

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

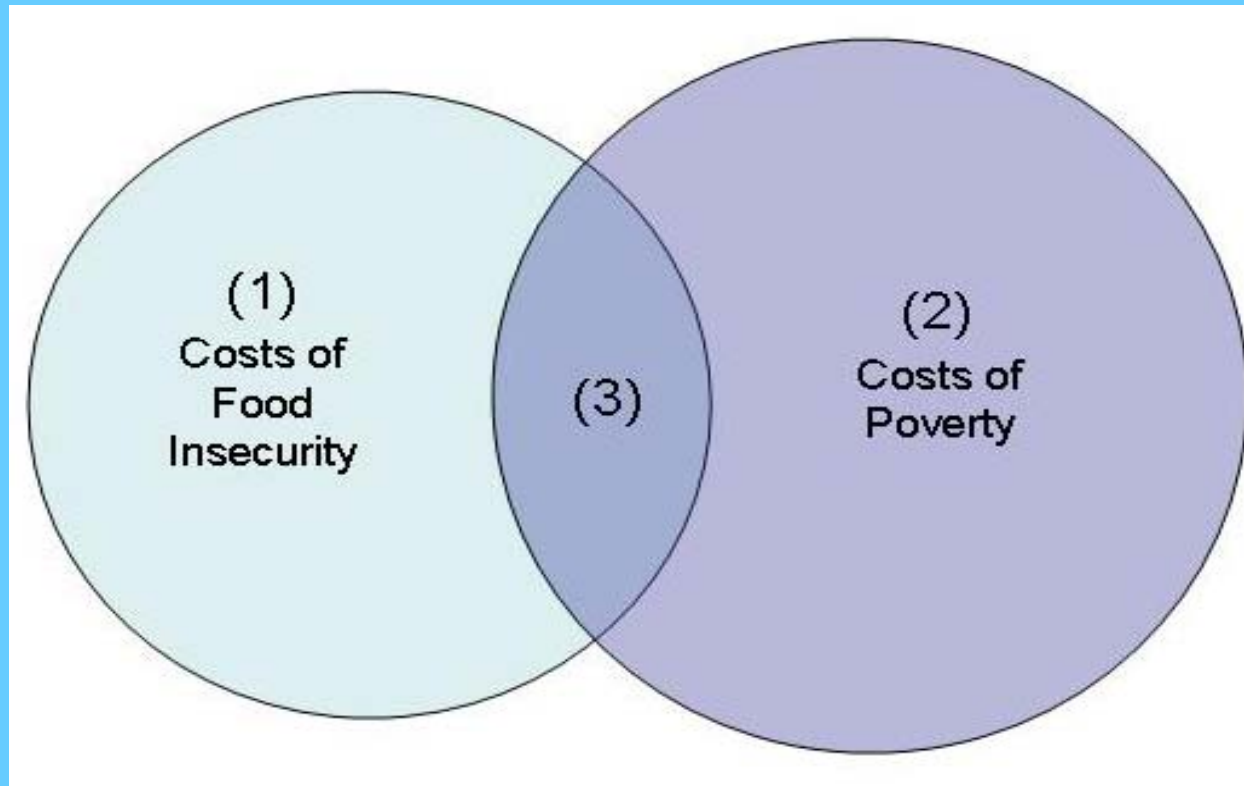


# What is Food Security?

## A Measure of the Adequacy of Food Resources

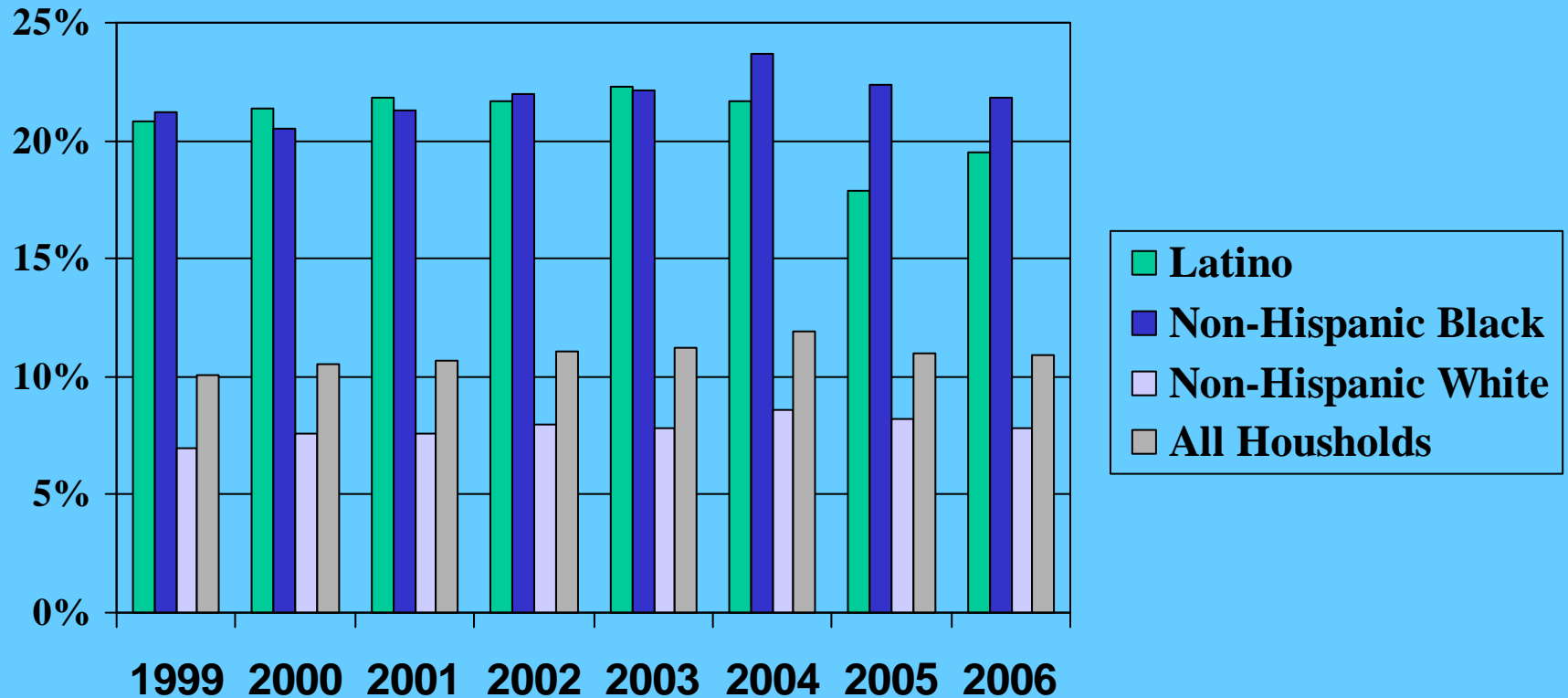
- Conceptual Definition: “Food security—access by all people at all times to enough food for an active, healthy life—is one of several conditions necessary for a population to be healthy and well nourished.” (*Household Food Security in the United States, 2005 / ERR-29* Economic Research Service/USDA)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

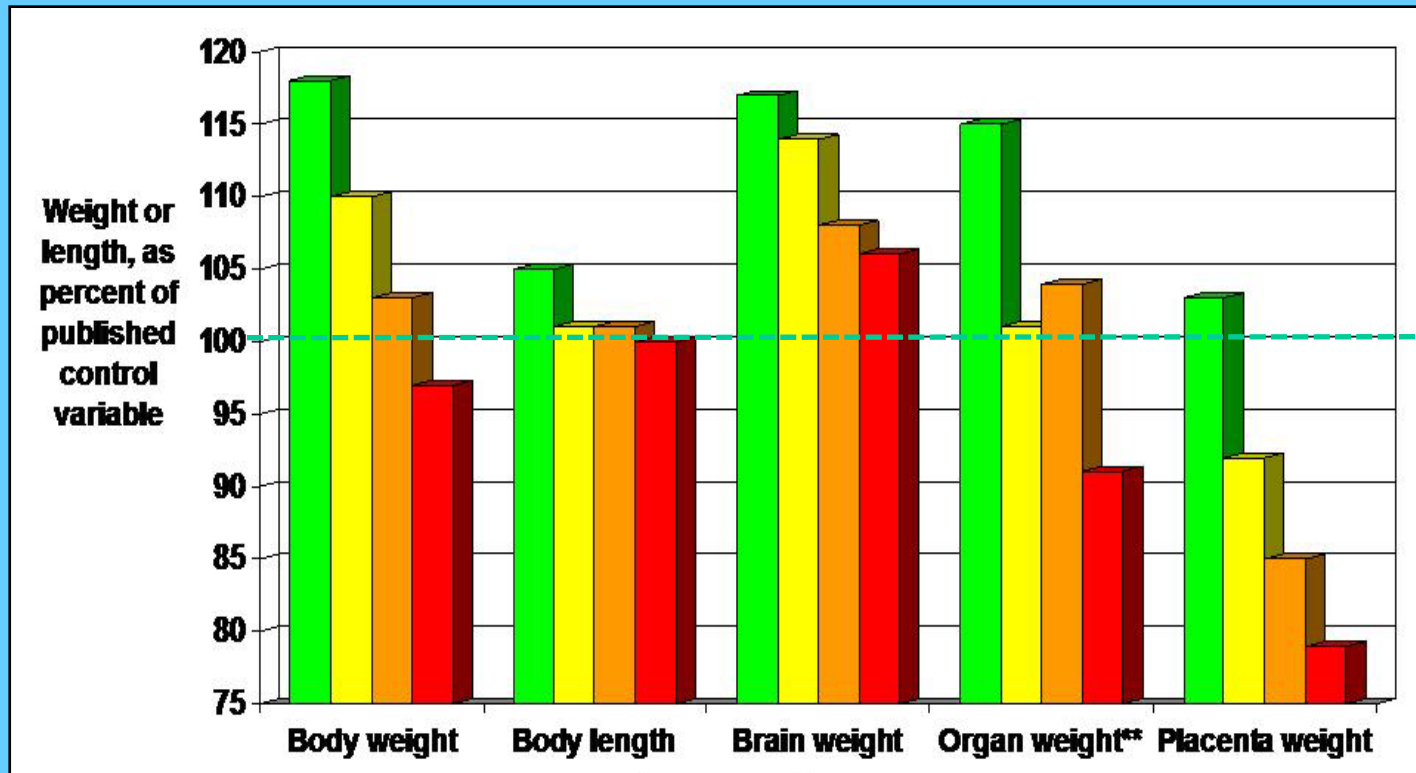
# **Food Insecurity and Low Birthweight: Costs versus Benefits**

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

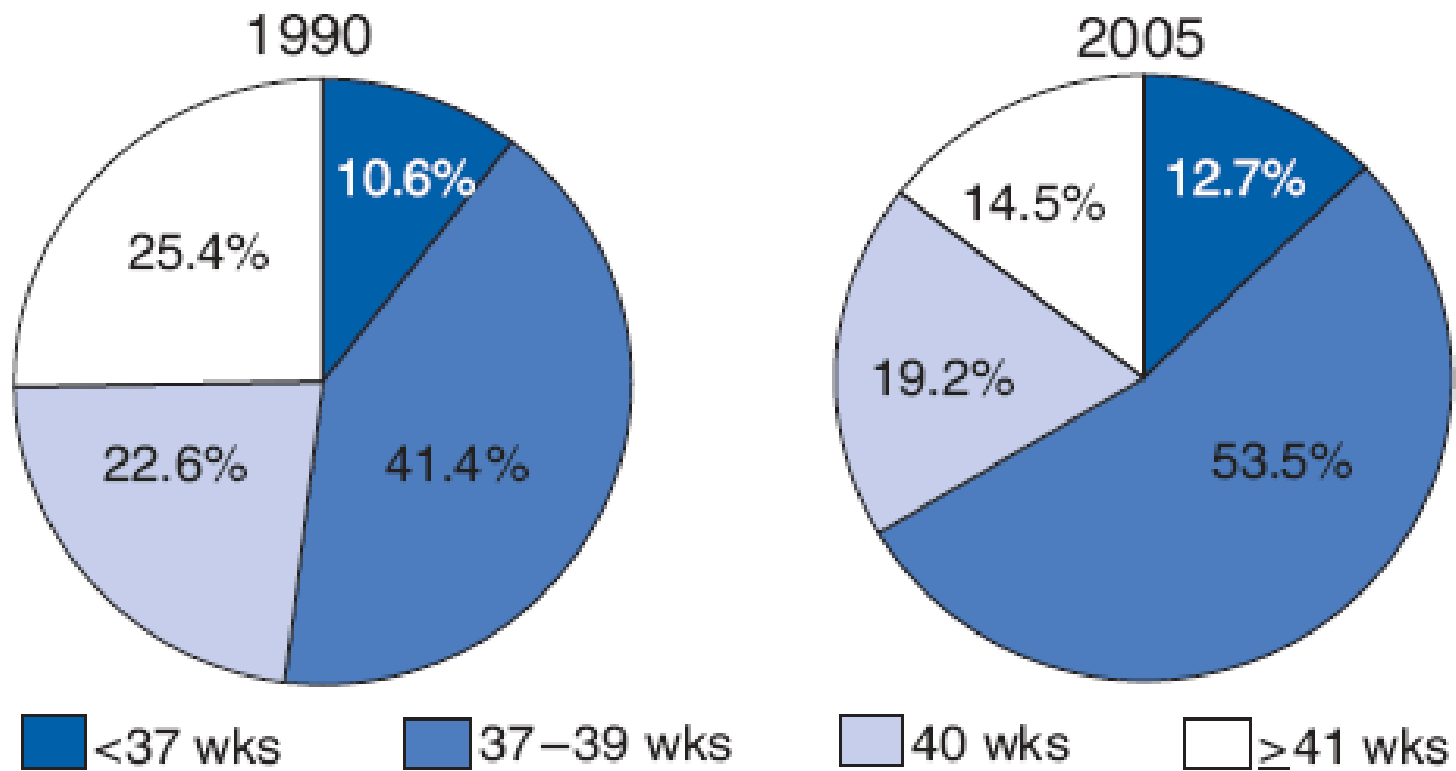
## Nutritional Categories:

- 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"

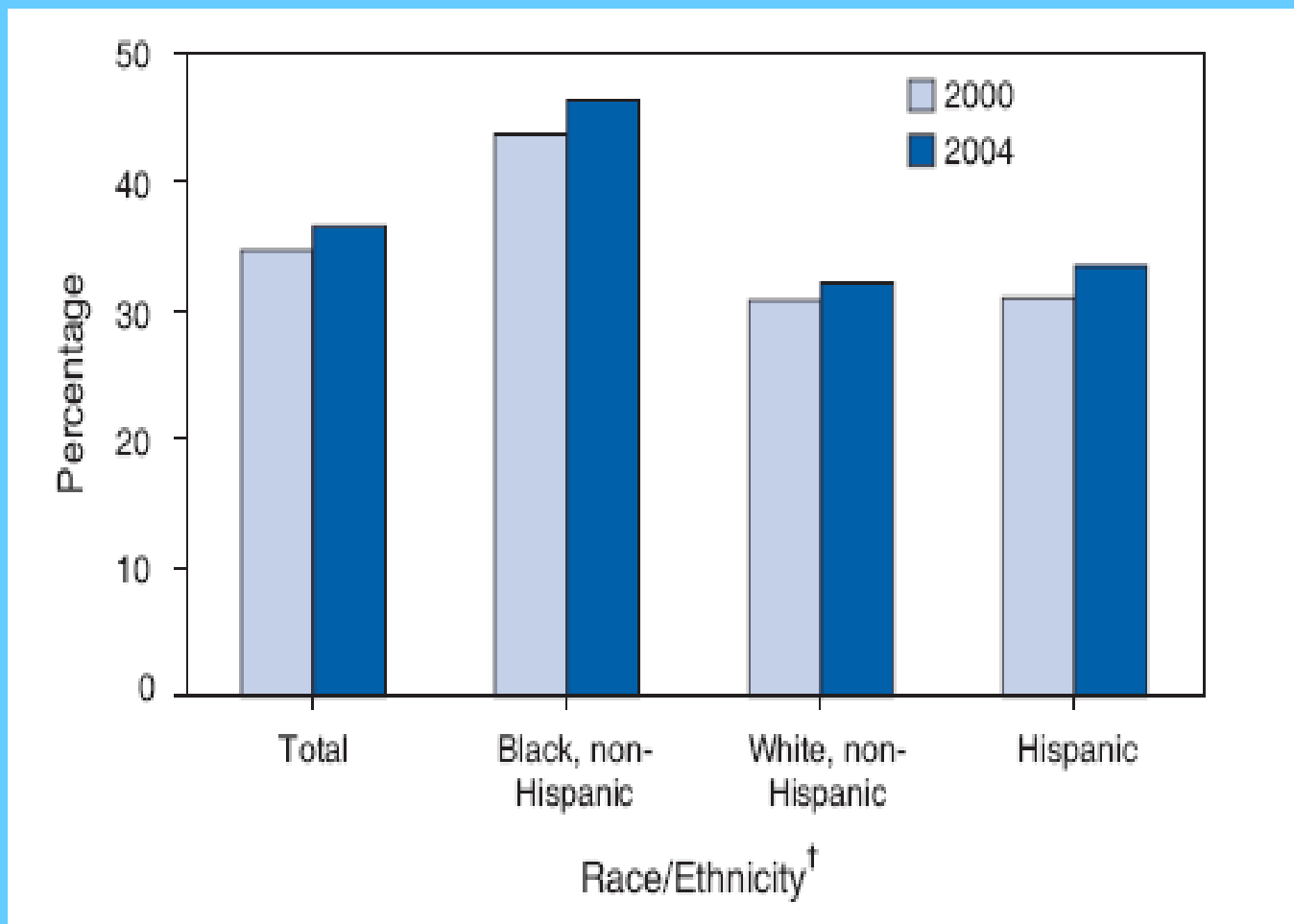
# Distribution of Births, by Gestational Age --- United States, 1990 and 2005



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

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

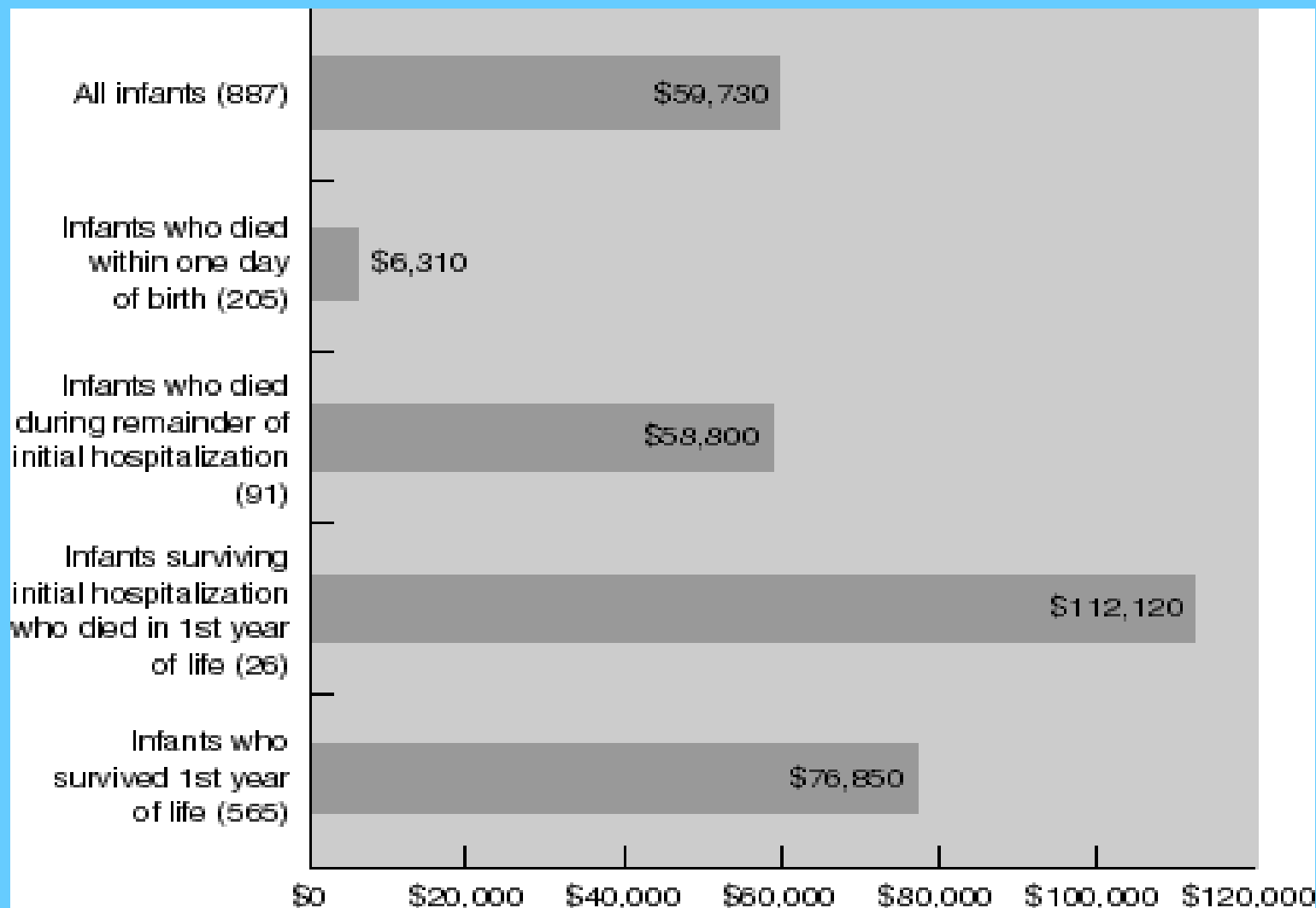
# Percentage of Infant Deaths from Preterm-Related Causes,\* by Race/Ethnicity --- United States, 2000 and 2004



**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>.

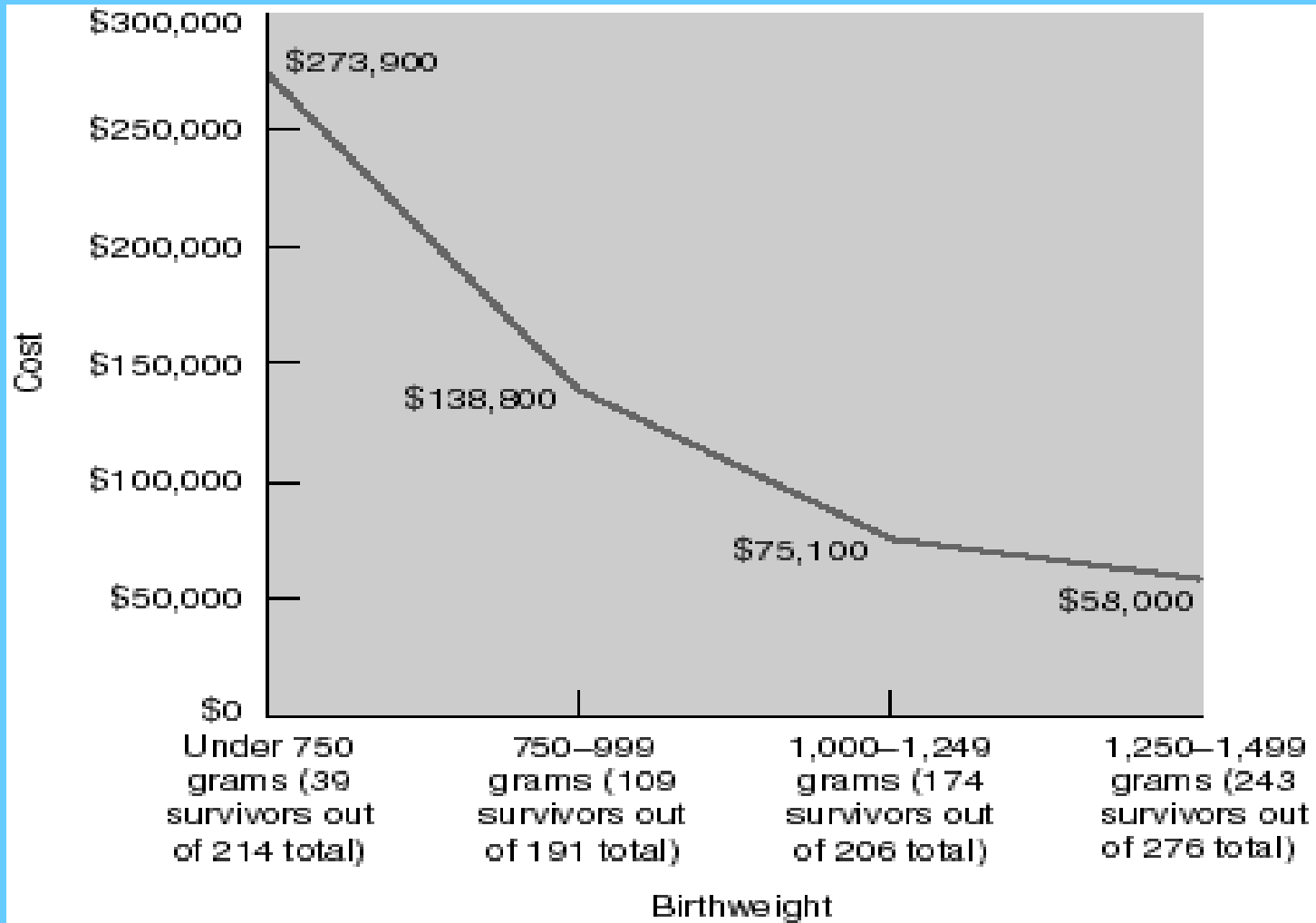


# Average Cost of Caring for Very Low Birthweight Infants During Their First Year of Life



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

