Explaining Recent Trends in Infant Mortality

Centers for Disease Control and Prevention
National Center for Health Statistics
Division of Vital Statistics

Authors / Acknowledgements

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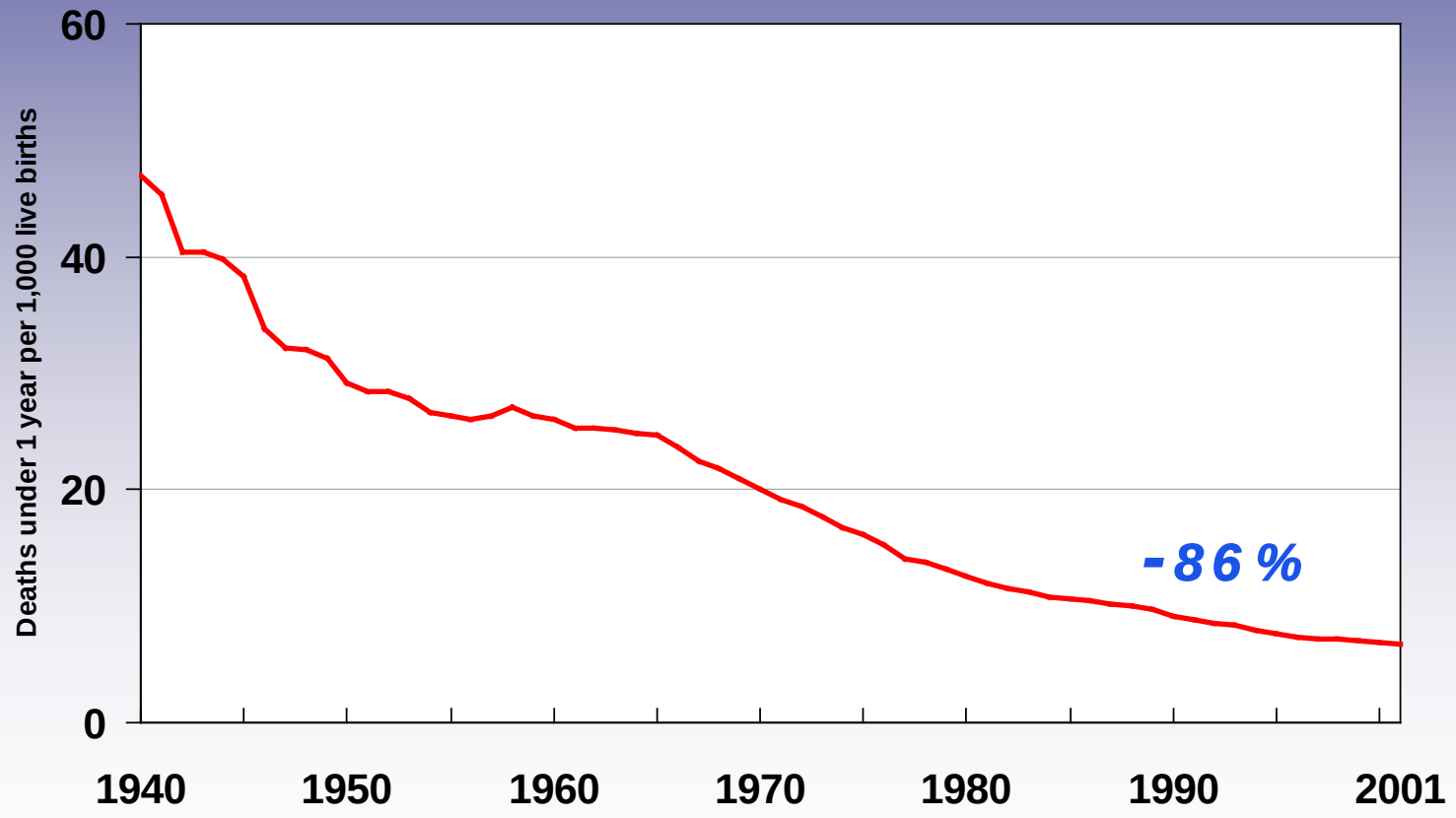
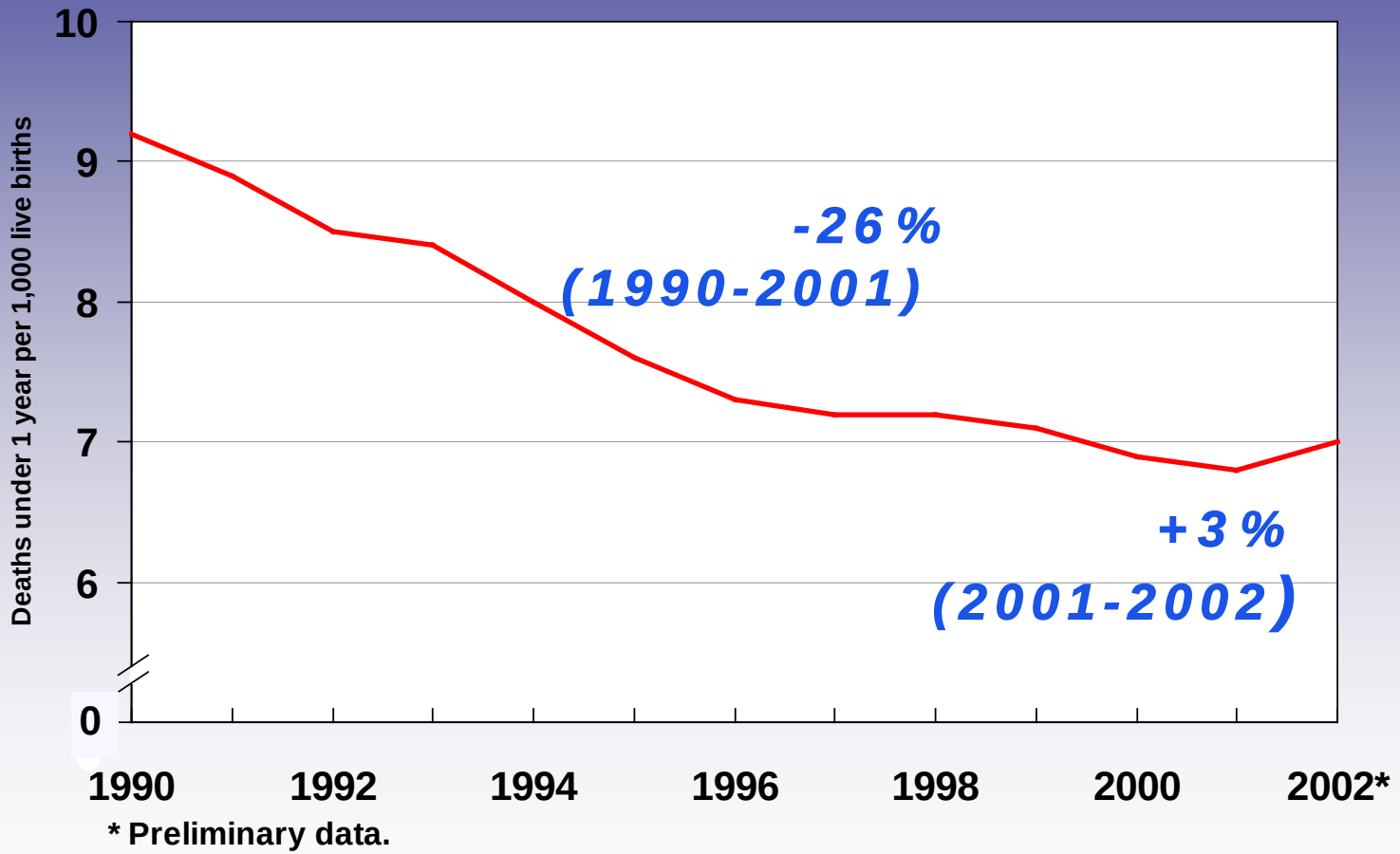
Infant mortality rate: United States, 1940-2001



SOURCE: National Vital Statistics System, NCHS, CDC.

Infant mortality rate: United States, 1990-2002



SOURCE: National Vital Statistics System, NCHS, CDC.

Challenge:

Explain increase in the IMR for public release with only limited preliminary data

The game plan:

- ✓ More detailed prelim data
- ✓ More current prelim data
- ✓ Unedited fetal death data
- ✓ 2003 *counts* of infants deaths
- ✓ Develop "Supplemental Analyses"

Infant deaths and infant, neonatal, and postneonatal mortality rates: United States, preliminary 2002, and final 2001

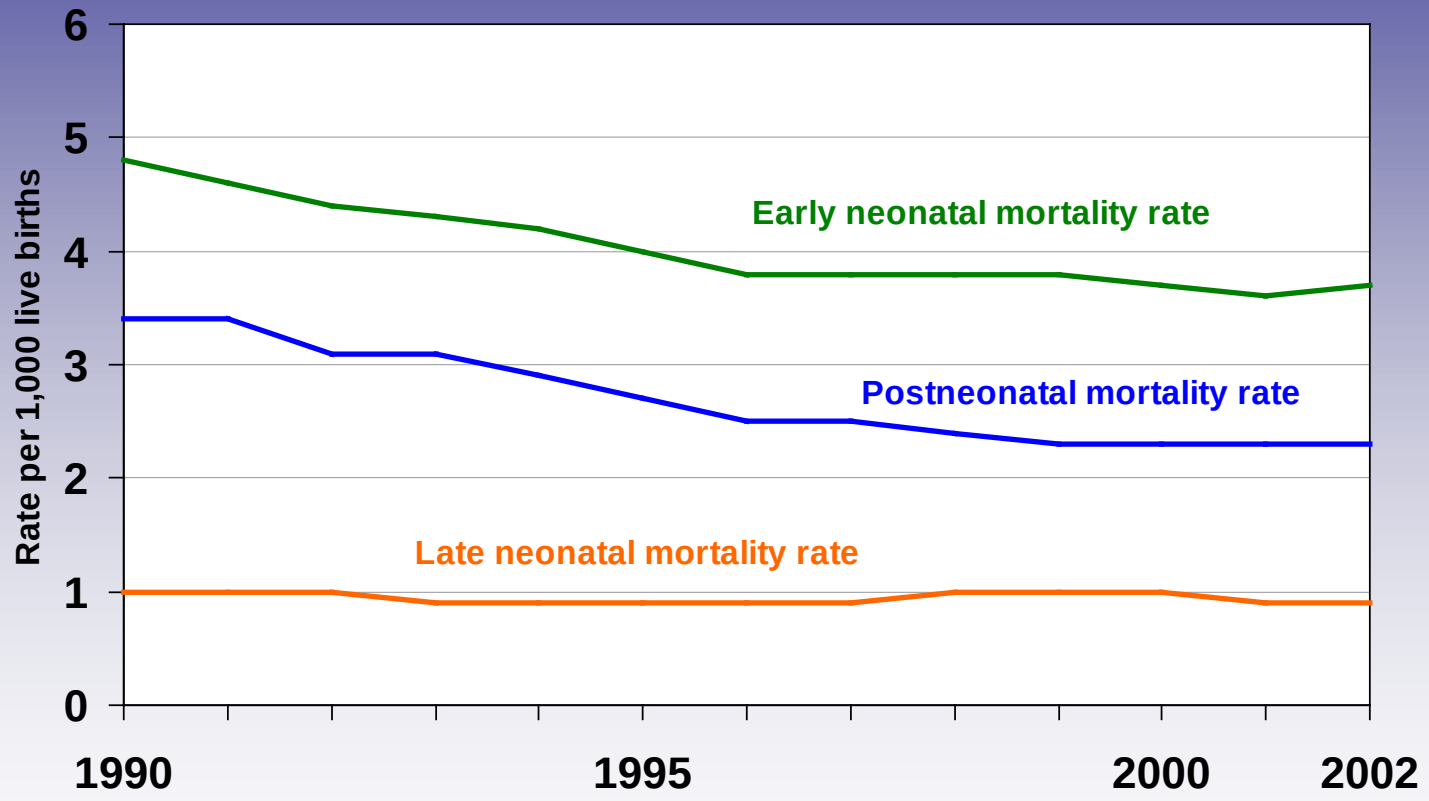
[Rates per 1,000 live births]

Year	Infant deaths	Infant mortality rate				
			Neonatal (Under 28 days)			Postneonatal (28 days – 11 months)
		Total	Total	Under 7 days	7-27 days	
2002 [1]	28,042	**7.0**	**4.7**	**3.7**	0.9*	2.3
2001	27,568	6.8	4.5	3.6	0.9	2.3

[1] Partially edited data processed through January 2004.
*2001 =0.908, 2002 = 0.931

NOTE: Bold underlined numbers indicate a statistically significant difference with the previous year.
SOURCE: National Vital Statistics System, NCHS, CDC.

Early and late neonatal and postneonatal mortality rates: United States, 1990-2002



Note: Rates for 2002 are based on partially edited data processed as of January, 2004.

Early neonatal mortality rate = deaths to infant < 7 days per 1,000 live births. Late neonatal mortality rate = deaths to infants 7-27 days. Postneonatal mortality rate = deaths to infants 28 days - 11 months per 1,000 live births.

Source: National Vital Statistics System, NCHS, CDC.

Infant mortality rates by leading causes: United States, preliminary 2002, and final 2001

[Rates per 100,000 live births]

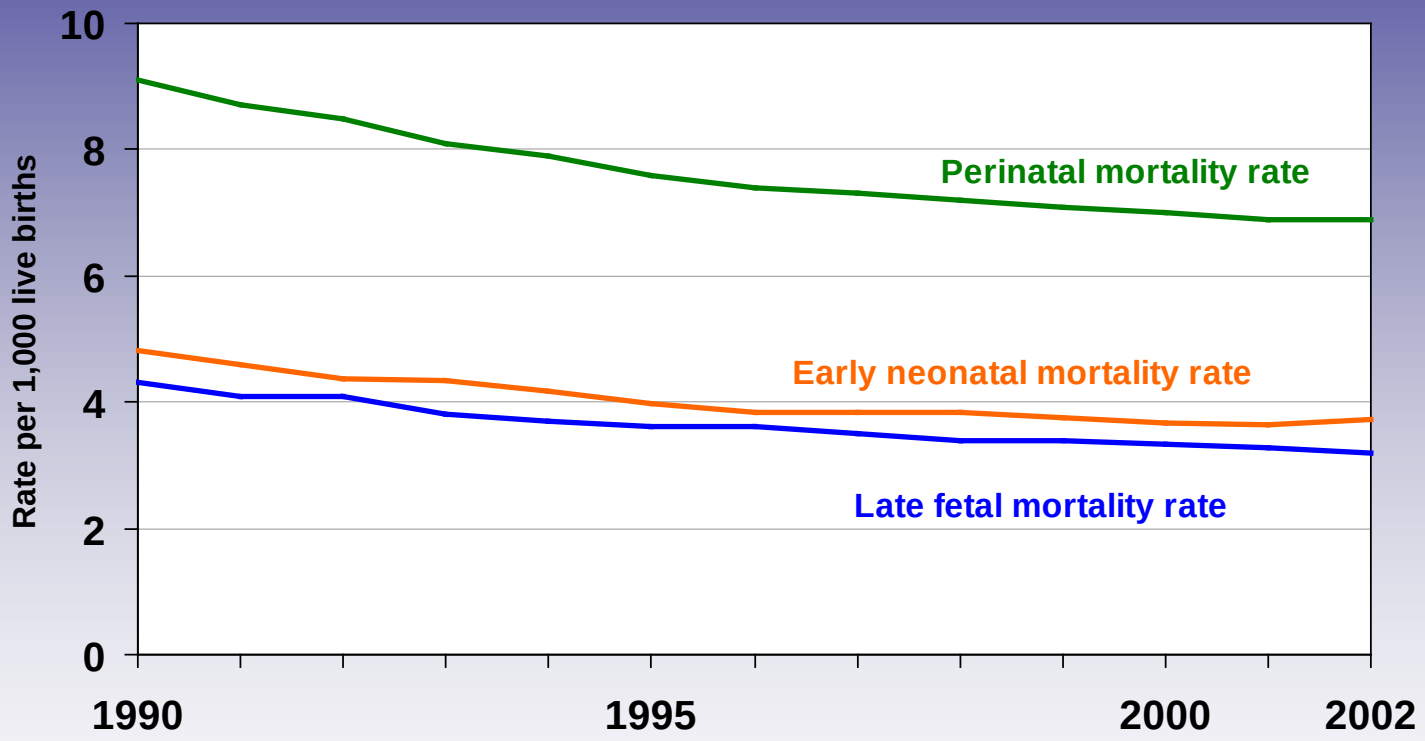
Cause of death [1]	2002 [2]	2001
Congenital malformations, deformations and chromosomal abnormalities	**140.7**	136.9
Disorders relating to short gestation and low birthweight, not elsewhere classified	**114.4**	109.5
Sudden infant death syndrome	50.6	55.5
Newborn affected by maternal complications of pregnancy	**42.9**	37.2

[1] World Health Organization. International Statistical Classification of Diseases and Related Health Problems, Tenth Revision. Geneva: World Health Organization. 1992.

[2] Preliminary data for 2002 processed through July 10, 2003.

SOURCE: National Vital Statistics System, NCHS, CDC.

Perinatal, late fetal, and early neonatal mortality rates, 1990-2002



Note: Rates for 2002 are based on partially edited data processed as of January, 2004.

Perinatal mortality rate = late fetal deaths plus infant deaths <7 days per 1,000 live births plus late fetal deaths.

Early neonatal mortality rate = deaths to infants <7 days per 1,000 live births.
Late fetal mortality rate = fetal deaths with stated or presumed gestational ages of 28 weeks or more per 1,000 live births plus late fetal deaths.

Source: National Vital Statistics System, NCHS, CDC.

Provisional 12 month ending infant mortality rates, 2001-2003

Month	IMR (per 1,000 live births) 2001	2002	2003	Change 2002 - 2003
January	6.6	6.9	6.8	⇩
February	6.6	6.8	6.8	⇔
March	6.6	6.8	6.7	⇩
April	6.6	6.9	6.7	⇩
May	6.6	6.8	6.6	⇩
June	6.6	6.9	6.6	⇩
July	6.6	6.9	6.7	⇩
August	6.6	6.9	6.6	⇩
September	6.5	6.9	6.7	⇩
October	6.6	6.9	---	
November	6.8	6.9	---	
December	6.9	6.9	---	

--- Data not available.

SOURCE: National Vital Statistics System, NCHS, CDC.

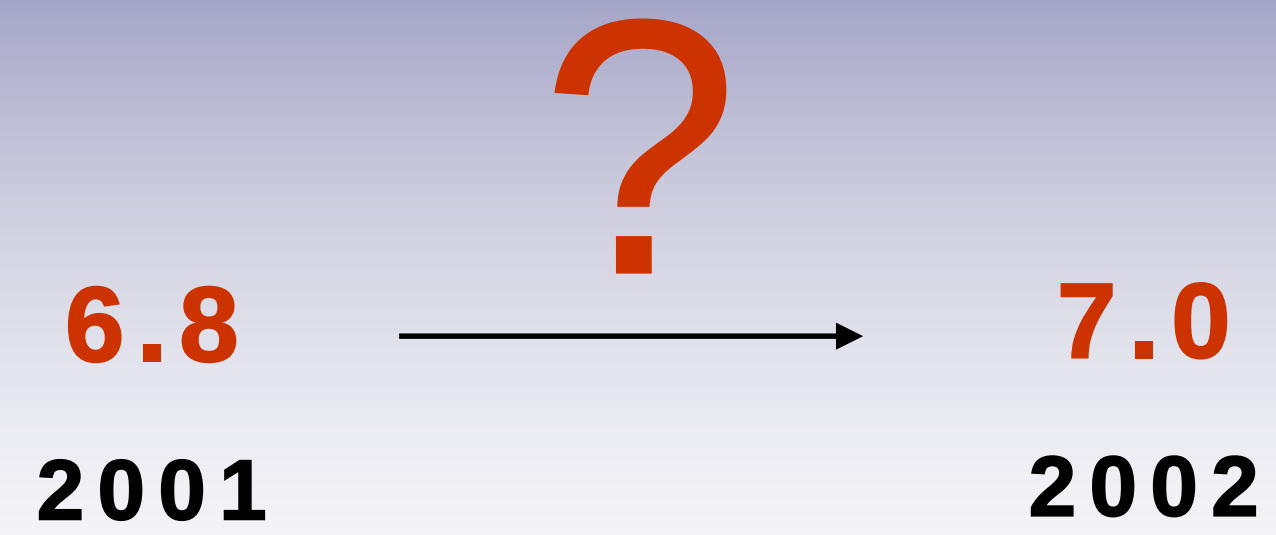
Infant mortality rates and international rankings: Selected countries, 1999 and 2000

Country	IMR (per 1,000 live births) 1999	2000	Rank	Change 1999 - 2000
Singapore	3.3	2.5	1	
Japan	3.4	3.2	3	
Finland	3.6	3.8	5	⇧
Spain	4.5	3.9	7	
Italy	5.1	4.5	10	
Austria	4.4	4.8	12	⇧
Northern Ireland	6.4	5.1	15	
Australia	5.7	5.2	17	
Canada	5.3	5.3	18	⇔
United States	7.1	6.9	27	

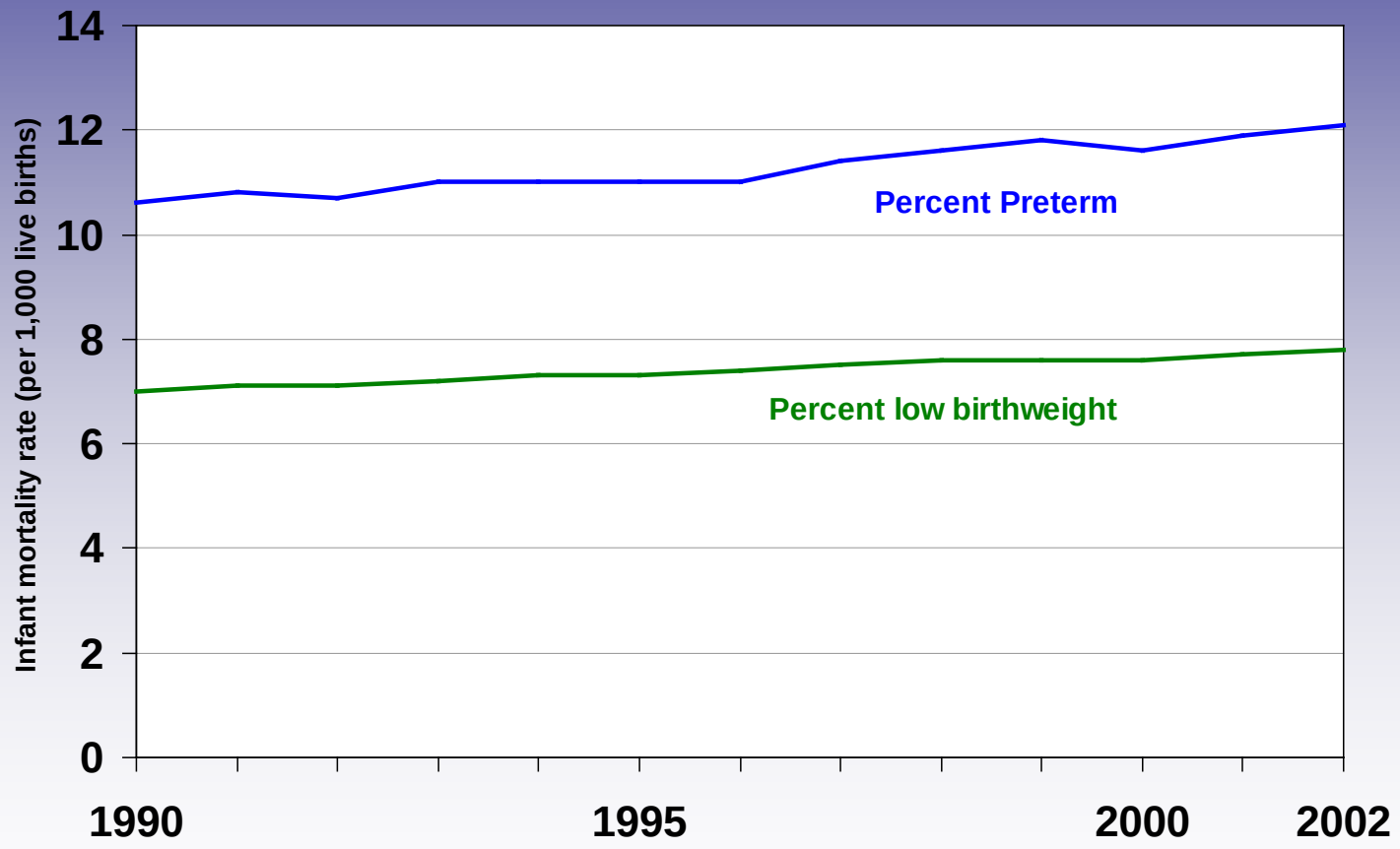
SOURCE: Organization for Economic Cooperation and Development

Infant mortality rate

A look at potential explanatory factors

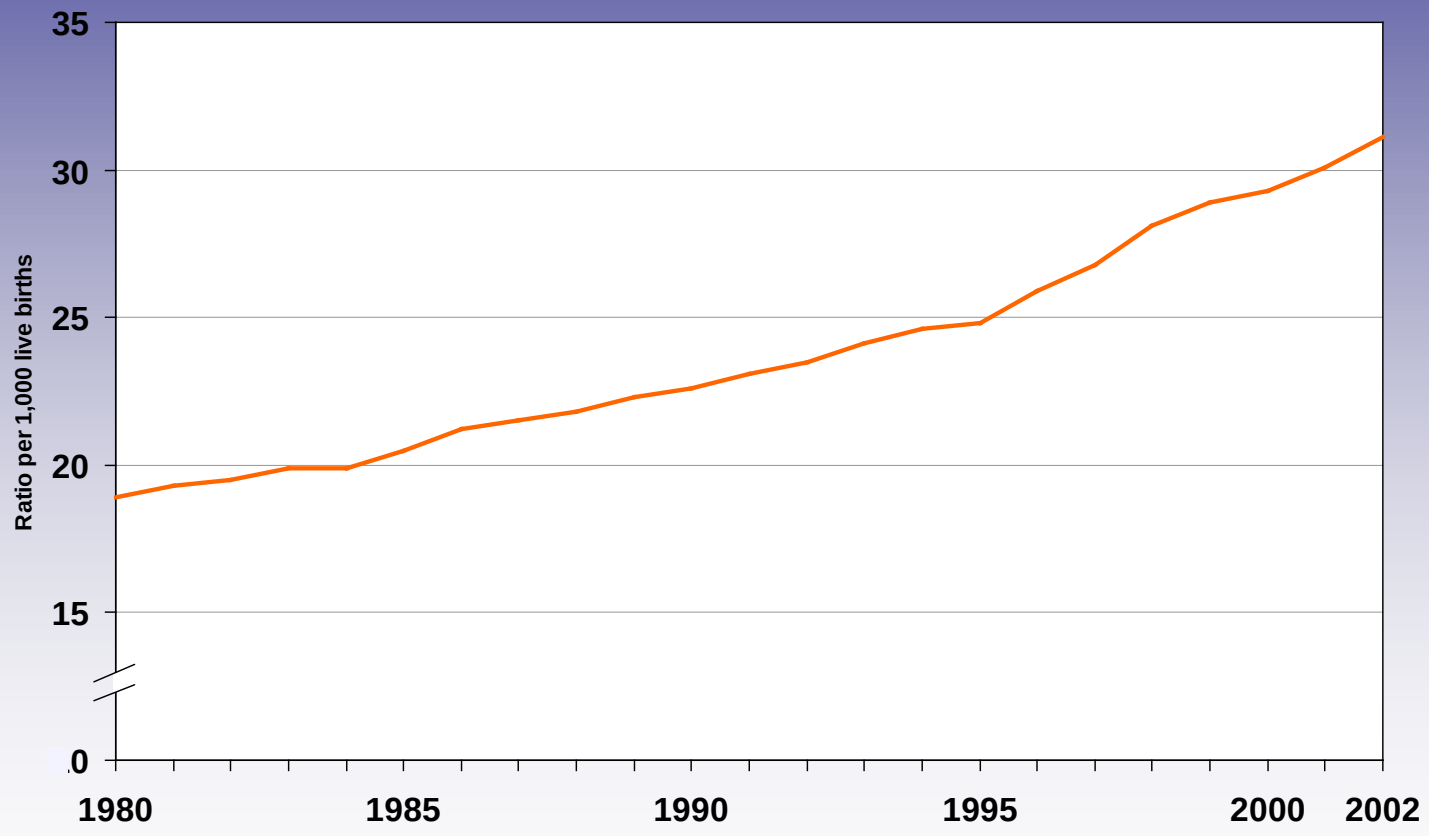


Preterm and low birthweight rates: United States, 1990-2002



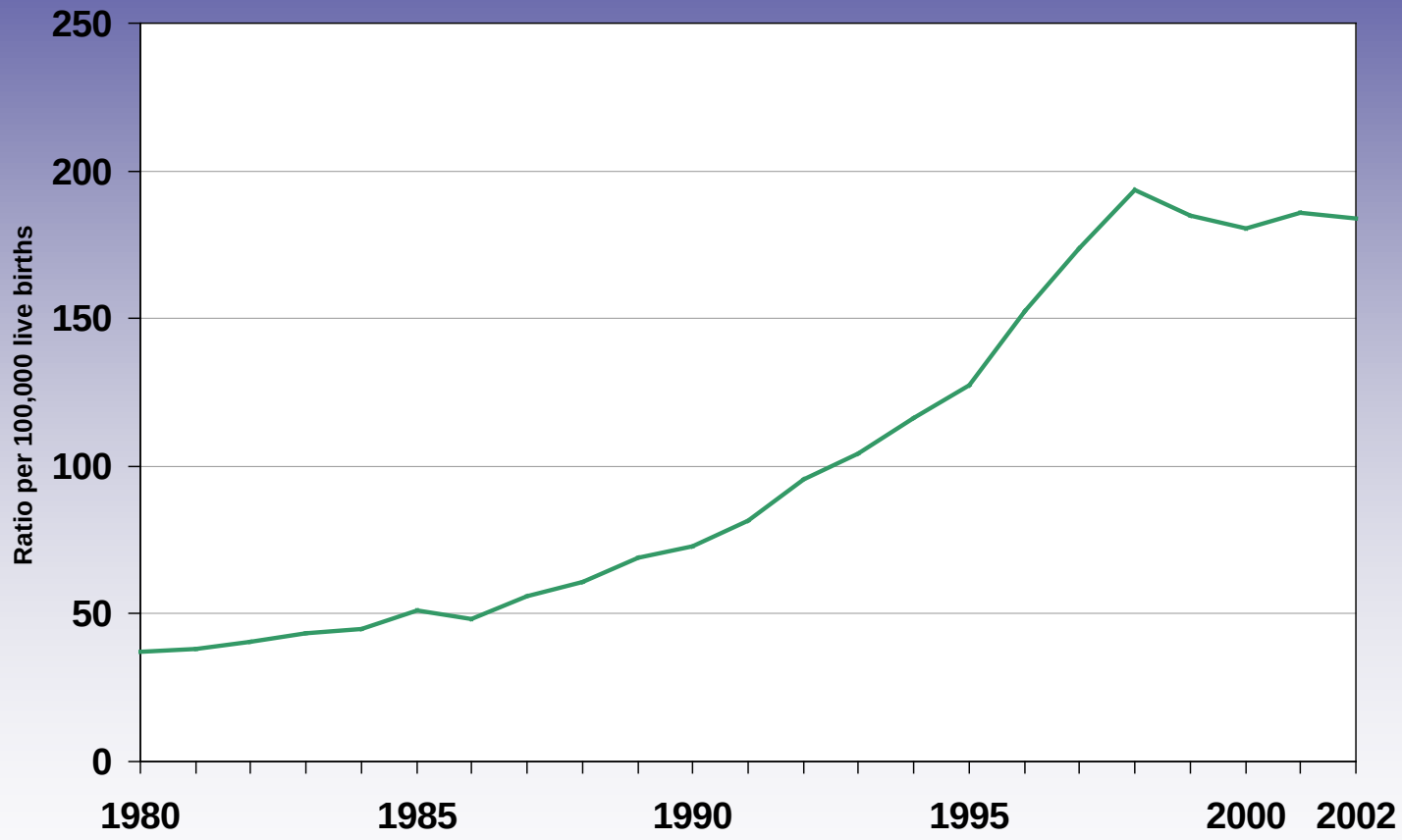
NOTE: Preterm is less than 37 completed weeks of gestation. Low birthweight is less than 2,500 grams.
SOURCE: National Vital Statistics System, NCHS, CDC.

Twin birth rate: United States, 1971-2002



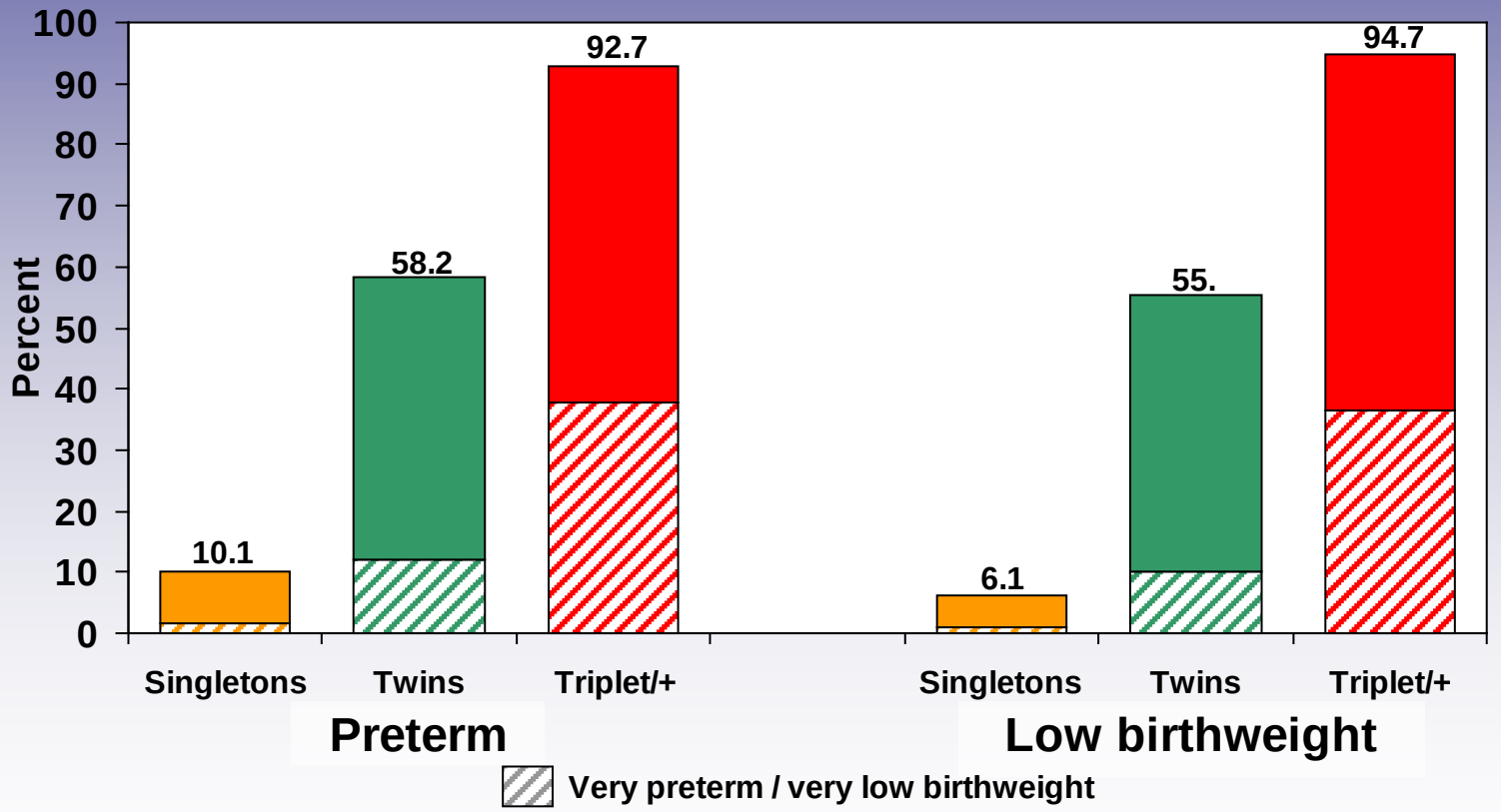
NOTE: Twin birth rate is the number of live born infants in twin deliveries per 1,000 live births.
SOURCE: National Vital Statistics System, NCHS, CDC.

Triplet+ birth rate: United States, 1980-2002



NOTE: Triplet+ birth rate is the total number of live born infants in triplet+ deliveries per 1,000 live births. Triplet+ includes births in greater than twin deliveries.
SOURCE: National Vital Statistics System, NCHS, CDC.

Preterm and low birthweight rates by plurality: United States, 2002



SOURCE: National Vital Statistics System, NCHS, CDC.

Preterm and low birthweight rates among singleton births have also been on the rise…

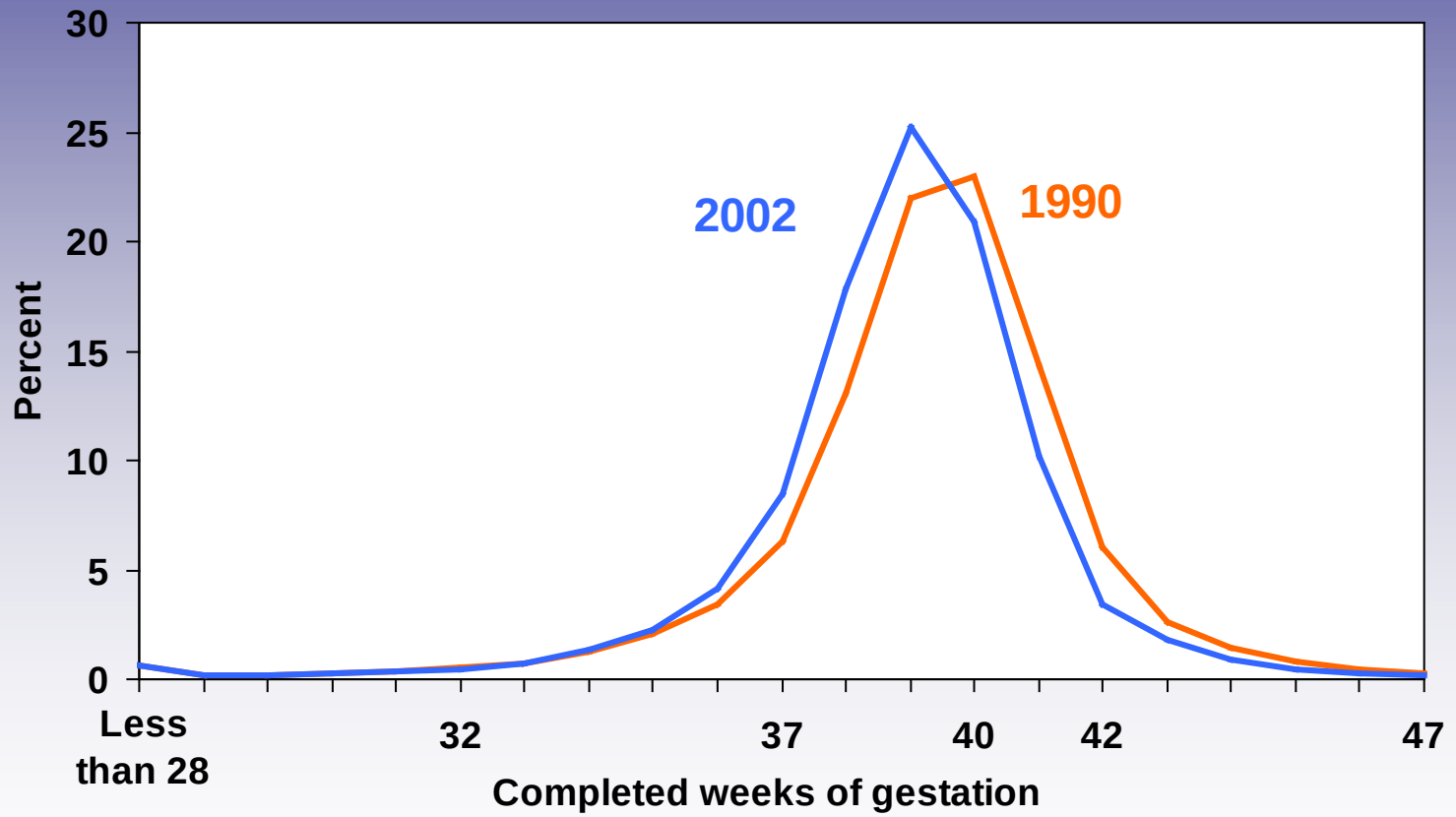
Percent very and moderately preterm, and very low and moderately low birthweight among singletons, United States: 1990 and 2002

	2002	1990
Very preterm	1.57	1.96
Moderately preterm	8.87	8.01
Very low birthweight	1.11	1.05
Moderately Low birthweight	6.12	5.90

Note: Very preterm is less than 32 completed weeks of gestation. Preterm is less than 37 weeks of gestation. Very low birthweight is less than 1,500 grams. Low birthweight is less than 2,500 grams.

SOURCE: National Vital Statistics System, CDC/NCHS

Percent distribution of singleton births by gestational age: U.S., 1990 and 2002



SOURCE: National Vital Statistics System, NCHS, CDC.

Risk of Poor Perinatal Outcome – Singletons*

Assisted Reproductive Therapy (ART)

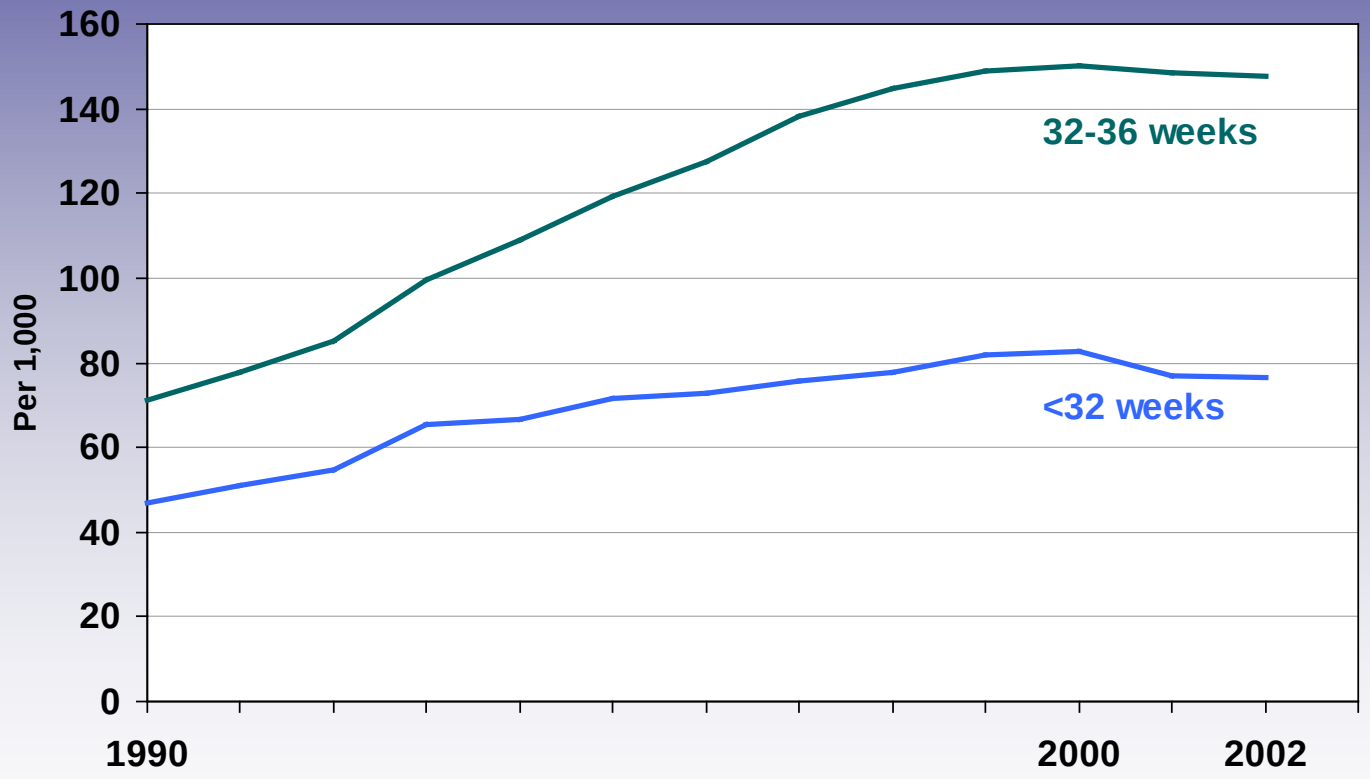
- Very preterm ↑ 327%
- Preterm ↑ 204%
- Very low birthweight ↑ 300%
- Low birthweight ↑ 70%
- Perinatal mortality ↑ 68%

Non-ART Fertility Therapies

?

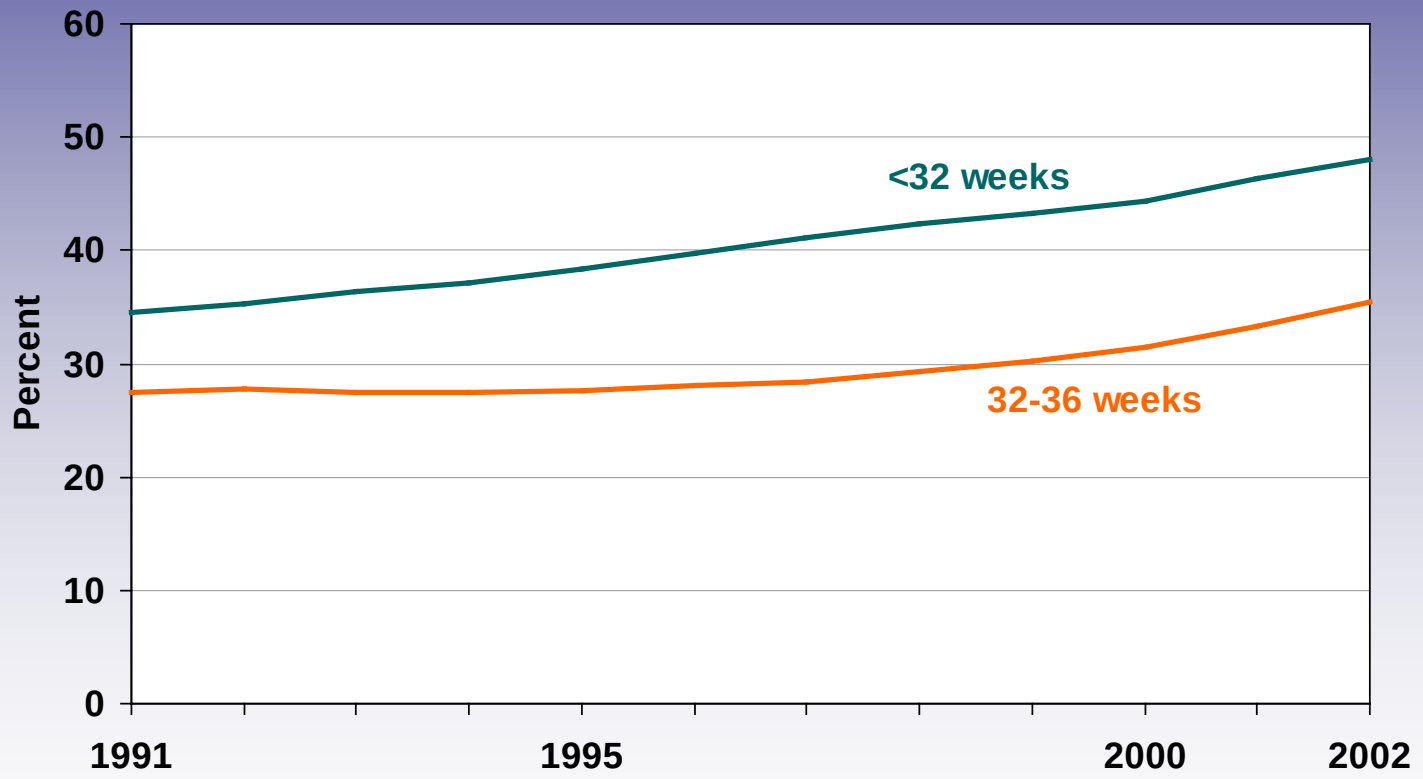
*SOURCE: Helmerhorst FM, Perquin DAM, Donker, D, Keirse JNC. Perinatal outcome of singletons and twins after assisted conception: a systematic review of controlled studies. BMJ 328: 261-70. 2004.

Rates of induction of labor by length of gestation: United States, 1989-2002



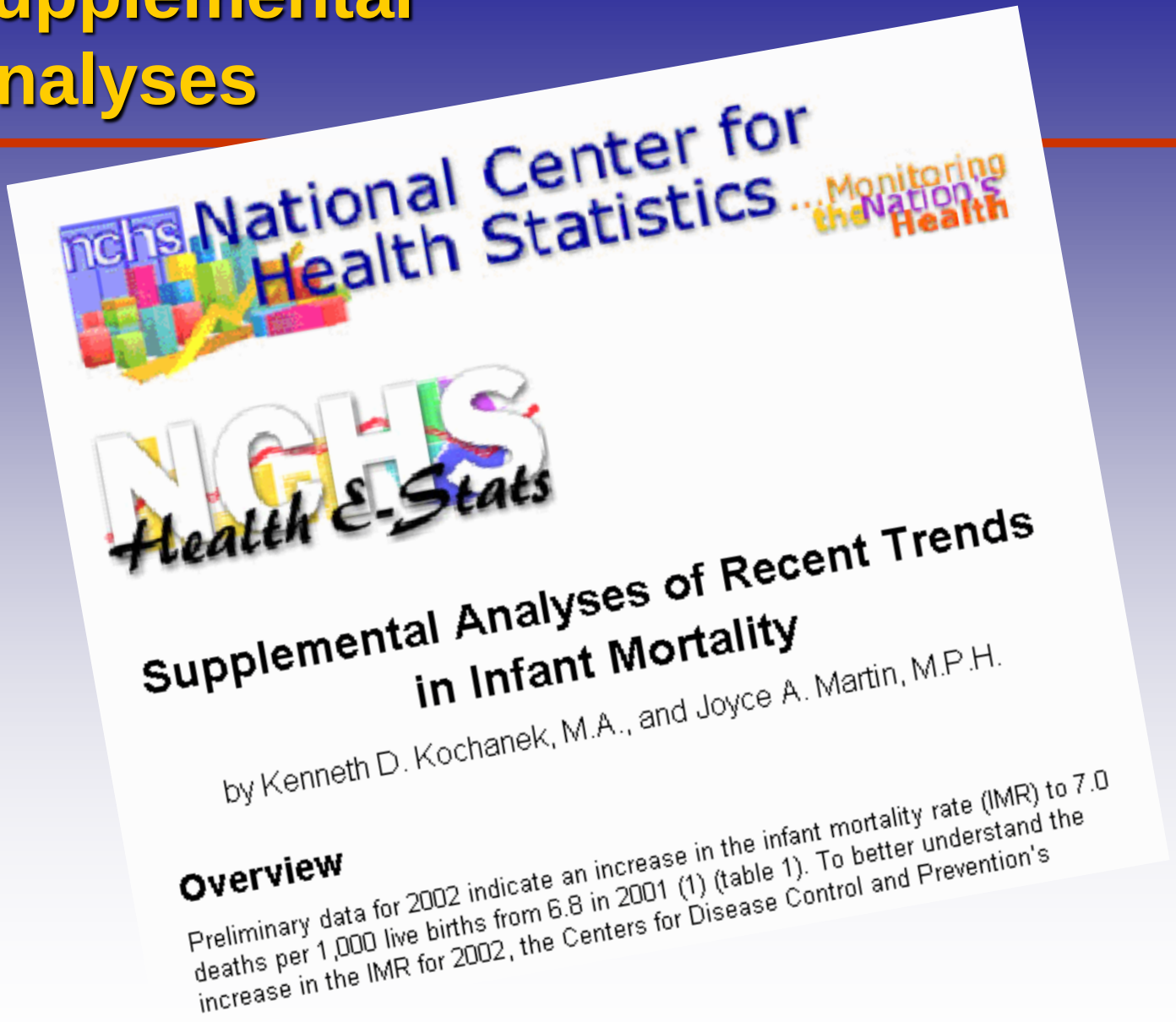
NOTES: Louisiana, Nebraska, and Oklahoma did not report induction in 1989. Oklahoma did not report induction in 1990.
SOURCE: National Vital Statistics System, NCHS, CDC.

Rates of cesarean delivery by length of gestation: United States, 1991-2002



SOURCE: National Vital Statistics System, NCHS, CDC.

Supplemental Analyses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NCHS Health E-Stats

Supplemental Analyses of Recent Trends in Infant Mortality

by Kenneth D. Kochanek, M.A., and Joyce A. Martin, M.P.H.

Overview

Preliminary data for 2002 indicate an increase in the infant mortality rate (IMR) to 7.0 deaths per 1,000 live births from 6.8 in 2001 (1) (table 1). To better understand the increase in the IMR for 2002, the Centers for Disease Control and Prevention's

And… the MEDIA!

U.S. Infant Mortality Rate Rises 3%

First Increase Since '58 Surprises Officials as Other Health Indicators Keep Improving

By Rob Stein
Washington Post Staff Writer

The number of U.S. babies dying shortly after birth has crept up for the first time in more than four decades, federal health officials reported yesterday.

The cause of the small but disturbing rise remains unclear, but it may be a combination of the surge in older women having babies, the popularity of fertility treatments, and, paradoxically, advancements in identifying and saving fetuses in distress, experts said.

Regardless of the cause, the surprising increase has raised alarm because the infant mortality rate is considered a fundamental measure of a society's well-being.

"It's always a matter of concern when an important measure of public health such as infant mortality increases," said Joyce A. Martin of the federal Centers for Disease Control and Prevention, which released the new numbers. "It's so basic. The saving of young lives is important to everyone."

The increase was particularly unexpected because it comes as a number of other important measures of the nation's health continued long-term positive trends

ed States has been dropping, as have the rates from the leading causes of mortality—heart disease, stroke, accidents and cancer. And U.S. life expectancy has reached a new high—77.4 years

The United States has long had one of the highest infant mortality rates among developed countries, but the rate had either declined or remained steady every year since 1958. So government scientists were caught off guard when a preliminary analysis of the most recent data showed that the infant mortality rate had inched up—climbing from 6.8 deaths per 1,000 live births in 2001 to 7.0 deaths in 2002—a 3 percent increase.

"I have to say, it was a surprise," said Martin, lead statistician for the National Center for Health Statistics, part of the CDC. "We weren t expecting it."

A follow-up analysis confirmed that the increase would hold true in the final numbers. When researchers parsed the data, they found the increase was caused by a jump in deaths in the first week of life among babies who were either born with birth defects, who were unusually small or whose mothers had complications during their

them early and then keep them alive when they are born preterm.

"Because of these improvements, obstetricians have had more freedom to deliver a baby that may be in jeopardy," Zhang said.

That has prompted an increase in doctors inducing delivery early or delivering babies preterm

natal death," Zhang said.

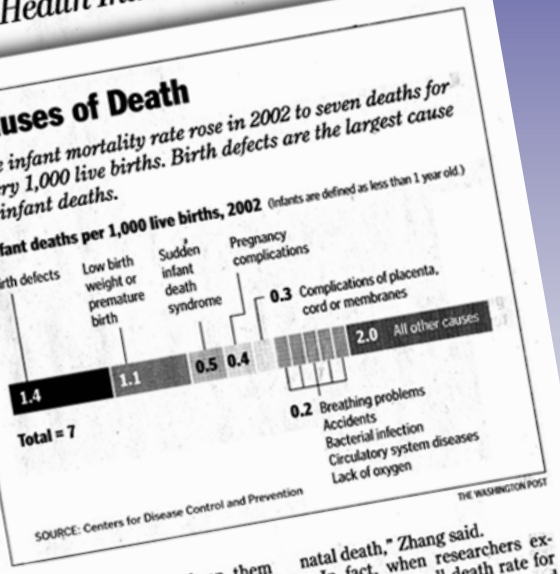
In fact, when researchers examined the overall death rate for fetuses both in late pregnancy and after birth, they found no increase.

Martin agreed and added that some of the alarm has been offset by a very preliminary analysis of the 2003 data which look like

Causes of Death

The infant mortality rate rose in 2002 to seven deaths for every 1,000 live births. Birth defects are the largest cause of infant deaths.

Infant deaths per 1,000 live births, 2002 (Infants are defined as less than 1 year old)



SOURCE: Centers for Disease Control and Prevention

THE WASHINGTON POST

Research Agenda: Linked Birth/Infant Death File

Is the increase the result of changes in risk BEFORE birth:

- Maternal characteristics
  - age, race, education, medical risk factors, prenatal care, tobacco use
- Infant characteristics
  - plurality
  - birthweight
  - gestational age
  - congenital anomalies
- Characteristics of labor and delivery
  - PROM
  - induction of labor
  - cesarean delivery

Research Agenda: Linked Birth/Infant Death File – cont.

If so, how are these factors associated with age/cause of death?

- Congenital malformations
- Disorders related to short gestation/low birthweight
- Maternal complications related to pregnancy
- Others??

OR

- Is the 2002 increase in the IMR primarily the result of an increase in the risk of death AFTER birth:
  - changes in birthweight/gestation-specific mortality?
  - changes in obstetric and neonatal care?

Re-engineering the Vital Records Process…

What could we do better with Re-engineered Vital Statistics Systems?

- ✓ **New, improved data items**
  - Fertility therapy – drugs & ART
  - Tobacco use before and during pregnancy
  - Infections during pregnancy
  - Maternal morbidity
  - Breast feeding
  - Source of payment for delivery
- ✓ **Configurable electronic systems**
  - Easily modified to capture information on emerging issues
  - Easily improve/change items as needed
- ✓ **Integrated electronic systems**
  - Incorporate electronic data transmission standards
  - Permit integration with other systems (prenatal care, newborn screening, immunization)

What could we do better with Re-engineered Vital Statistics Systems? –

- ✓ **Higher quality data**
  - Data edited and queried at the source
  - Standardized systems across nation
- ✓ **More standardized data**
  - Standardized collection instruments
  - Standardized instructions & definitions
- ✓ **More timely data**
  - Data released within months of event
  - Births/infant deaths automatically linked = data available simultaneously

Summary: 2002 rise in the IMR

- **First increase in more than 4 decades**
- **Among neonatal deaths only**
- **Causes of infant death appear pregnancy-related**
- **Fetal mortality down/Perinatal mortality unchanged**
- **Likely decline in IMR for 2003**

Stay tuned….

Data from the Linked Birth/Infant Death Data Set will allow us to more fully explain this troubling change

- **summer 2004**