Infant Mortality: National Opportunities for Prevention

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Secretary's Advisory Committee on Infant Mortality
March 8, 2012

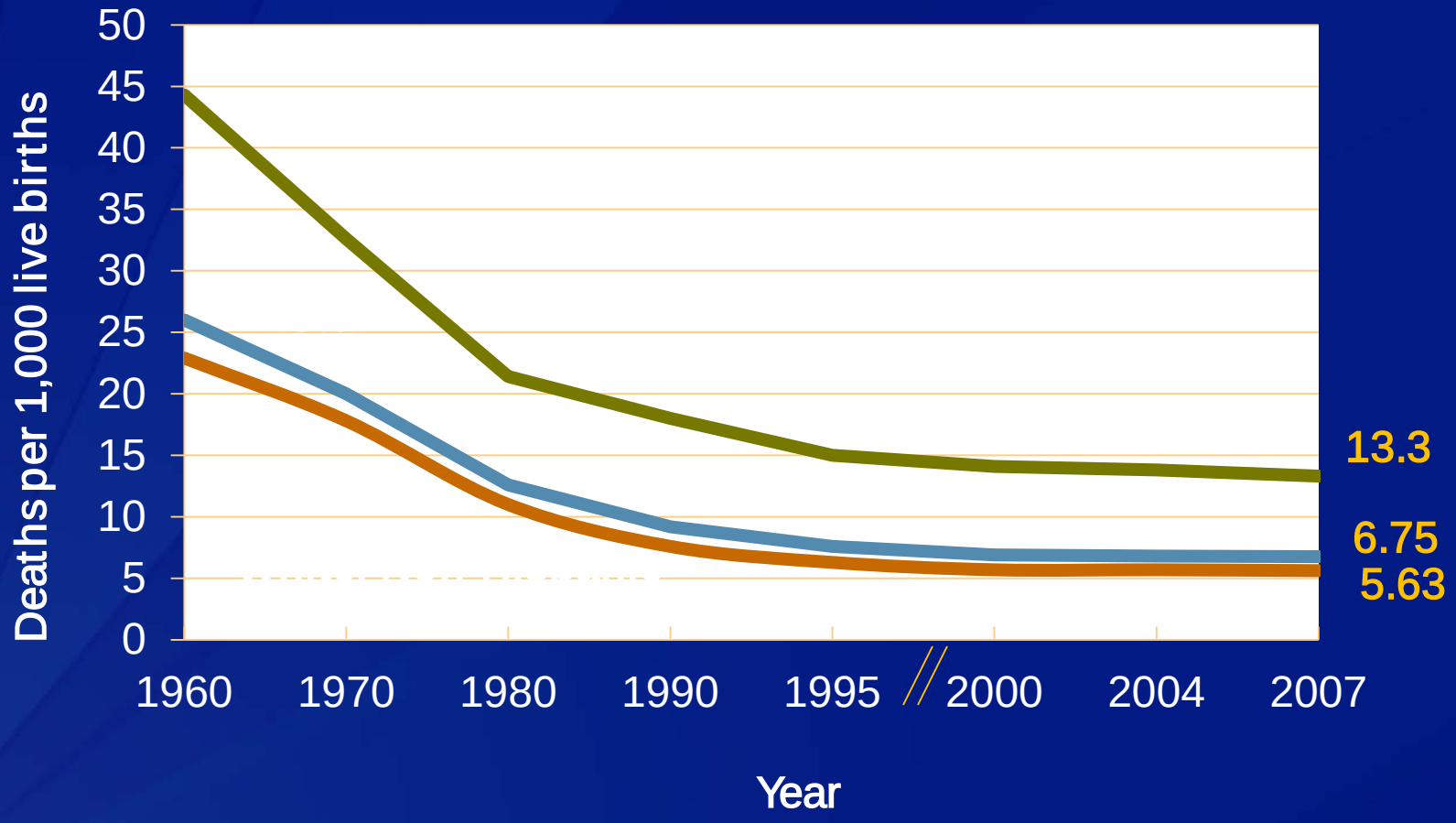
National Center for Chronic Disease Prevention and Health Promotion
Division of Reproductive Health

Outline

- The problem of infant mortality
- Tackling Infant Mortality: Maternal health, community health, and social determinants
  - CDC's public health approach for impact through community-based prevention efforts
- What can we do together to address infant mortality?

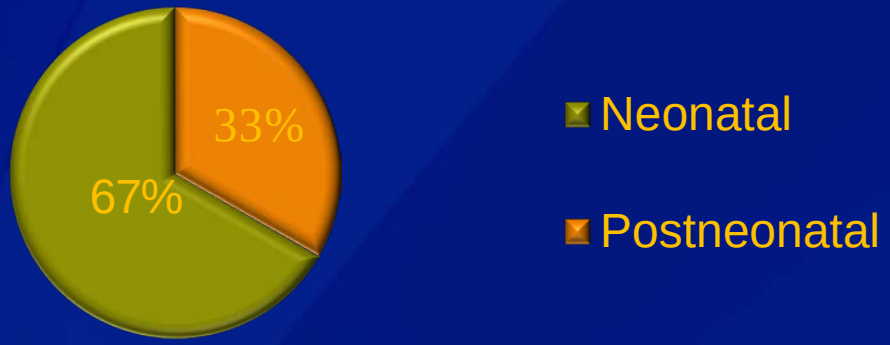
The Problem of Infant Mortality

Persistent Racial Disparity in U.S. Infant Mortality Rate 1950-2007



NCHS National Vital Statistics Reports

Timing of Infant Death



Neonatal (<28 days)

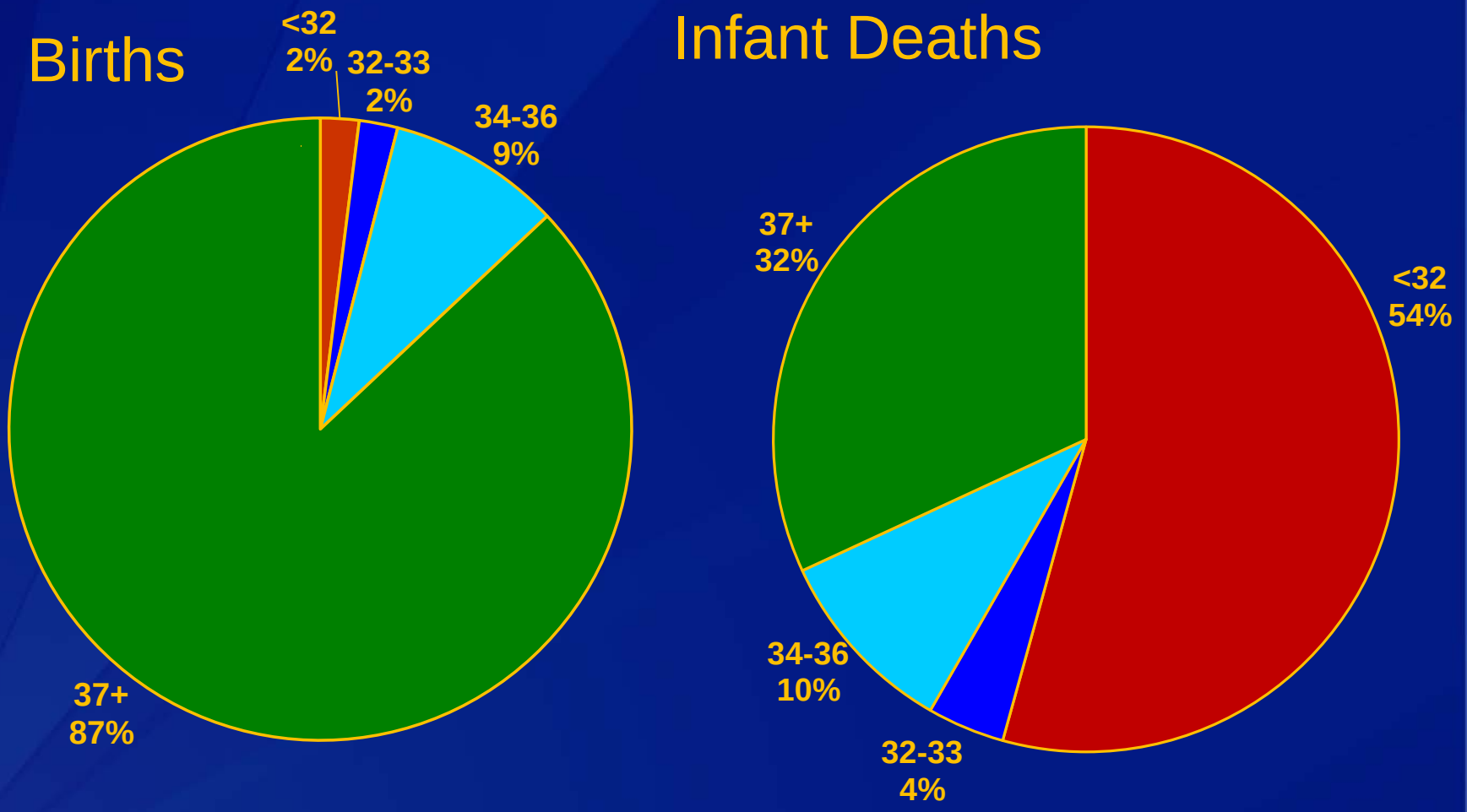
- 2/3 of all deaths
- Drivers: preterm, birth defects, maternal/ newborn health, risk-appropriate care
- Moderately preventable given current knowledge

Postneonatal (28-364 days)

- 1/3 of all deaths
- Drivers: SIDS/SUID, injury, infection
- Highly preventable with current knowledge

The Contribution of Preterm Birth to Infant Mortality

Percent of Live Births and Infant Deaths by Weeks of Gestation, US, 2007



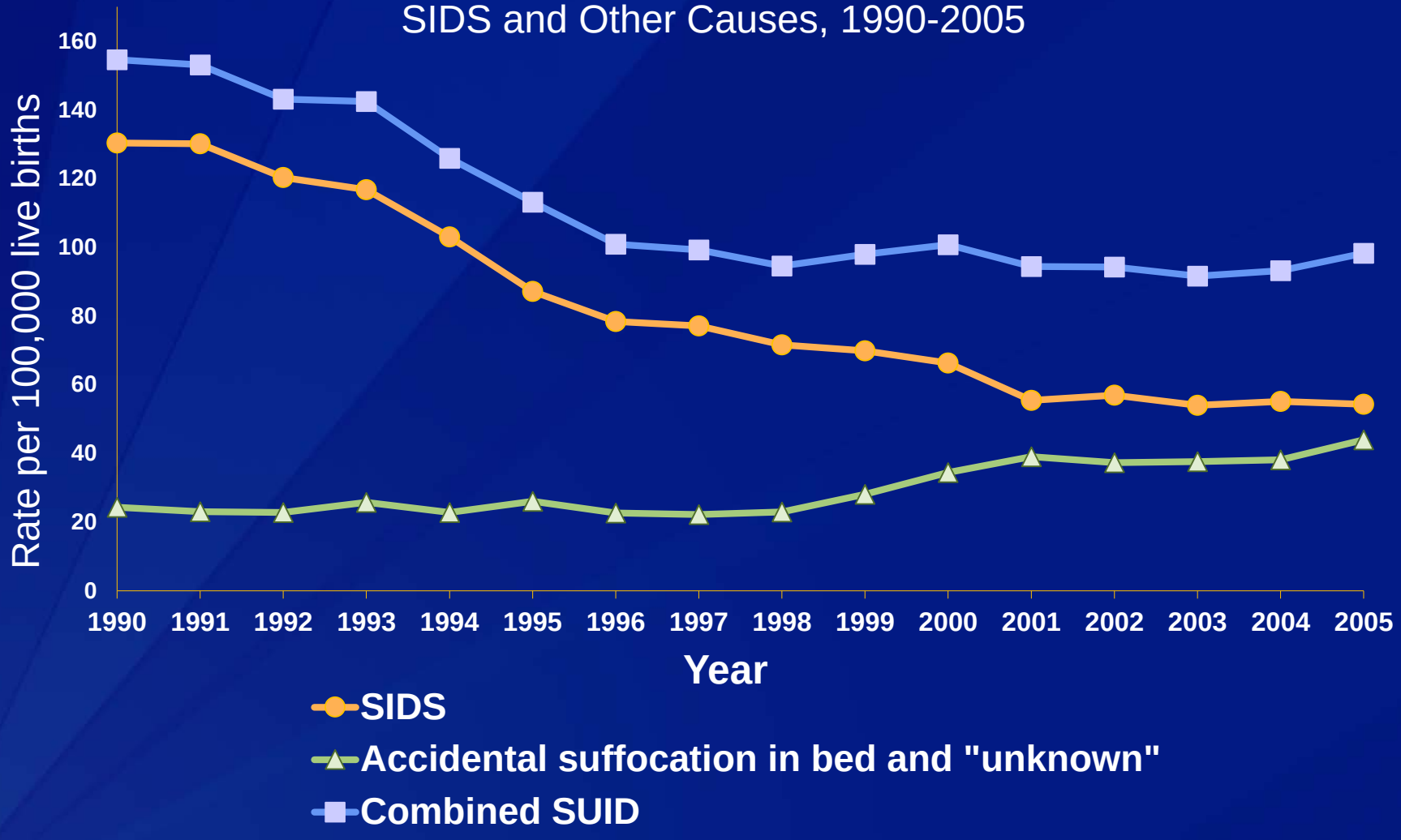
Source: NCHS, linked birth/infant death data set

The Contribution of SIDS/SUID to Infant Mortality

- About 4200 SUID cases/year
- Most frequently reported causes:
  - SIDS (leading cause of postneonatal mortality)
  - Unknown/undetermined cause (UNK)
  - Accidental suffocation &strangulation in bed (ASSB)
    - leading cause of infant injury mortality
    - potentially preventable
- Less frequent reported causes:
  - Infantcide/intentional suffocation, inborn errors of metabolism, cardiac channelopathies, infection

Shapiro-Medoza et al, *Pediatrics* 2009, Kinney et al, *NEJM,* 2009

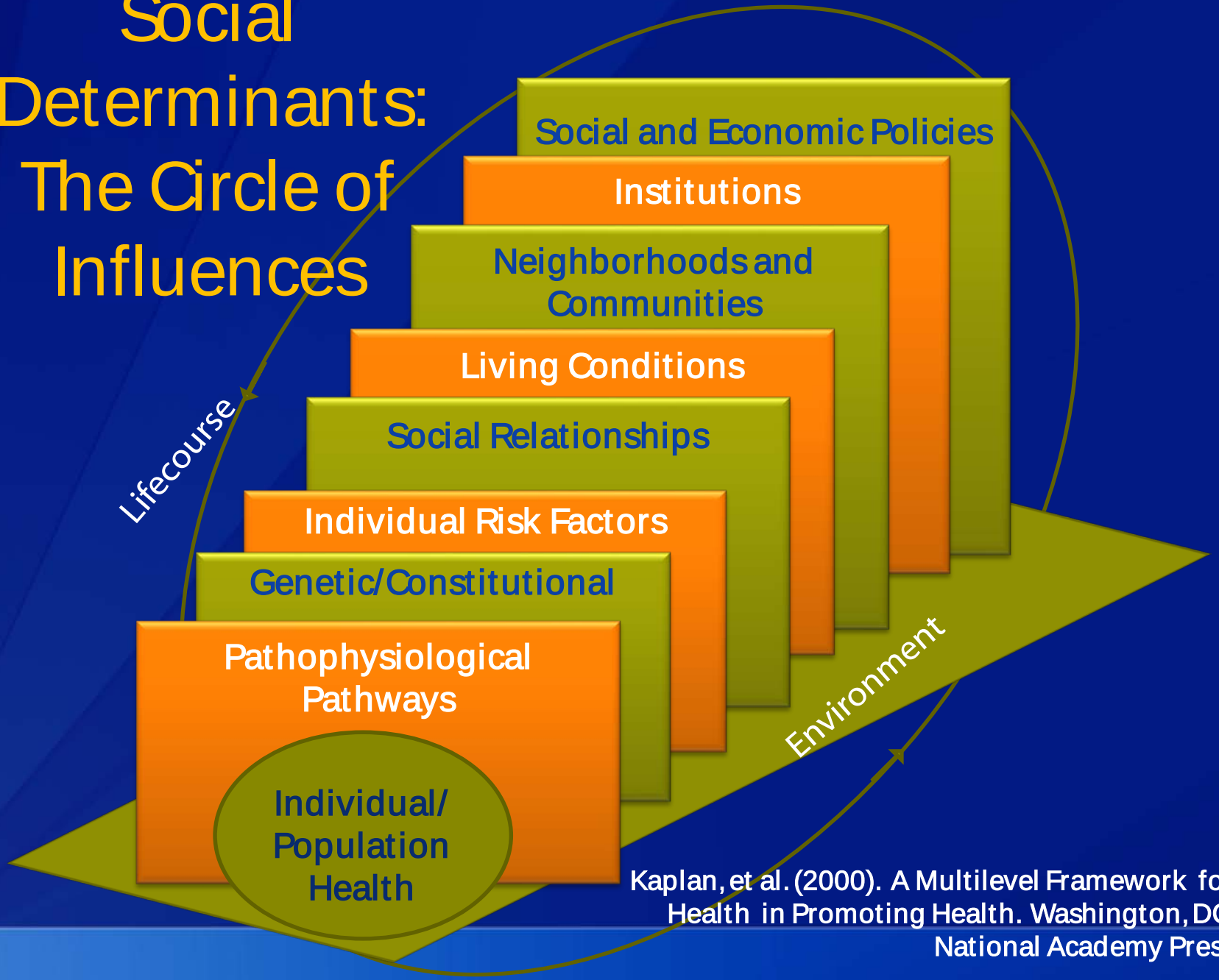
Sudden Unexpected Infant Deaths (SUID):



Source: CDC WONDER, Mortality Files

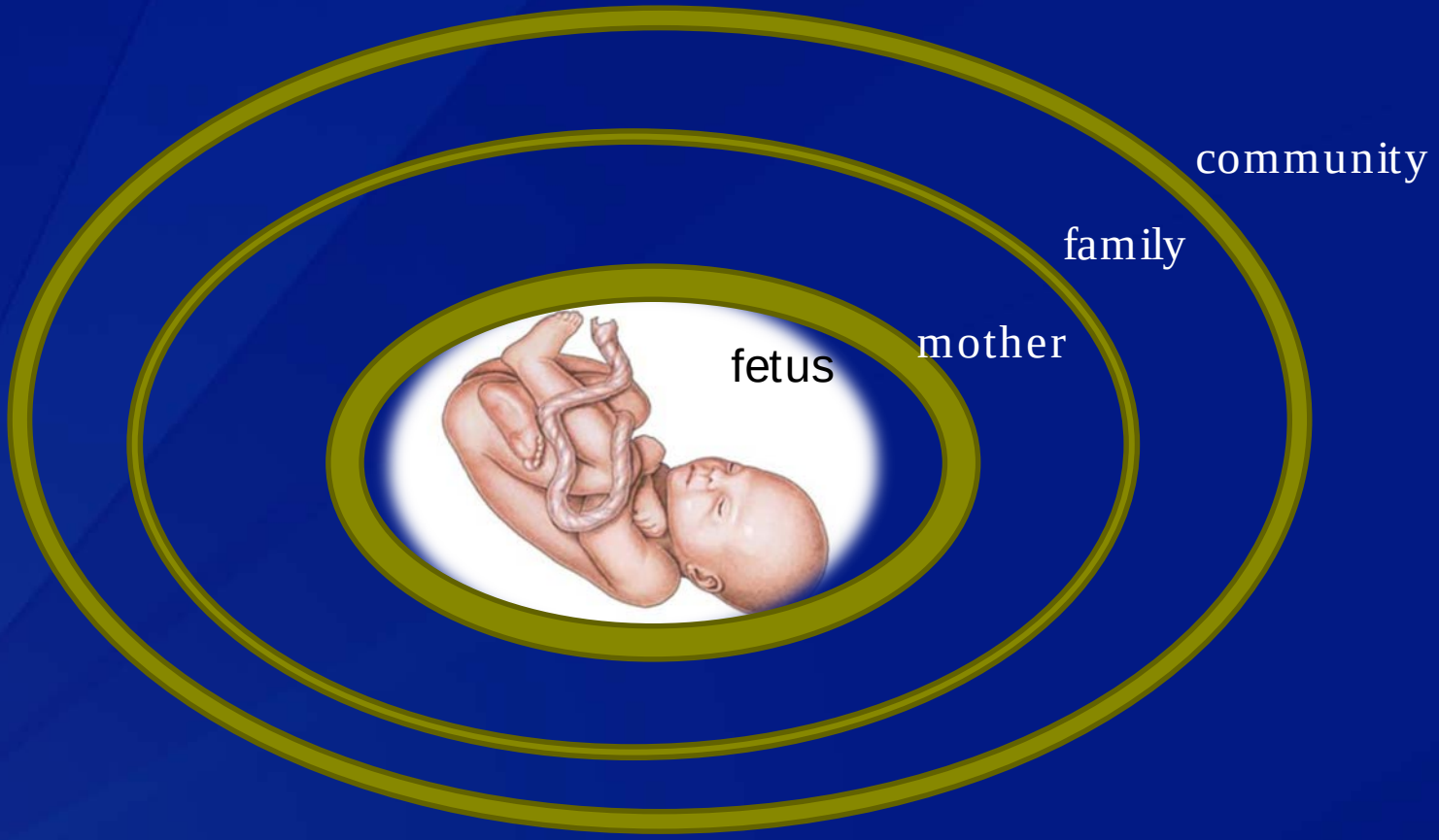
Tackling Infant Mortality

Social Determinants: The Circle of Influences



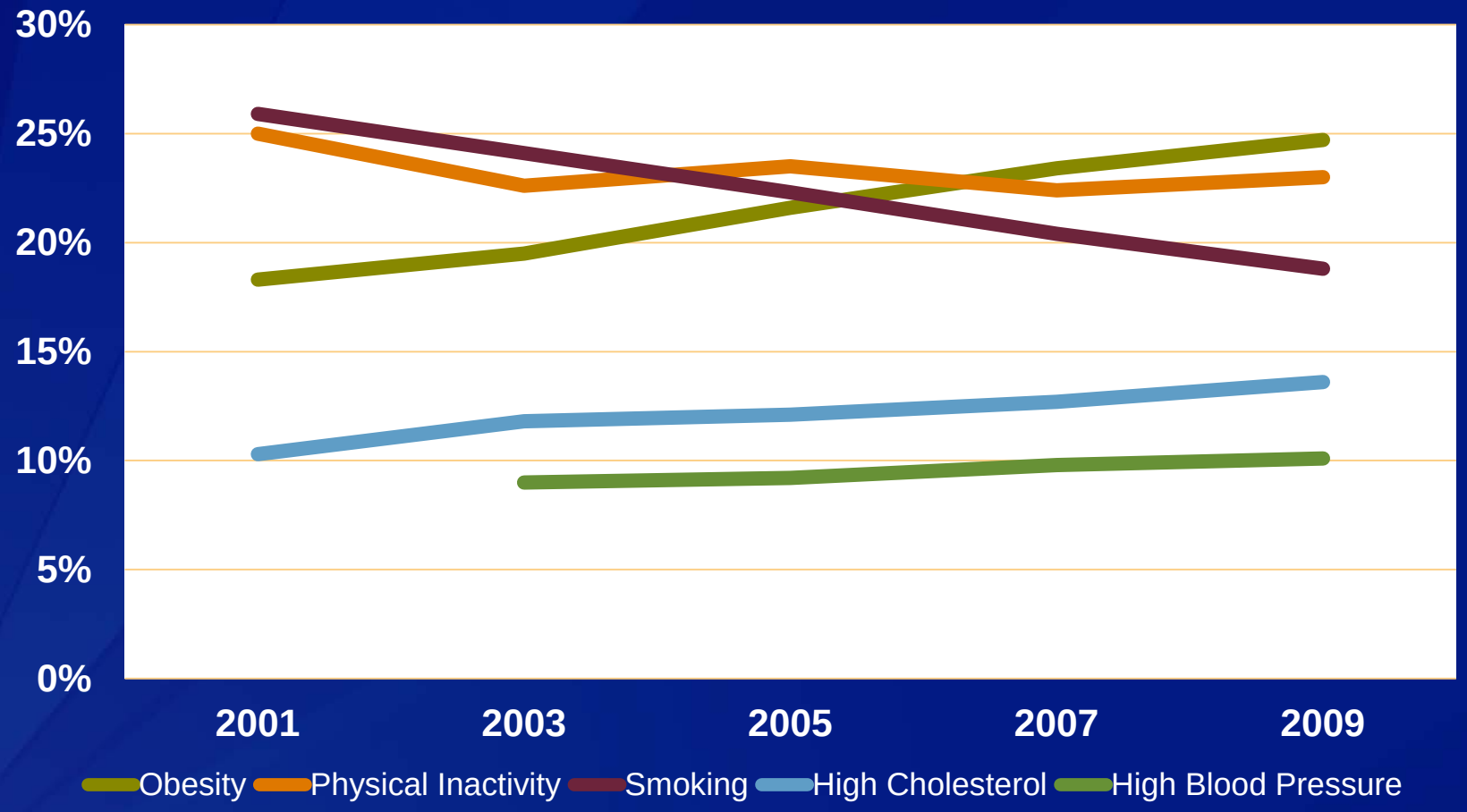
Kaplan, et al. (2000). A Multilevel Framework for Health in Promoting Health. Washington, DC: National Academy Press

Social Determinants : The Circle of Influences on the Fetus/Infant



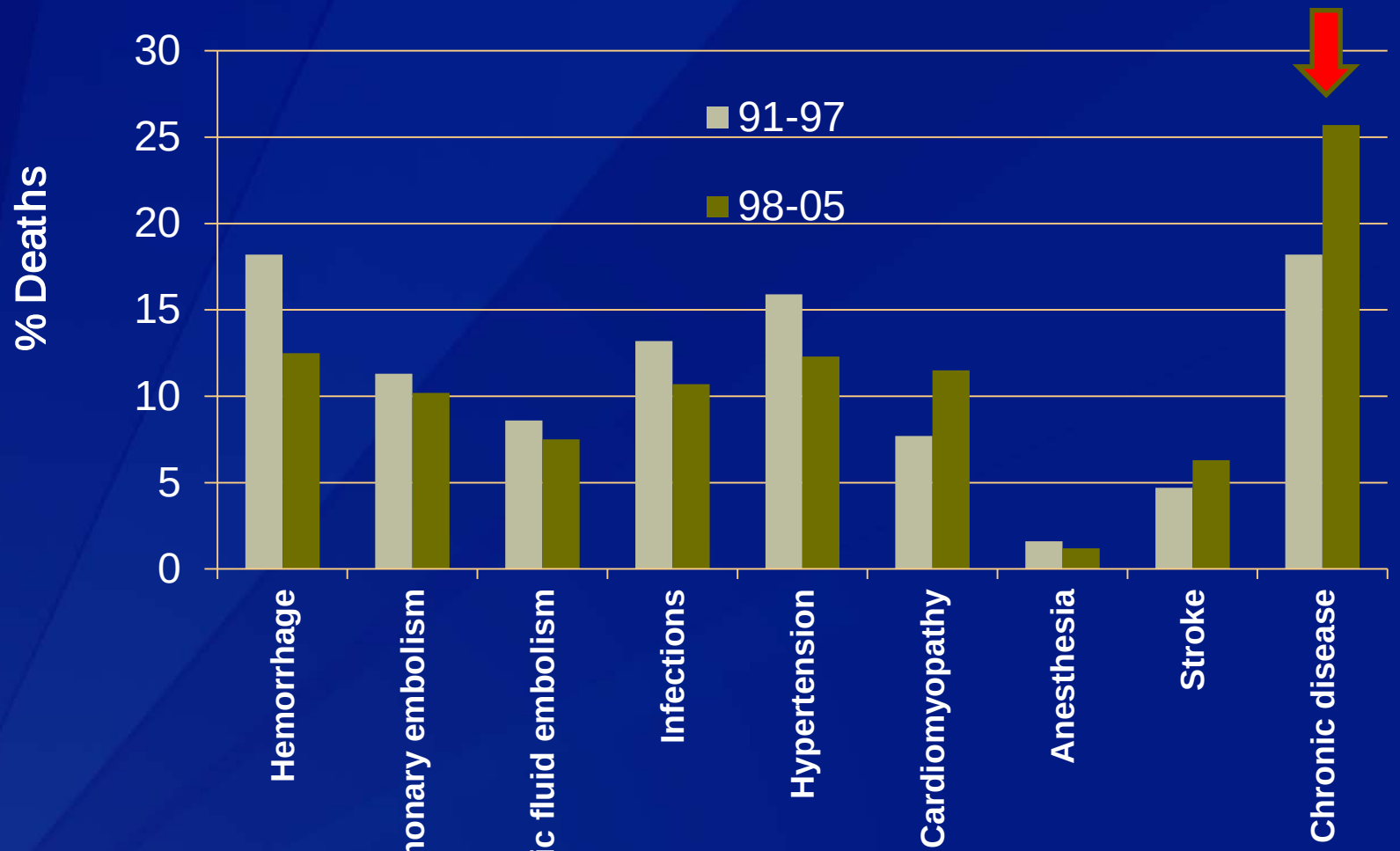
Declining Health of Women of Reproductive Age

Prevalence of Risk Factors and Chronic Conditions, By Year, Among Adult Women of Reproductive Age, BRFSS, 2001-2009



Hayes DK, et al. *Prev Chronic Dis,* 2011

Causes of Pregnancy Related Deaths, U.S.



Berg et al. *Obstet Gynecol, 2010*

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF LABOR,
CHILDREN'S BUREAU,
Washington, September 25, 1916.

SIR: I transmit herewith a report entitled "Maternal Mortality from all Conditions Connected with Childbirth in the United States and Certain Other Countries," by Dr. Grace L. Meigs, in charge of the hygiene division of this bureau. This report has been prepared because the bureau's studies of infant mortality in towns and rural districts reveal a connection between maternal and infant welfare so close that it becomes plain that infancy can not be protected without the protection of maternity.

of maternity. She points out clearly that maternal mortality is in great measure preventable, that no available figures show a decrease in the United States in recent years, and that certain other countries now exhibit more favorable rates. This report reveals an unconscious neglect due to age-long ignorance and fatalism. It is earnestly be-

CDC's Division of Reproductive Health: Priority Areas

CDC's National Center for Chronic Disease Prevention and Health Promotion: Action Areas

Public Health Infrastructure

- Surveillance
- Applied research
- Capacity building /workforce

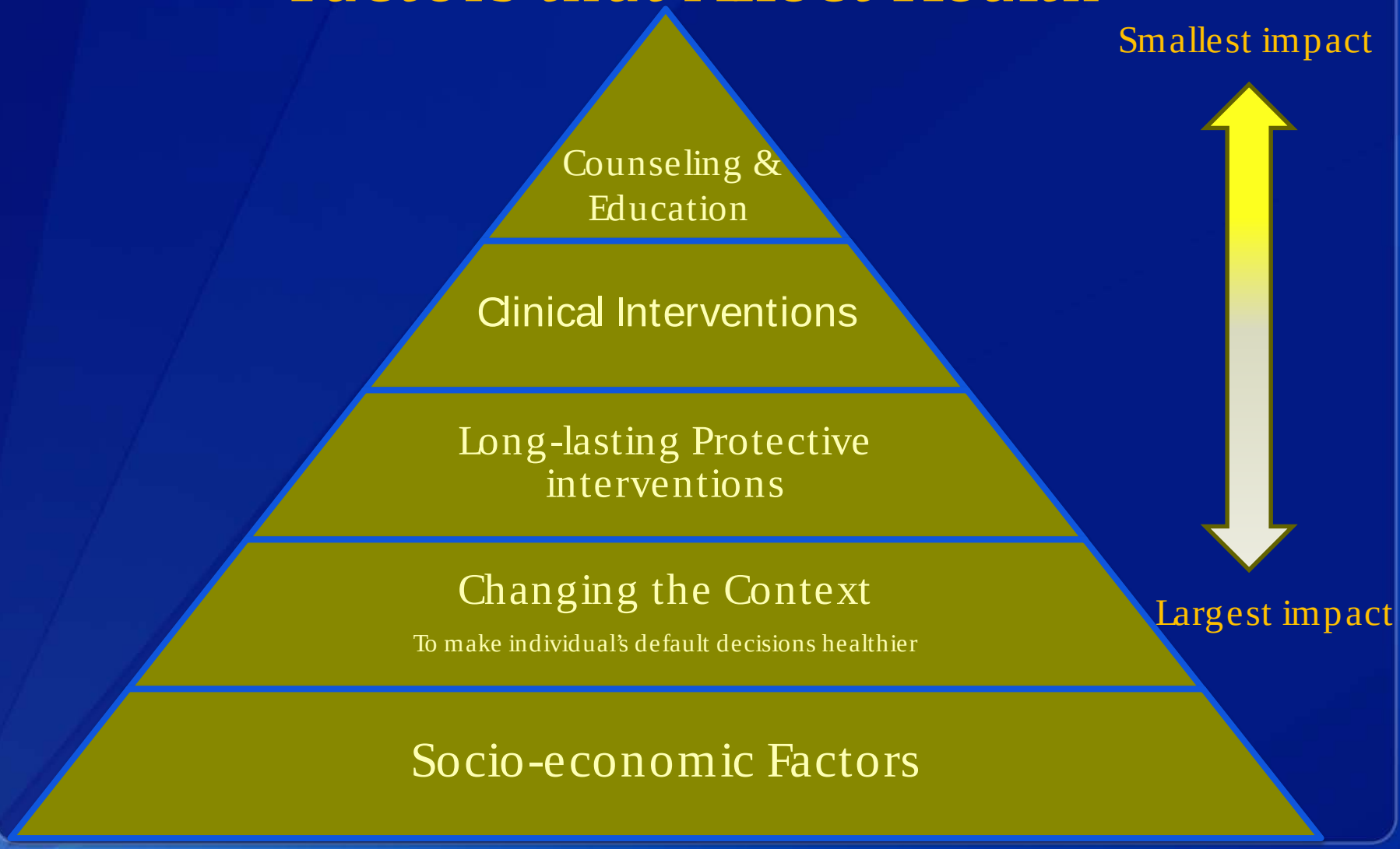
Healthy Communities

- Tobacco control
- Nutrition and physical activity
- Child and adolescent health
- Oral health
- Reproductive health

Healthy Care Environments

- Promote delivery of clinical preventive services
- Chronic disease management
- Healthy schools and work environments

CDC's Impact Pyramid: Factors that Affect Health

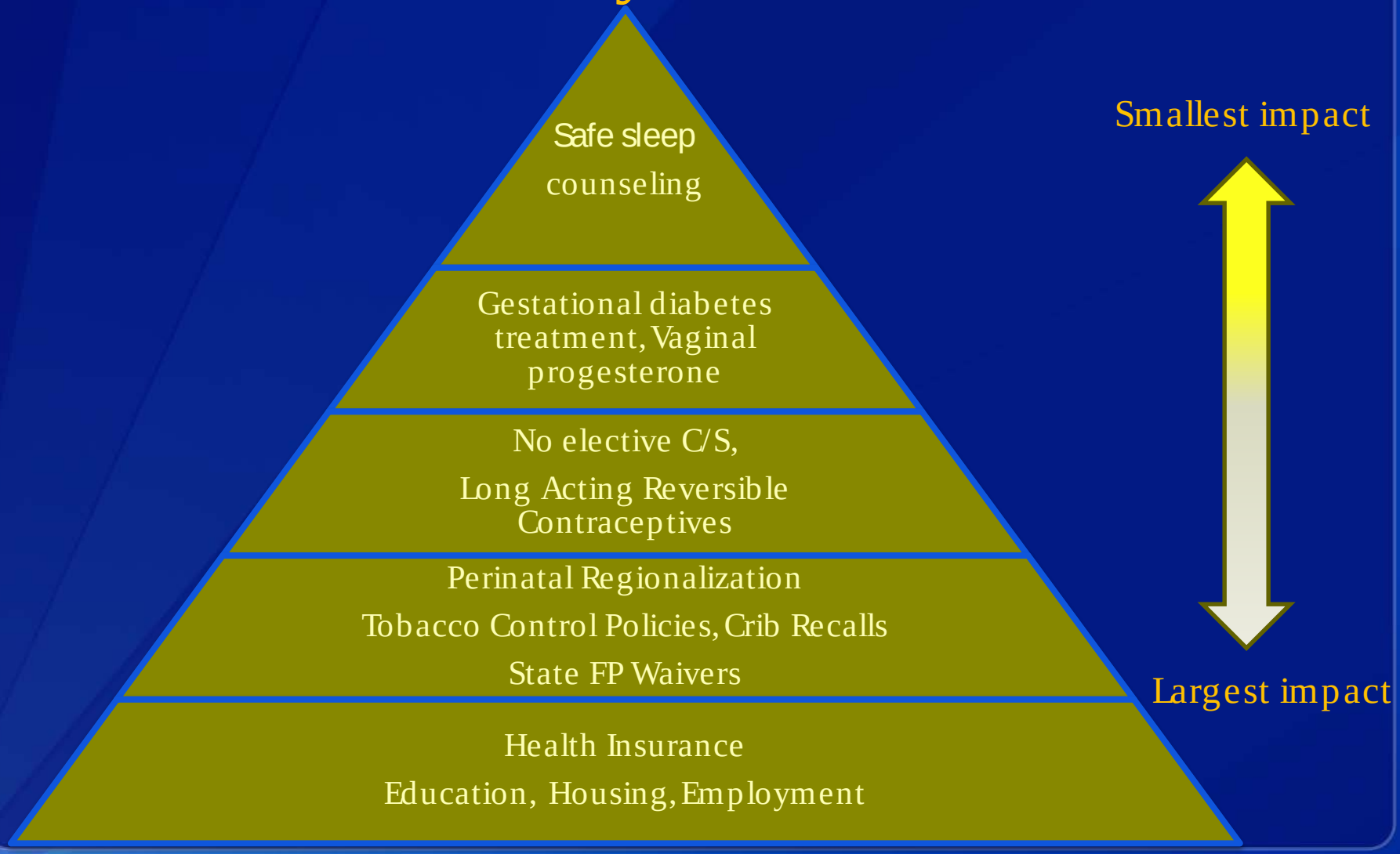


Frieden TR, *Am J Public Health*, 2009

Potential Prevention Strategies

- Improving Women's Health
  - Chronic conditions, obesity
  - Smoking
  - Preconception care
- Treatment of diabetes in pregnancy
- Long acting reversible contraception (birth spacing)
- Safe infant sleep, injury prevention
- New models of care (e.g. Centering)
- Preventing non-indicated late preterm/early term births
- Perinatal Regionalization
- Health insurance , Employment

Illustration: Impact Pyramid for Infant Mortality Prevention




What can we do together?

Use Data to Address Social Determinants

- Pregnancy Risk Assessment Monitoring System (PRAMS)
- Behavioral Risk Factor Surveillance System (BRFSS)
- State Longitudinal Data Linkage
- Perinatal Periods of Risk (PPOR)
- Maternal Mortality Surveillance System (PMSS)
- SUID Case Registry (CO, GA, MI, MN, NH, NJ, NM)
- Perinatal Collaboratives

SPECIAL ARTICLE

The Sudden Unexpected Infant Death Case Registry: A Method to Improve Surveillance

AUTHORS: Carrie K. Shapiro-Mendoza, PhD, MPH,[a] Lena T. Camperlengo, RN, MPH, DrPH(c),[b] Shin Y. Kim, MPH,[a] and Theresa Covington, MPH[b]

[a]Division of Reproductive Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia; and [b]National Center for Child Death Review, Michigan Public Health Institute, Okemos,

abstract

This article describes a multistate population-based surveillance system for monitoring sudden unexpected infant deaths (SUIDs) known as the SUID Case Registry pilot program. The pilot program represents collaboration between the Centers for Disease Control and Prevention and the ter for Child Death Review (NCCDR), which is funded by the rces and Services Administration. The SUID Case Registry sting child death review system activities and protocols. The the SUID Case Registry are to collect accurate and consis- ion-based data about the circumstances and events as- h SUID cases, to improve the completeness and quality of vestigations, and to use a decision-making algorithm with definitions to categorize SUID cases. States who participate rogram commit to review all SUID cases in their state by ultidisciplinary state and local child death review teams. request and review data from death scene investigators, iners and coroners, law enforcement, social services, pe-

PEDIATRICS®

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Improve Social Determinants in Women's Health: Preventive Services

- Clinical guidelines for contraception to:
  - Prevent unintended pregnancy
  - Provide adequate child spacing
  - Provide effective, safe treatment for women with chronic medical conditions
  - Complement pre-conception, inter-conception care

CDC Medical Eligibility Criteria for Contraceptive Use, MMWR 2010

ACOG COMMITTEE OPINION

Number 435 • June 2009

Postpartum Screening for Abnormal Glucose Tolerance in Women Who Had Gestational Diabetes Mellitus

CLINICAL OPINION www.AJOG.org

OBSTETRICS

Preventing type 2 diabetes: public health implications for women with a history of gestational diabetes mellitus

Lucinda J. England, MD, MSPH; Patricia M. Dietz, DrPH, MPH; Terry Njoroge, MPH; William M. Callaghan, MD, MPH; Carol Bruce, BSN, MPH; Rebecca M. Buus, PhD; David F. Williamson, PhD

idence that lifestyle modification can prevent or delay the
betes mellitus in high-risk individuals. Women with gestational
ncreased risk for type 2 diabetes and so are candidates for
review literature on type 2 diabetes risk in women with
line current recommendations for postpartum and long-term
findings from a 2007 expert-panel meeting. We found data to

Postpartum Screening for Diabetes After a Gestational Diabetes Mellitus–Affected Pregnancy

Patricia M. Dietz, DrPH, MPH, Kimberly K. Vesco, MD, MPH, William M. Callaghan, MD, MPH, Donald J. Bachman, MS, F. Carol Bruce, MPH, Cynthia J. Berg, MD, MPH, Lucinda J. England, MD, MPH, and Mark C. Hornbrook, PhD

OBJECTIVE: To estimate trends in postpartum glucose testing in a cohort of women with gestational diabetes mellitus (GDM).

tolerance tests were ordered. From 2004 to 2006, the practice site where women received care was the factor most strongly associated with the clinician order, but it

Improve Social Determinants in Communities

- Evaluation of state tobacco control policies, spending, and taxes on smoking before, during and after pregnancy and on birth outcomes (PRAMS)

- Assessing Medicaid coverage of smoking cessation services

- Investigating causes of Sudden Unexpected Infant Death (SUID) to inform policy for safe infant sleep environments

Community Transformation Grants (CTG)

- $103 million awarded to 61 states and communities
- Emphasis on population groups experiencing greatest burden of chronic disease
- Five priority areas:
  1. Tobacco-free living
  2. Active Living and Healthy Eating
  3. Evidence-based Quality Clinical and Other Preventive Services
  4. Social and Emotional Wellness
  5. Healthy and Safe Physical Environments
- $4.2 million for 7 national NGOs to support, disseminate, and amplify CTG strategies nationwide

Provision of Risk Appropriate Care: "right place-right time"

- Meta-analysis of 30 years of data on perinatal regionalization (104,944 VLBW infants)

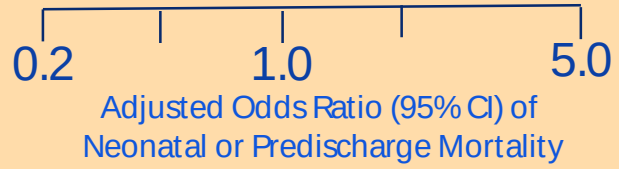
- Odds of death at non-level III facilities
  - VLBW (≤1500g) infants (37 studies)
    - OR 1.62 (95% CI 1.44-1.83)
  - ELBW (≤1000g) infants (4 studies)
    - OR 1.64 (95% CI 1.14-2.36)
  - Very Preterm (≤32 weeks) infants (4 studies)
    - OR 1.55 (95% CI 1.21, 1.98)

Lasswell et al. *JAMA 2010*

Adequate- & High-Quality Publications on Very Low-Birth-Weight (VLBW) Infants

Stratified by Level of Adjustment for Confounding (Cont'd on next slide)

Source	Level Comparison	Adjusted Odds Ratio (95% CI)	PValue
Adjustment for Confounding: Case Mix			
Paneth et al, 1982	II vs III	1.32 (1.08-1.62)	.01
Gortmaker et al, 1985	I and II vs III	1.30 (1.14-1.48)	<.001
Sanderson et al, 2000	II + vs III	1.23 (0.70-2.17)	.48
Bode et al, 2001	II vs III	2.06 (1.82-2.33)	<.001
Kamath et al, 2008	I and II vs III	1.85 (2.31-1.22)	<.001
Combined Estimate		1.56 (1.22-1.98)	<.001



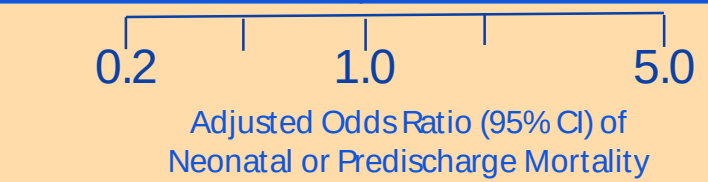
Case mix indicates adjustment for demographic and/or socioeconomic status variables; extensive indicates adjustment for case mix plus maternal/perinatal risk factors and infant illness severity. CI indicates confidence interval. Size of data markers indicates size of study population.

Lasswell et al. *JAMA 2010*

Adequate- & High-Quality Publications on Very Low-Birth-Weight (VLBW) Infants

Stratified by Level of Adjustment for Confounding

Source	Level Comparison	Adjusted Odds Ratio (95% CI)	PValue
Adjustment for Confounding: Extensive			
Verloove-Vanhorick et al, 1988	II vs III	1.90 (1.11-3.24)	.02
Cifuentes et al, 2002	II vs III	2.37 (1.67-3.40)	<.001
Bacak et al, 2005	I and II vs III	1.50 (1.11-2.02)	.01
Howell et al, 2008	I and II vs III/IV	1.23 (0.89-1.70)	.21
Combined Estimate		1.66 (1.24-2.23)	<.001
Overall: all adequate- and high-quality VLBW studies		1.60 (1.33-1.92)	<.001

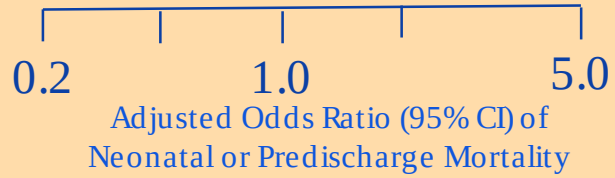


Case mix indicates adjustment for demographic and/or socioeconomic status variables; extensive indicates adjustment for case mix plus maternal/perinatal risk factors and infant illness severity. CI indicates confidence interval. Size of data markers indicates size of study population.

Lasswell et al. *JAMA 2010*

Adequate- & High-Quality Publications on Extremely Low-Birth-Weight Infants

Source	Level Comparison	Adjusted Odds Ratio (95% CI)	PValue
Gortmaker et al, 1985	II and II vs III	1.33 (1.08-1.72)	.03
Sanderson et al, 2000	II + vs III	1.78 (0.90-3.51)	.01
Bode et al, 2001	II vs III	2.71 (2.32-3.18)	<.001
Bacak et al, 2005	I and II vs III	1.50 (1.11-2.02)	.01
Kamath et al, 2008	I and II vs III	1.85 (1.43-2.31)	<.001
Overall		1.80 (1.31-2.46)	<.001

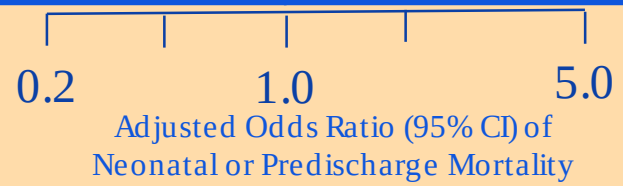


CI indicates confidence interval. Size of data markers indicates size of study population.

Lasswell et al. *JAMA 2010*

Adequate- &High-Quality Publications on Very Preterm Infants

Source	Level Comparison	Adjusted Odds Ratio (95% CI)	PValue
Lee et al, 2003	Outborn vs inborn	1.75 (1.14-2.68)	.01
Johansson et al, 2004	II vs III	1.41 (0.98-2.13)	.10
Palmer et al, 2005	Outborn vs inborn	1.00 (0.56-1.78)	>.99
Overall		1.42 (1.06-1.88)	.02



Size of data markers indicate size of study population.
Inborn infants are those born in a level III hospital; outborn infants are those born in a lower-level hospital then transferred to a level III hospital.

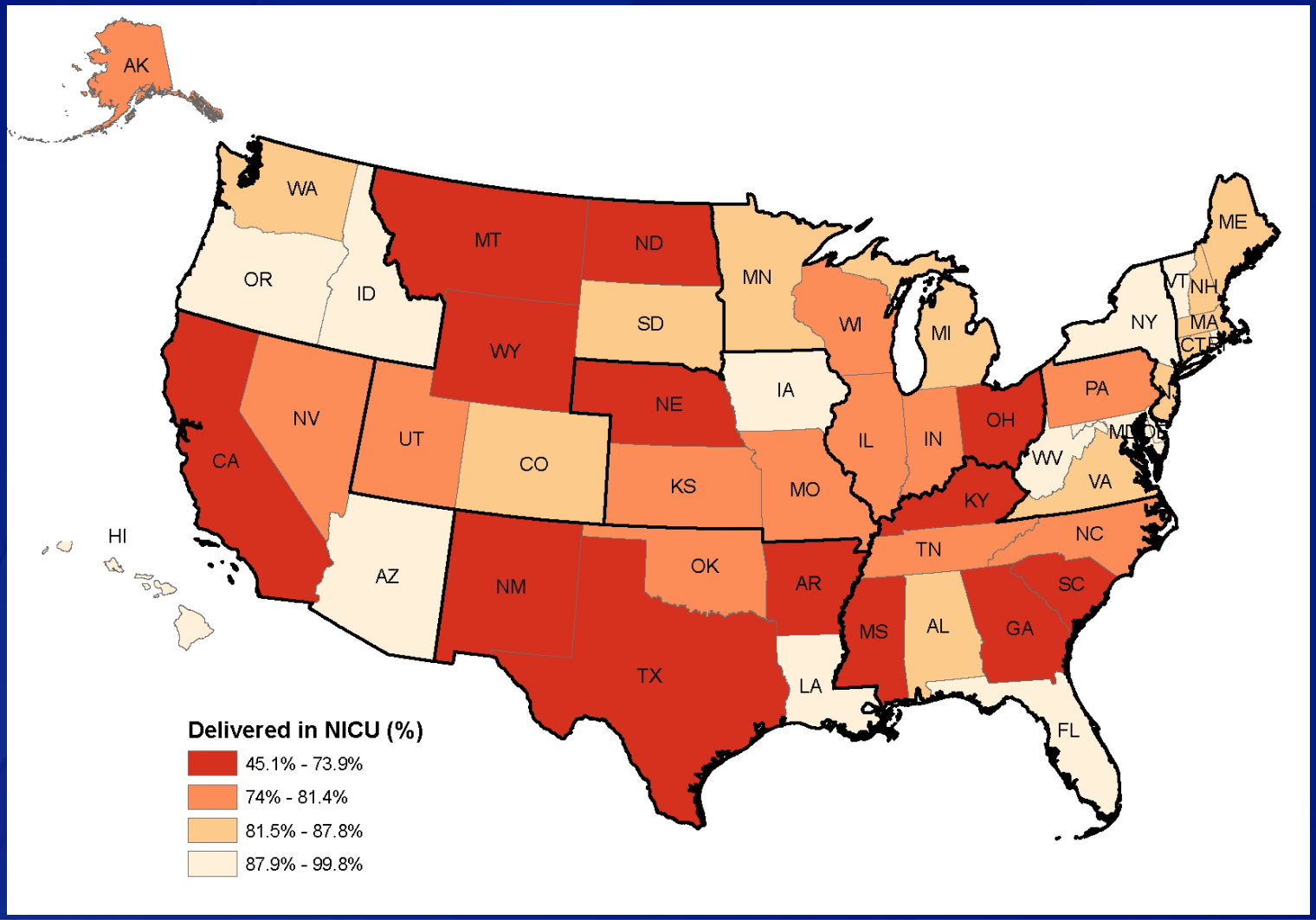
Lasswell et al. *JAMA 2010*

Provision of Risk Appropriate Care

- **States regulate health care services and facilities**
  - License hospitals
  - Promulgate State Health Plans/Regulations
  - Approve facility expansion and construction
  - Implement Title V programs
  - Pay for provision of care (e.g. ICUs, transport)
- **Yet many states**
  - Have not met Healthy People/MCHB Performance Measure goal of 90% VLBW infants delivered in level III facilities
  - Have differing performance measure definitions
  - Do not monitor regionalized systems of care

Blackmon et al. *J Perinatol* 2009; Nowakowski et al, *MCHJ* 2009

Percent of LVBW Infants Delivered in Level III NICUs



MCHB, Title V Information System, 2009

Summary

- **The problem of infant mortality—**
  - Very preterm birth and SUID/SIDS represent the majority of US infant deaths and disparities in infant mortality
  - Maternal health, community health, and social determinants matter to reduce infant deaths and disparities
  - A public health framework for impact provides a practical approach for prevention of infant deaths
  - Together with the current evidence, we can take important steps to reduce infant death NOW



Questions?

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http://www.cdc.gov/reproductivehealth/

Optimal Reproductive Health for a Healthy Future