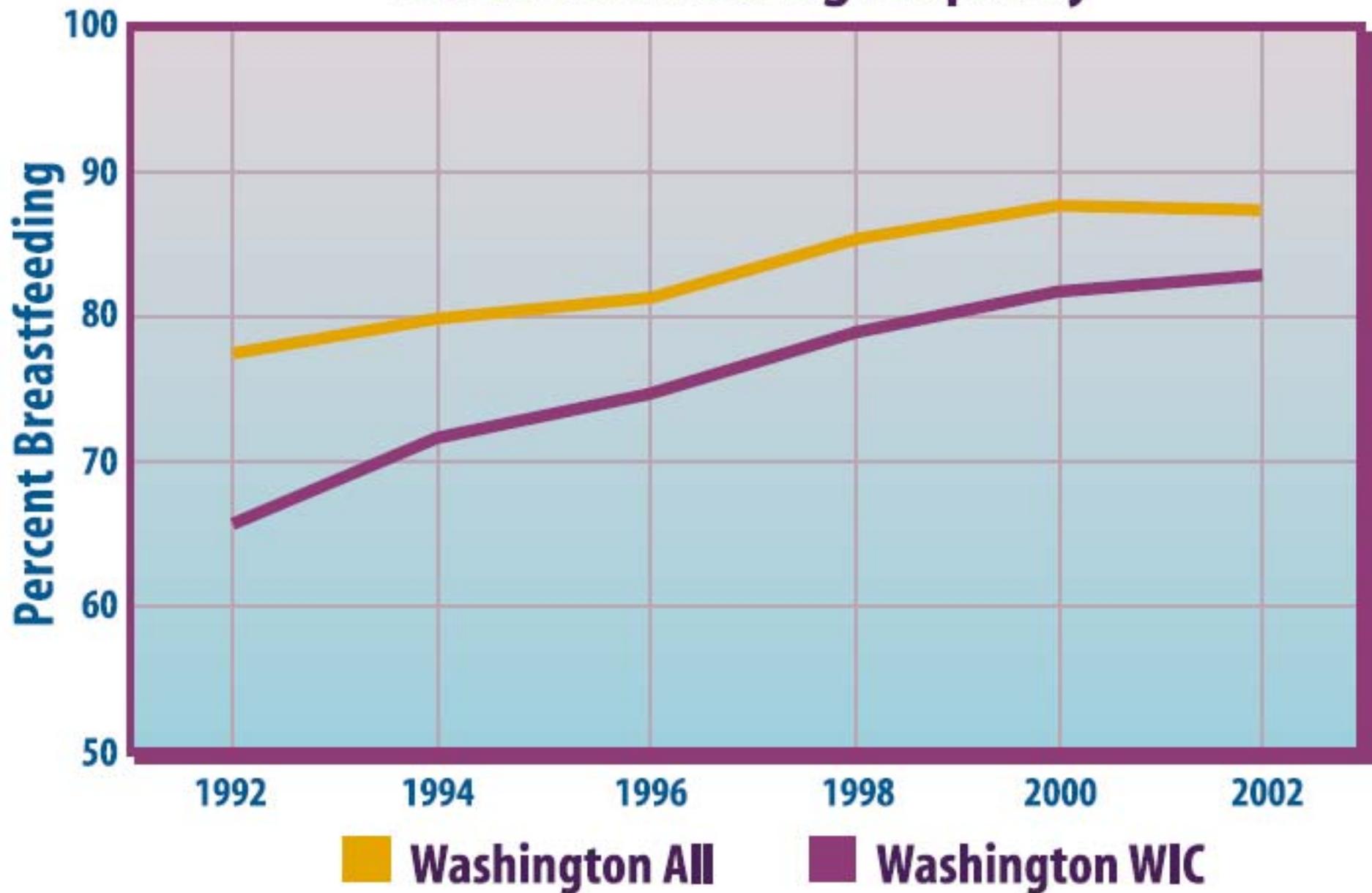
**1998**



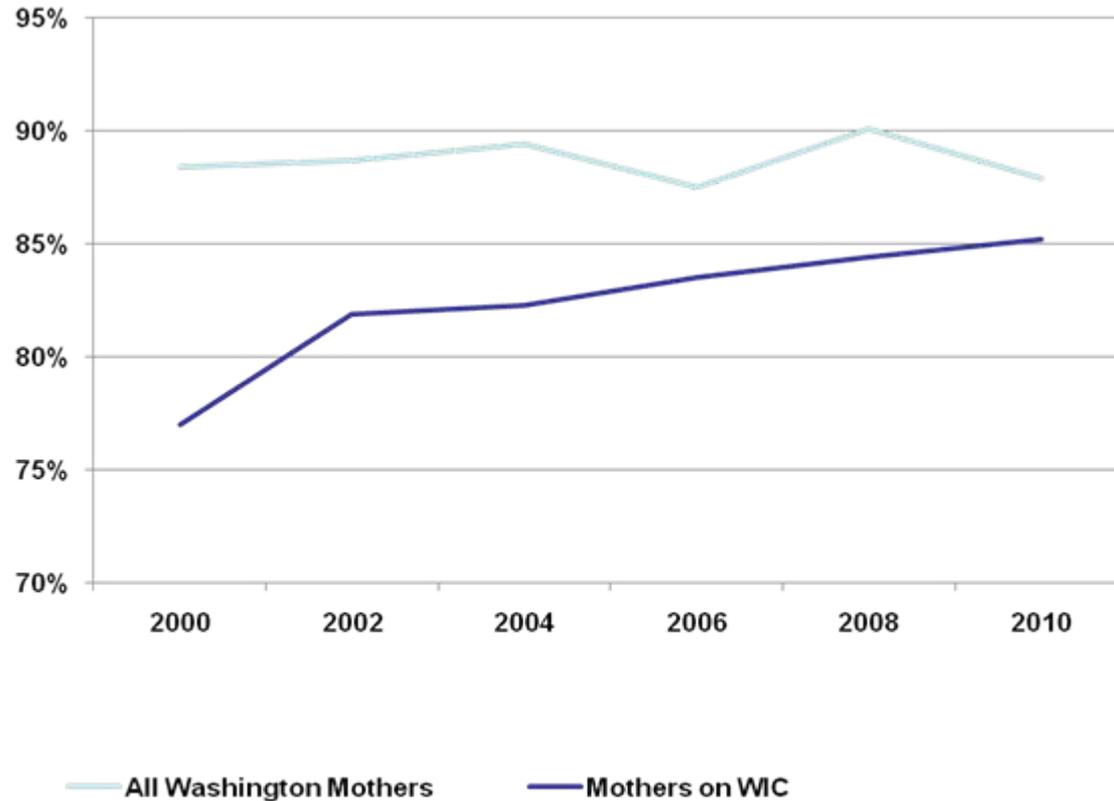
**2008**



## WIC Breastfeeding Disparity<sup>3</sup>



# WIC & Breastfeeding Equity



# WIC is Essential for the Health of the Population

- Benefits of breastfeeding, iron adequacy, food security, and other WIC outcomes persist throughout life (timeline).
- WIC reduces risks and provides protective factors; improves health trajectories by helping families to accumulate positive attributes (timing/environment).
- WIC can help achieve Healthy People 2020 goals & health equity.