

Early Investment in Prenatal and Early
Childhood Nutrition *versus* Later Treatment
of Medical and Developmental Problems:
A Cost-benefit Analysis

Briefing with
Congressman Robert C. Scott
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Children's Sentinel Nutrition Assessment Program (C-SNAP)

- A research center made up of a national network of pediatric clinicians and public health specialists for research on the effects of U.S. social policy on young, low-income children's health and nutrition. Research sites are located in:
 - **Little Rock, AR, Boston, MA, Baltimore, MD, Minneapolis, MN, Philadelphia, PA (Active)**
 - **Los Angeles, CA, Washington, D.C. (Inactive)**



Presentation Overview

- Household Food Insecurity
- Associations Between Food Security and Child Health and Development
- Costs and Benefits of Prenatal Nutrition

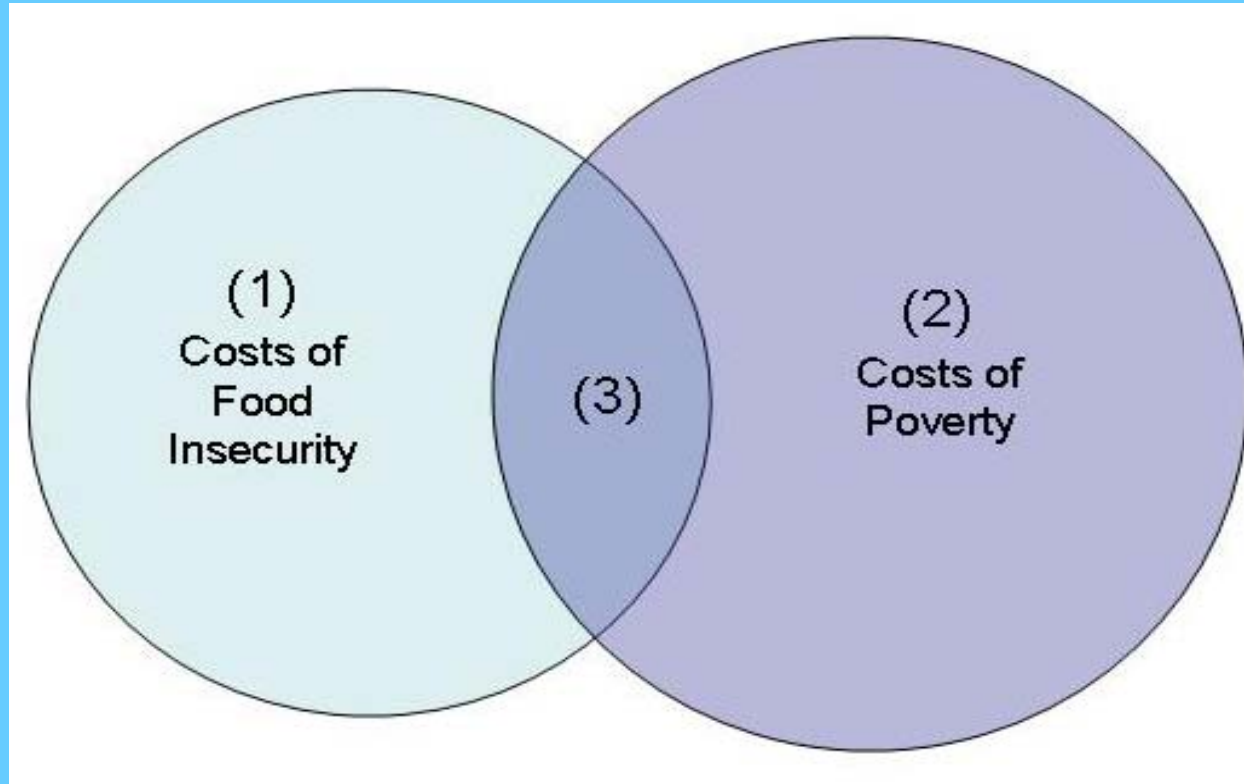


What is Food Security?

A Measure of the Adequacy of Food Resources

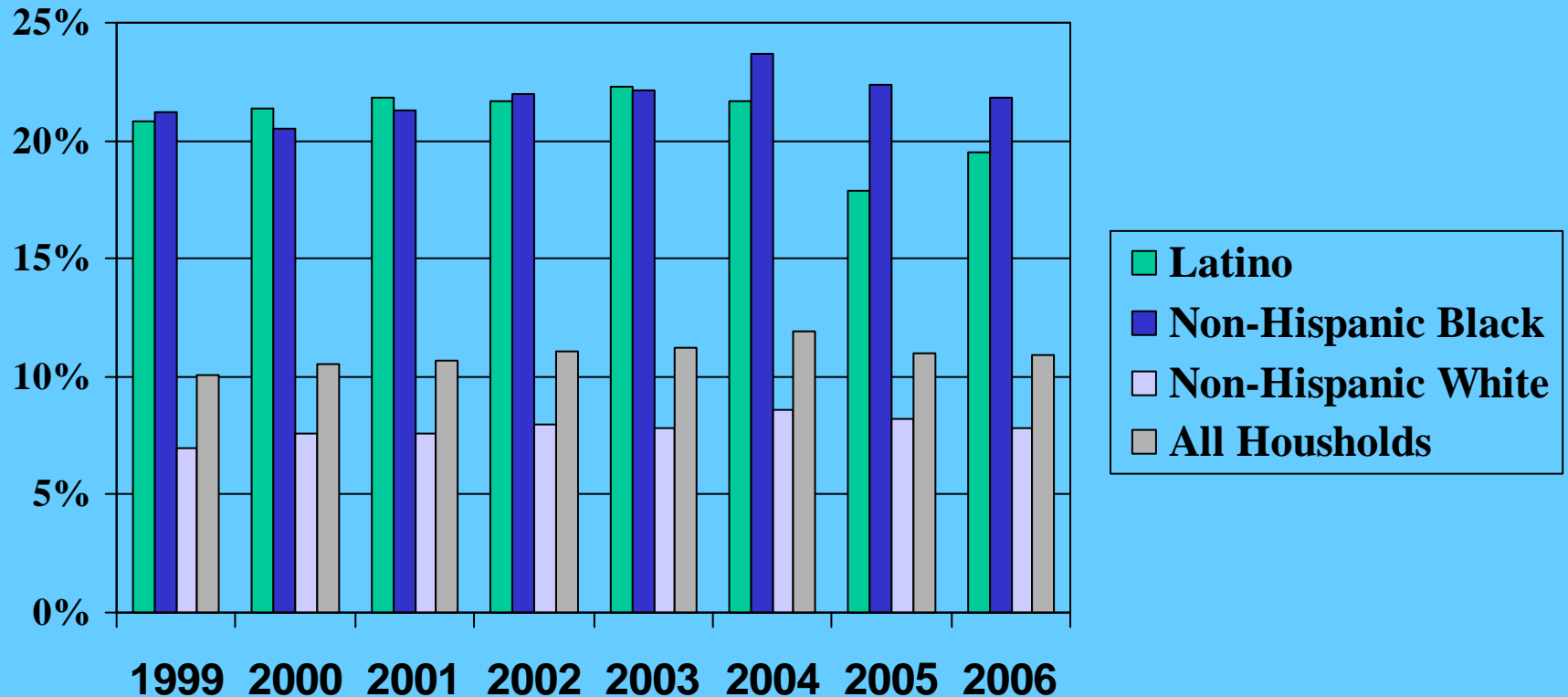
- Conceptual Definition: “Food security—access by all people at all times to enough food for an active, healthy life—is one of several conditions necessary for a population to be healthy and well nourished.” (*Household Food Security in the United States, 2005 / ERR-29 Economic Research Service/USDA*)
- Measured using the 18-item US Food Security Scale (USDA/NCHS)

Cost Intersection: Food Insecurity and Poverty



- Food insecurity and poverty overlap, but are not congruent
- Food insecurity's costs can be above and beyond costs of poverty

Proportion of U.S. Households that are Food Insecure, By Race/Ethnicity: 1999-2006*



*Includes households with and without children.

Source: USDA\ERS Food Security in the U.S., various years.

Prevalence of Food Insecurity by Race/Ethnicity, All People and All Children, 2006

| | Total Food Insecure | |
|-------------------------|---------------------|---------|
| | Number | Percent |
| All People | | |
| Latino | 9,004,000 | 21.2% |
| Black | 8,144,000 | 22.9% |
| White | 16,452,000 | 8.3% |
| All Children < 18 years | | |
| Latino | 3,600,000 | 26.0% |
| Black | 3,137,000 | 29.3% |
| White | 5,250,000 | 11.8% |

Source: Nord M, Andrews M, Carlson S. Household Food Security in the U.S., 2006

What we Have Learned About Ways Food Insecurity and Hunger are Bad for Children

1. Brain architecture/cognitive development harmed, in the perinatal period and early life, (0-3 yrs)
2. School-readiness harmed (0-5 yrs),
3. Learning, academic performance and educational attainment harmed (6-17 yrs)
4. Physical, mental, and social development, growth and health harmed (0-17 yrs)
5. Psychosocial, behavior and mental health, harmed (6-17 yrs)
6. Child health related quality of life; perceived functionality, efficacy and “happiness/satisfaction,” reduced (6-17 yrs)
7. Some, not yet clear associations with obesity (0-17 yrs)

A Framework for Considering Economic Costs of Food Insecurity

Human Capital Theory (Becker, 1962, 1975, 1994)

1. Every individual is born with a particular human capital endowment comprised of their genetic material as expressed in interaction with the environments in which they grow and develop.
2. From conception until death, each person undergoes a continuous process of human capital formation and destruction through growth, development, education, experience. Health is a form of human capital.

COSTS OF FOOD INSECURITY: YOUNG CHILDREN

- At different life stages (prenatal, ages 0-3) & at varying levels (household), food insecurity works through biological processes like:
 - (Prenatal) Low birthweight, birth defects
 - (Early life) Social/emotional problems, iron-deficiency anemia, impaired immune function
 - (Household) Poor child feeding practices, maternal depression

COSTS OF FOOD INSECURITY: YOUNG CHILDREN

- Ultimately influencing increased mortality, cognitive delays, infection/illness, decreased parent work attendance/performance to cost society:
 - Lost/decreased human capital
 - Increased special education
 - Increased medical costs, including mental health and hospitalization
- Some processes are cyclical:
 - Poor health → underweight → decreased immune function → poor health etc.

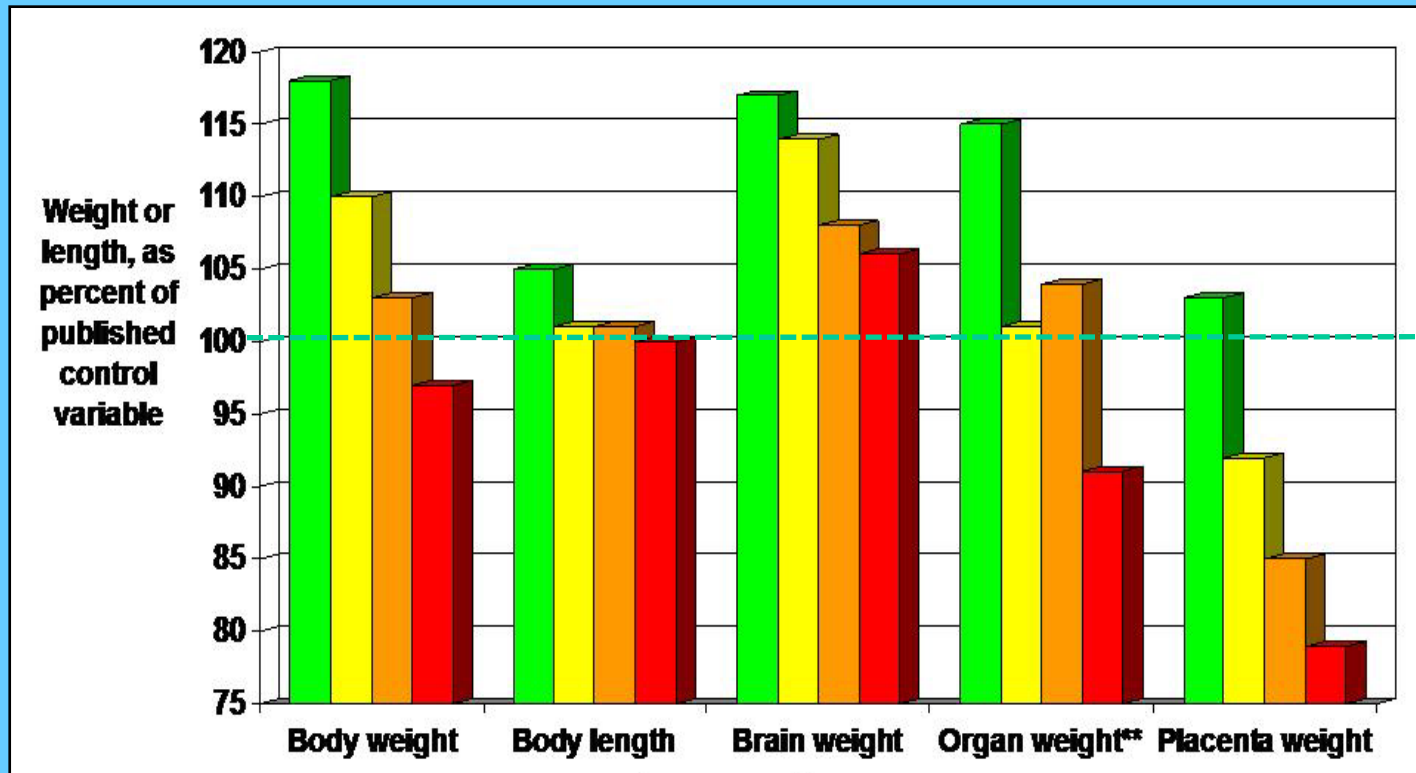
Food Insecurity and Low Birthweight: Costs versus Benefits

1. Overall fetal growth is significantly influenced by maternal nutrient intake.
2. Black et. al. (2005) show that a 10 percent increase in birthweight reduces 1-year mortality by approximately 28 deaths per 1,000 births.
3. Maternal WIC participation during pregnancy results, on average, in 7.5% increase in infant birthweight (Kowaleski-Jones 2002).
4. WIC participation among eligible pregnant women reduces 1-year mortality rates (compared to women who did not receive WIC) by approximately 21 deaths per 1,000 births.

Food Insecurity and Low Birthweight: Costs versus Benefits (cont'd.)

- Even individuals with less than a ninth grade education will have a lifetime earnings over \$415,000 to contribute to the nation's economy
- **Losing 21 babies – even if they only get minimal education - is more costly, in lifetime economic terms, than paying for WIC for their pregnant mothers for one year.**

Poor Maternal Nutrition Leads to Poor Fetal Growth



100% = control variable value; average for infants born to normal-weight women with normal gestational weight gain

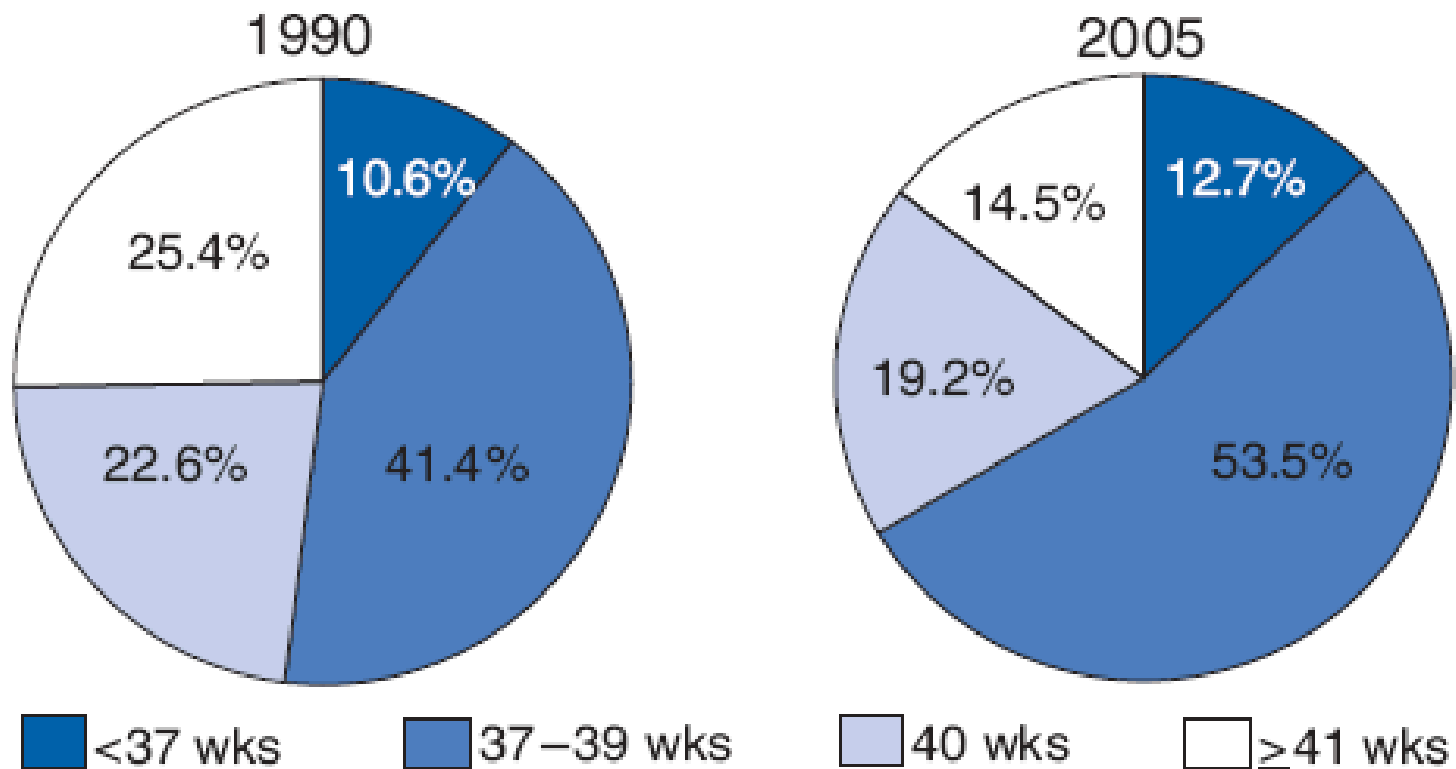
Nutritional Categories:

- Overweight women with high gestational weight gain
- Underweight women with high gestational weight gain
- Overweight women with low gestational weight gain
- Underweight women with low gestational weight gain

**Organ weight represents average of thymus, heart, lungs, spleen, liver, adrenals, and kidney weights.

Data from Naeye, "Effects of maternal nutrition on the human fetus"

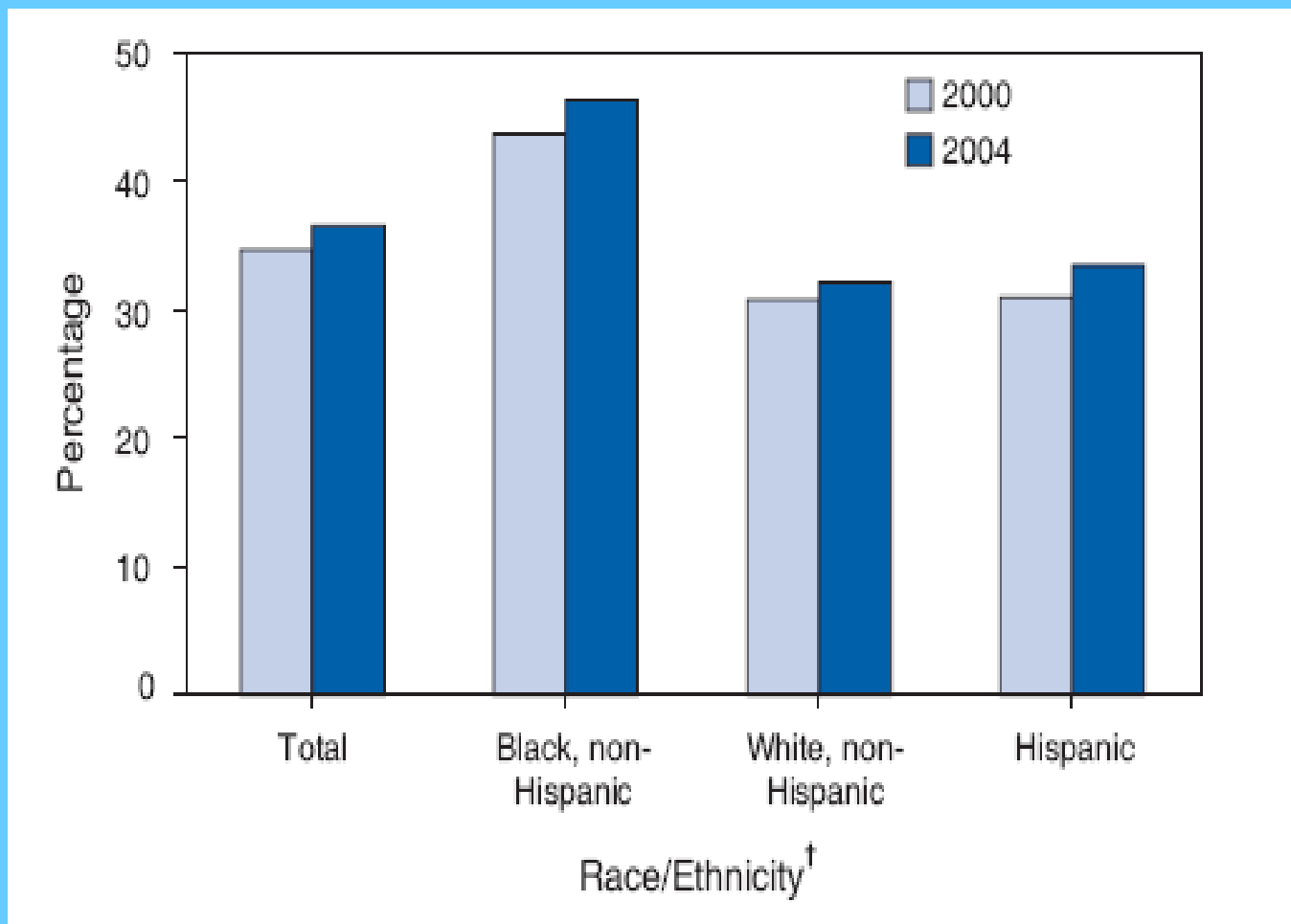
Distribution of Births, by Gestational Age --- United States, 1990 and 2005



SOURCE: National Vital Statistics System. Births: preliminary data for 2005. Available at

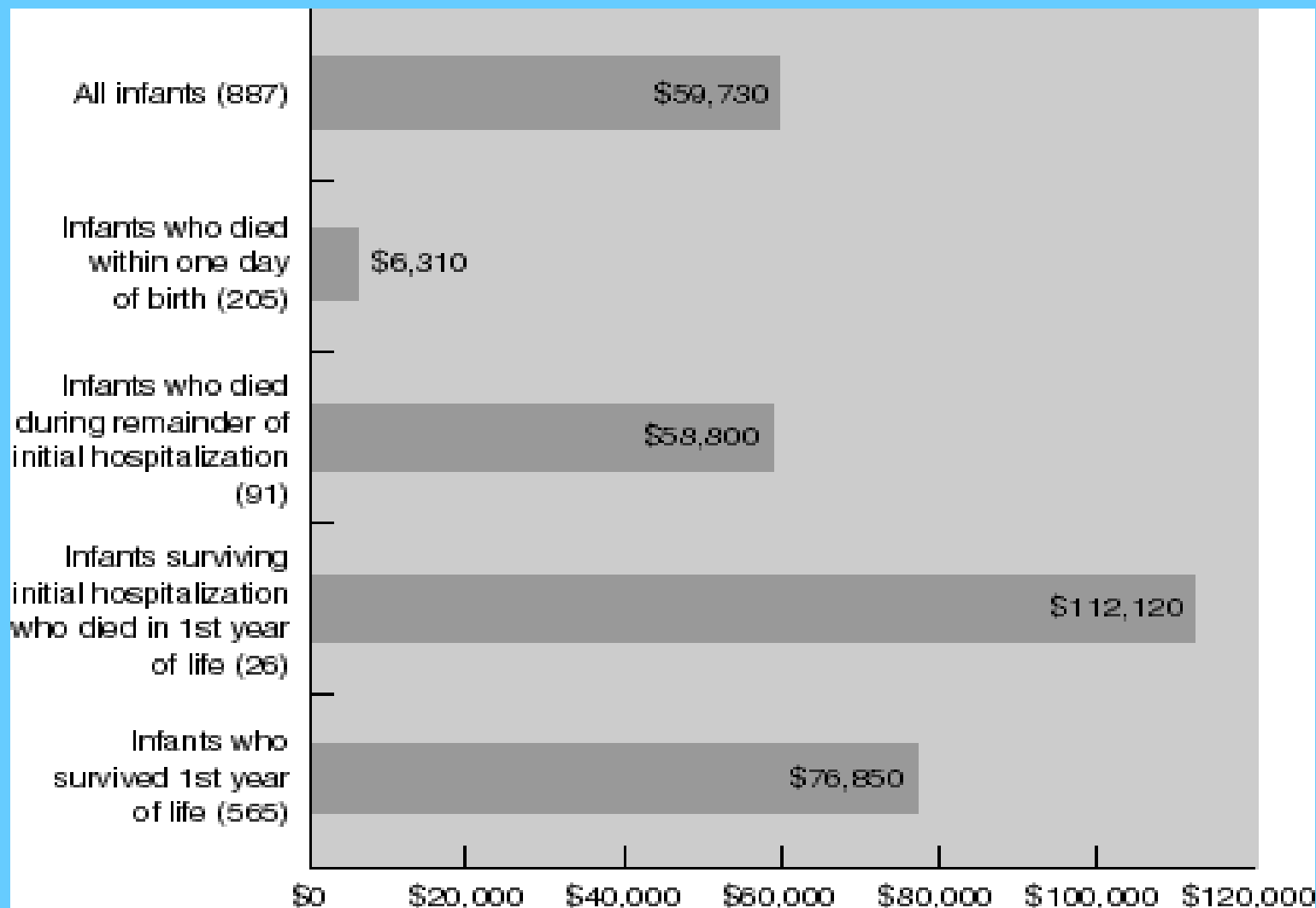
<http://www.cdc.gov/nchs/products/pubs/pubd/hestats/prelimbirths05/prelimbirths05.htm>

Percentage of Infant Deaths from Preterm-Related Causes,* by Race/Ethnicity --- United States, 2000 and 2004



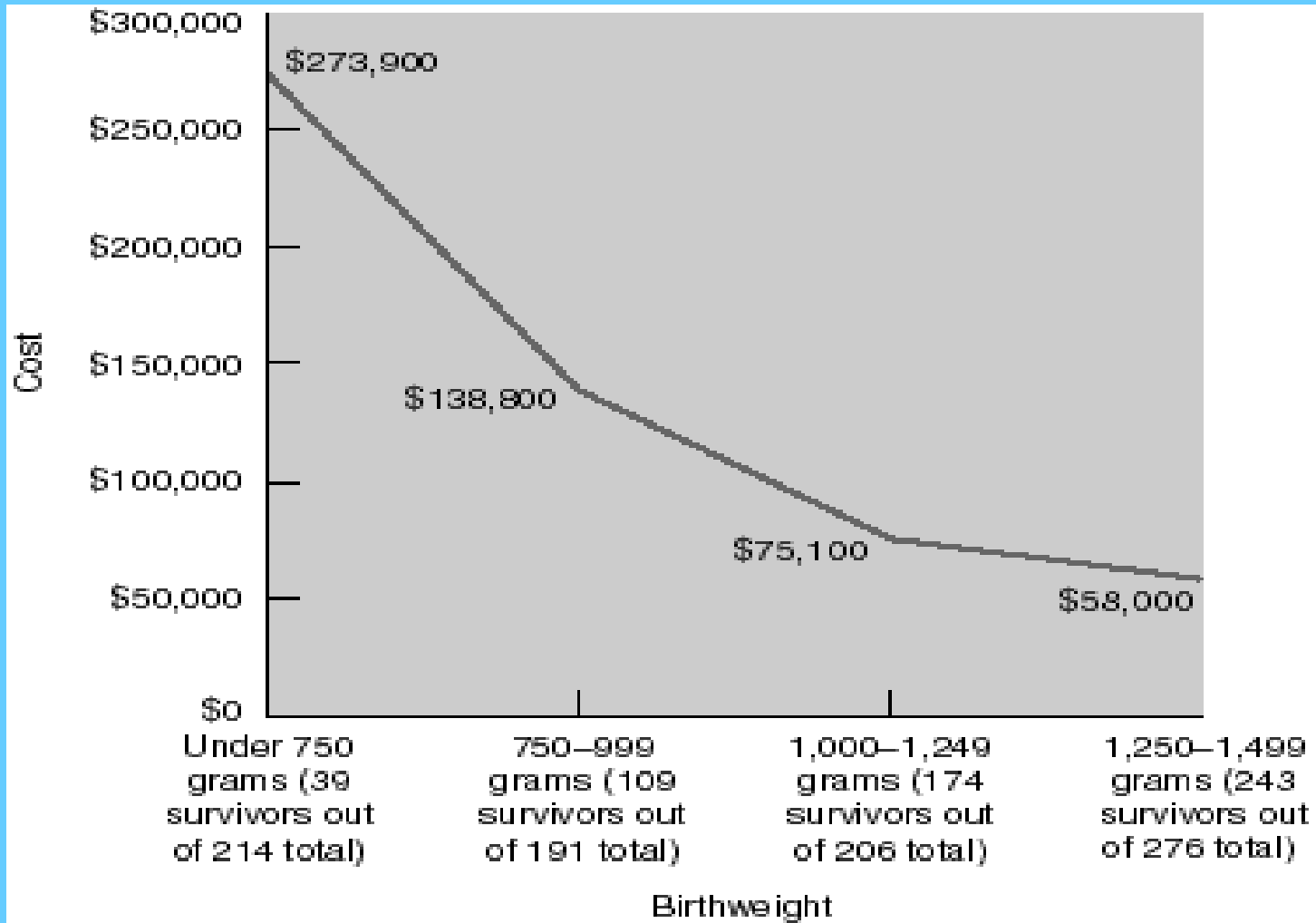
SOURCE: MacDorman MF, Callaghan WM, Mathews TJ, Hoyert DL, Kochanek KD. Trends in preterm-related infant mortality by race and ethnicity: United States, 1999--2004. Hyattsville, MD: US Department of Health and Human Services, CDC, National Center for Health Statistics; 2007. Available at <http://www.cdc.gov/nchs/products/pubs/pubd/hestats/infantmort99-04/infantmort99-04.htm>.

Average Cost of Caring for Very Low Birthweight Infants During Their First Year of Life



SOURCE: RAND, Preventing Very Low Birthweight Births: A Bundle of Savings, 1998.

Cost-Effectiveness of Treating Very Low Birthweight Infants Improves with Higher Birthweights



NOTE: Costs are in constant 1987 dollars, rounded to the nearest hundred.

SOURCE: RAND, Preventing Very Low Birthweight Births: A Bundle of Savings, 1998.

THANK YOU
FOR YOUR ATTENTION

