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International Comparisons of Infant Mortality and Related Factors: United States and Europe, 2010

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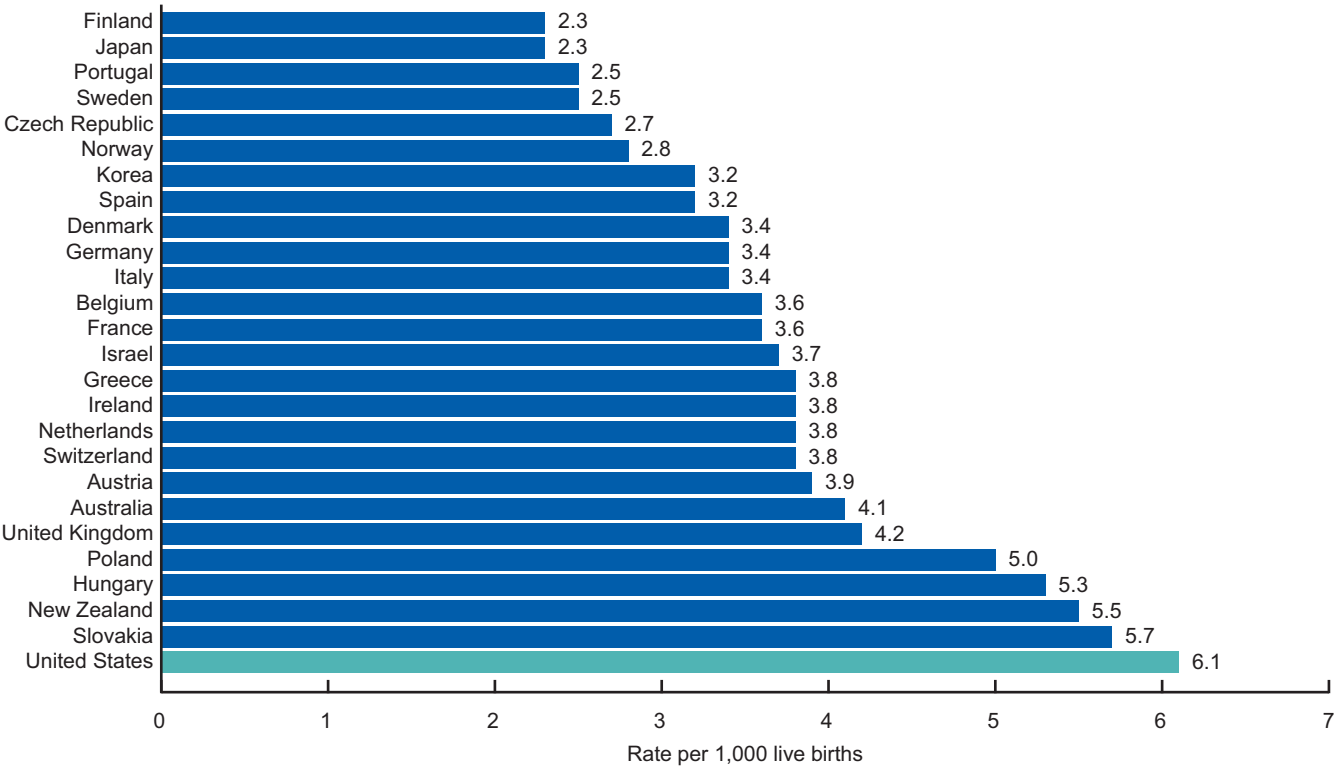
Abstract

Objectives—This report investigates the reasons for the United States' high infant mortality rate when compared with European countries. Specifically, the report measures the impact on infant mortality differences of two major factors: the percentage of preterm births and gestational age-specific infant mortality rates.



NOTES: Canada's 2010 data were not available from the Organisation for Economic Co-operation and Development (OECD) at the time of manuscript preparation. The 2009 infant mortality rate for Canada was 4.9. If the 2010 data for Canada had been available, the U.S. ranking may have changed. Deaths at all gestational ages are included, but countries may vary in completeness of reporting events at younger gestational ages.
SOURCES: CDC/NCHS, linked birth/infant death data set (U.S. data); and OECD 2014 (all other data). Data are available from: http://www.oecd.org.

Figure 1. Infant mortality rates: Selected Organisation for Economic Co-operation and Development countries, 2010

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Methods—Infant mortality and preterm birth data are compared between the United States and European countries. The percent contribution of the two factors to infant mortality differences is computed using the Kitagawa method, with Sweden as the reference country.

Results—In 2010, the U.S. infant mortality rate was 6.1 infant deaths per 1,000 live births, and the United States ranked 26th in infant mortality among Organisation for Economic Co-operation and Development countries. After excluding births at less than 24 weeks of gestation to ensure international comparability, the U.S. infant mortality rate was 4.2, still higher than for most European countries and about twice the rates for Finland, Sweden, and Denmark. U.S. infant mortality rates for very preterm infants (24–31 weeks of gestation) compared favorably with most European rates. However, the U.S. mortality rate for infants at 32–36 weeks was second-highest, and the rate for infants at 37 weeks of gestation or more was highest, among the countries studied. About 39% of the United States' higher infant mortality rate when compared with that of Sweden was due to a higher percentage of preterm births, while 47% was due to a higher infant mortality rate at 37 weeks of gestation or more. If the United States could reduce these two factors to Sweden's levels, the U.S. infant mortality rate would fall by 43%, with nearly 7,300 infant deaths averted annually.

Keywords: Euro-Peristat Project • preterm birth • gestational age-specific infant mortality rates

Introduction

Infant mortality is an important indicator of the health of a nation because it is associated with a variety of factors such as maternal health, quality and access to medical care, socioeconomic conditions, and public health practices (1–3). After a plateau from 2000 to 2005 (4), the U.S. infant mortality rate declined from 6.87 infant deaths per 1,000 live births in 2005 to 6.07 in 2011 (5,6). Yet, the United States' infant mortality rate remains higher than for most other developed countries (7). This report compares infant mortality rates between the United States and selected European countries and assesses the impact on infant mortality differences of the percentage of preterm births and gestational age-specific infant mortality rates.

Methods

U.S. data from the 2010 linked birth/infant death data set (latest available at the time of manuscript preparation) were compared with international data from two sources: the Organisation for Economic Co-operation and Development (OECD) database (7), and the second European Perinatal Health Report (EPHR) (8). However, these two sources differ in several important respects. For example, data from the OECD database were not limited by gestational age, and ranked the United Kingdom as a whole rather than by components (England and Wales, Scotland, and Northern Ireland). In contrast, EPHR showed data for England and Wales, Scotland, and Northern Ireland separately and excluded births at the lowest gestational ages to facilitate more valid international comparisons. The OECD database also included countries outside of Europe, whereas EPHR focused exclusively on European countries (7,8).

Data from the OECD database (Figure 1) are used to establish a baseline for international comparison. In keeping with *Health, United States* procedures for international infant mortality ranking, countries with less than 2.5 million population were excluded from the rankings (9). International rankings of infant mortality can vary depending on the availability of required data and other inclusion criteria (7,9).

European data shown in the remainder of the report are from EPHR and associated unpublished data (8). Data were included for countries listed in both EPHR and the OECD database. Among the European countries, not all countries were able to supply all requested data metrics. Thus, countries included in the Table and Figures 2–5 are those that supplied the requisite data. Because most European countries use the obstetric estimate of gestation to measure gestational age (8), U.S. data in this report are tabulated using the obstetric estimate of gestation to facilitate international comparisons.

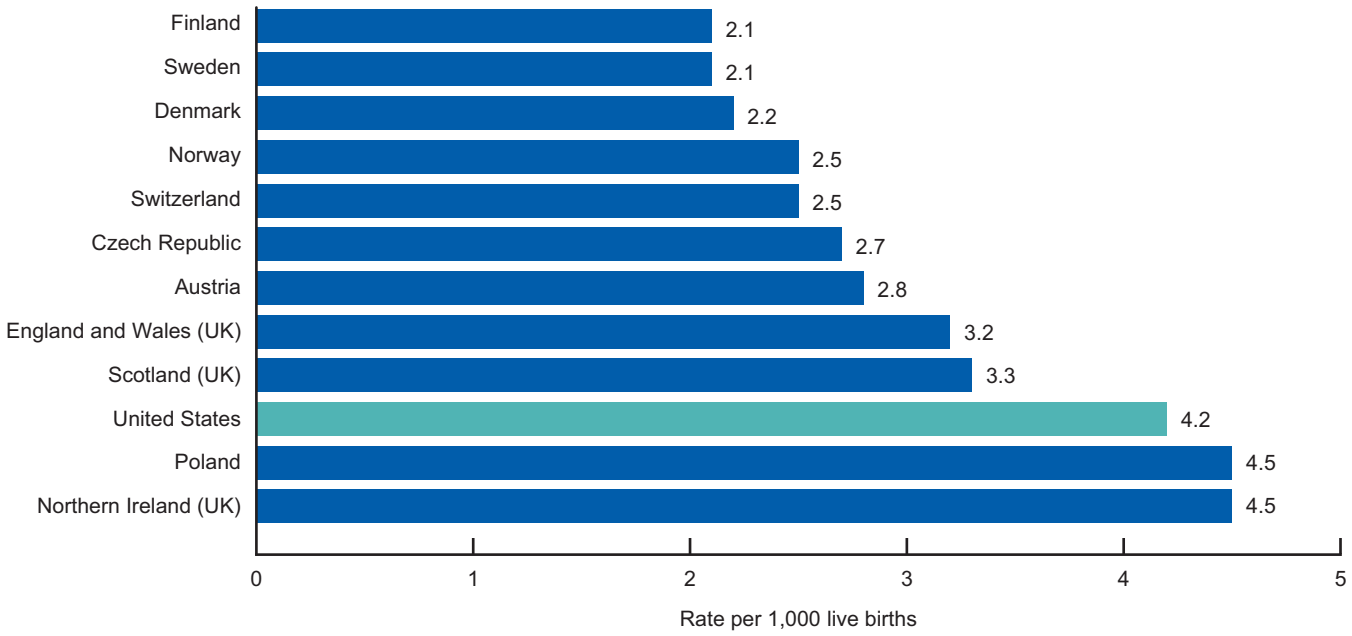
In the United States and most European countries, no gestational age or birthweight lower limit is placed on the reporting of live births or infant deaths, although a few countries do have lower limits for birth registration or reporting (7,8,10). Some studies have found variations between countries in the distribution of births and infant deaths at 22–23 weeks of gestation, suggesting the possibility of variations in reporting at these early gestational ages (11–13). Thus, events at less than 24 weeks of gestation were excluded from the analysis (except for Figure 1) to ensure international comparability. This is not meant to minimize the importance of these early infant deaths, which contribute substantially to the United States' overall infant mortality rate; rather, the approach recognizes that accurate international comparisons may not be possible for events at less than 24 weeks of gestation.

The Kitagawa method is a further development of direct standardization that more precisely quantifies the relative contribution of changes in variable-specific rates and in population composition to the total changes in rates in cases where both are changing simultaneously (14). In this report, the Kitagawa method is used to estimate the percent contribution of differences in the distribution of births by gestational age, and in gestational age-specific infant mortality rates to the overall difference in infant mortality rates between countries. It is also used to estimate the infant mortality rate that would have occurred, and the number of infant deaths that could have been averted, had different conditions been present.

Results

Despite recent declines in infant mortality (4), the United States ranked 26th among the 29 OECD countries in 2010 (9), behind most European countries as well as Japan, Korea, Israel, Australia, and New Zealand (Figure 1). The U.S. infant mortality rate of 6.1 infant deaths per 1,000 live births was more than twice that for Japan and Finland (both 2.3), the countries with the lowest rates. Twenty-one of the 26 OECD countries studied had infant mortality rates below 5.0. This pattern of high infant mortality rates in the United States when compared with other developed countries has persisted for many years (7,9).

When births at less than 24 weeks were excluded, the U.S. infant mortality rate dropped from 6.1 to 4.2 infant deaths per 1,000 live births in 2010 (Figure 2). The U.S. infant mortality rate (excluding births at less than 24 weeks) of 4.2 was about twice the rate for Finland, Sweden, and Denmark, the countries with the lowest rates. Compared with the U.S. rate, infant mortality rates were lower for 9 of the 11 European countries; the rate for both Poland and Northern Ireland was higher at 4.5.



NOTES: Countries included are those that provided these data to the European Perinatal Health Report. UK is United Kingdom.
SOURCES: CDC/NCHS, linked birth/infant death data set (U.S. data); and European Perinatal Health Report (European data).

Figure 2. Infant mortality rates excluding births at less than 24 weeks of gestation: United States and selected European countries, 2010

Gestational age-specific infant mortality rates are shown in the Table for the United States and the 11 European countries that supplied these data. The United States compares favorably with most European countries in infant mortality rates for very preterm infants (24–31 weeks of gestation), but the comparison becomes less favorable as gestational age increases. The U.S. mortality rate for infants born at 24–27 weeks of gestation was fifth lowest of 12 countries. Seven countries had higher rates, and only Denmark, Finland, Norway, and Sweden had lower rates than the United States. For infants born at 28–31 weeks of gestation, the U.S. rate was in the middle—fifth lowest of eight countries. For infants born at 32–36 weeks of gestation (the preterm category where most preterm births occur), the U.S. infant mortality rate was second highest among 11 countries; only Poland had a higher rate. However, for infants born at 37 weeks of gestation or more, the U.S. infant mortality rate was highest among the countries studied (2.20 per 1,000), and about twice the rates for Denmark, Finland, Norway, Sweden, and Switzerland.

Another important factor affecting infant mortality differences is the percentage of infants born preterm (i.e., before 37 completed weeks of gestation), because preterm infants have higher mortality rates than those born at 37 weeks of gestation or more (14). In 2010, after births at less than 24 weeks were excluded, 9.8% of U.S. births were preterm,

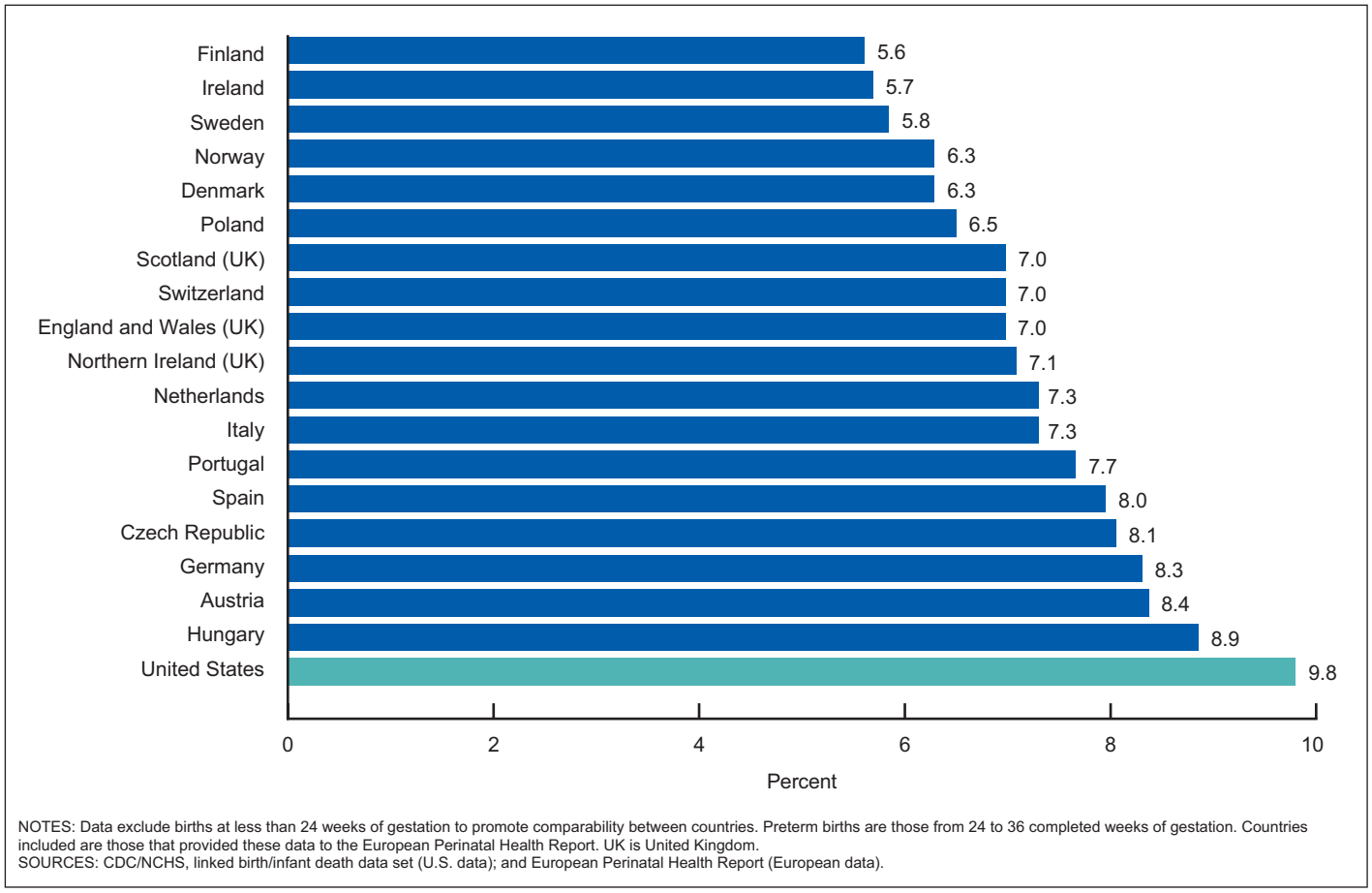
Table. Gestational age-specific infant mortality rates: United States and selected European countries, 2010

Country	Gestational age (weeks)			
	24–27	28–31	32–36	37 or more
Austria	217.39	34.38	8.01	1.24
Czech Republic	294.12	40.37	7.19	1.15
Denmark	198.80	*	7.95	1.11
England and Wales (UK)	245.17	48.29	8.73	1.60
Finland	203.25	*	9.74	0.97
Northern Ireland (UK)	325.00	*	*	1.96
Norway	189.78	*	9.87	1.06
Poland	429.32	98.98	15.43	1.95
Scotland (UK)	282.49	47.01	8.38	1.58
Sweden	165.08	35.14	8.33	1.10
Switzerland	308.41	41.75	6.77	1.12
United States	208.08	44.65	10.20	2.20

* Figure does not meet standards of reliability or precision; based on fewer than 20 deaths in the numerator.

NOTES: Infant mortality rates are per 1,000 live births in specified group. Countries included are those that provided these data to the European Perinatal Health Report. UK is United Kingdom.

SOURCES: CDC/NCHS, linked birth/infant death data set (U.S. data), and European Perinatal Health Report (European data).



NOTES: Data exclude births at less than 24 weeks of gestation to promote comparability between countries. Preterm births are those from 24 to 36 completed weeks of gestation. Countries included are those that provided these data to the European Perinatal Health Report. UK is United Kingdom.
SOURCES: CDC/NCHS, linked birth/infant death data set (U.S. data); and European Perinatal Health Report (European data).

Figure 3. Percentage of preterm births: United States and selected European countries, 2010

the highest among the 19 countries studied (Figure 3). The percentage of preterm births in the United States was 40% higher than in England and Wales, and 69%–75% higher than in Finland, Ireland, and Sweden.

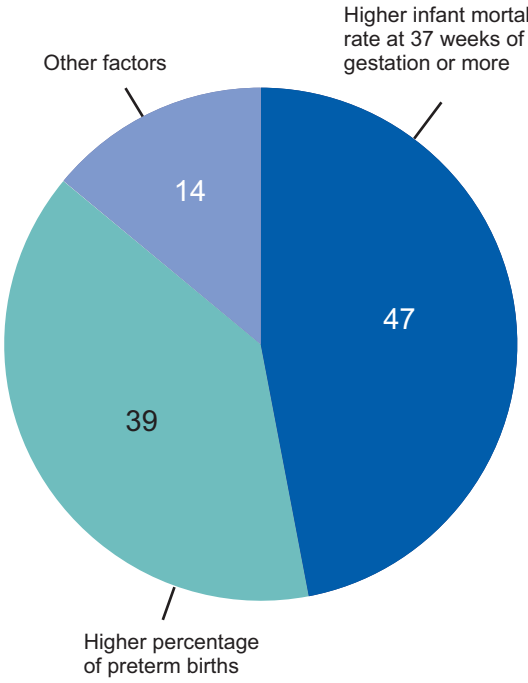
The Kitagawa method (14) was used to examine the contribution of preterm births and gestational age-specific infant mortality rates to the infant mortality difference between the United States and Sweden. About 39% of the United States' higher infant mortality rate when compared with that of Sweden was due to the higher U.S. percentage of preterm births, while 47% of the difference was due to the higher U.S. mortality rate for infants at 37 weeks of gestation or more (although Sweden had lower infant mortality rates at all gestational ages) (Figure 4). Other factors (such as infant mortality rates at 24–27, 28–31, and 32–36 weeks of gestation, and the percentage of births at 37 weeks or more) also contributed modestly to the differences; however, their influence was small when compared with these two main factors. For example, even though the U.S. infant mortality rate at 32–36 weeks of gestation was second-highest among the countries studied, the United States' higher gestational age-specific infant mortality rate at 32–36 weeks of gestation contributed only 6% to the overall difference.

If the United States could reduce its percentage of preterm births to Sweden's levels, the U.S. infant mortality rate (excluding events at less than 24 weeks of gestation) would decline by 19% to a rate of 3.4 (Figure 5). This would result in over 3,200 fewer infant deaths than actually occurred in 2010. Alternatively, if the United States could reduce its infant mortality rate for infants at 37 weeks of gestation or more to Swedish levels, the U.S. infant mortality rate (excluding events at less than 24 weeks) would decline by 24% to 3.2. This would avert nearly 4,100 infant deaths. If both factors could be reduced to the levels in Sweden, the U.S. infant mortality rate (excluding events at less than 24 weeks) would decline by 43% to 2.4, and nearly 7,300 infant deaths would be averted.

Discussion

Since 2005, the United States has made important progress in reducing both infant mortality and preterm birth (5,15,16). Because both the linked birth/infant death and EPHR data are available for the 2010 data year, the current analysis focused on 2010 data (8). However, more recent U.S. data on both infant mortality and preterm birth are available from other sources (6,16). The 2011 infant mortality rate of 6.07 infant deaths per 1,000 live births was 12% lower than the rate of 6.87 in 2005. The percentage of preterm births declined from a high of 12.80% in 2006 to 11.55% in 2012 (16). Despite these improvements, the U.S. international infant mortality ranking did not improve during this time frame (7,9), and the U.S. infant mortality rate remains higher than for most European countries, even after excluding births at less than 24 weeks of gestation. Furthermore, the United States still has the highest percentage of preterm births among the countries studied.

The United States compares favorably with most European countries in the survival of very preterm infants. However, the comparison becomes less favorable as gestational age increases. For example, the



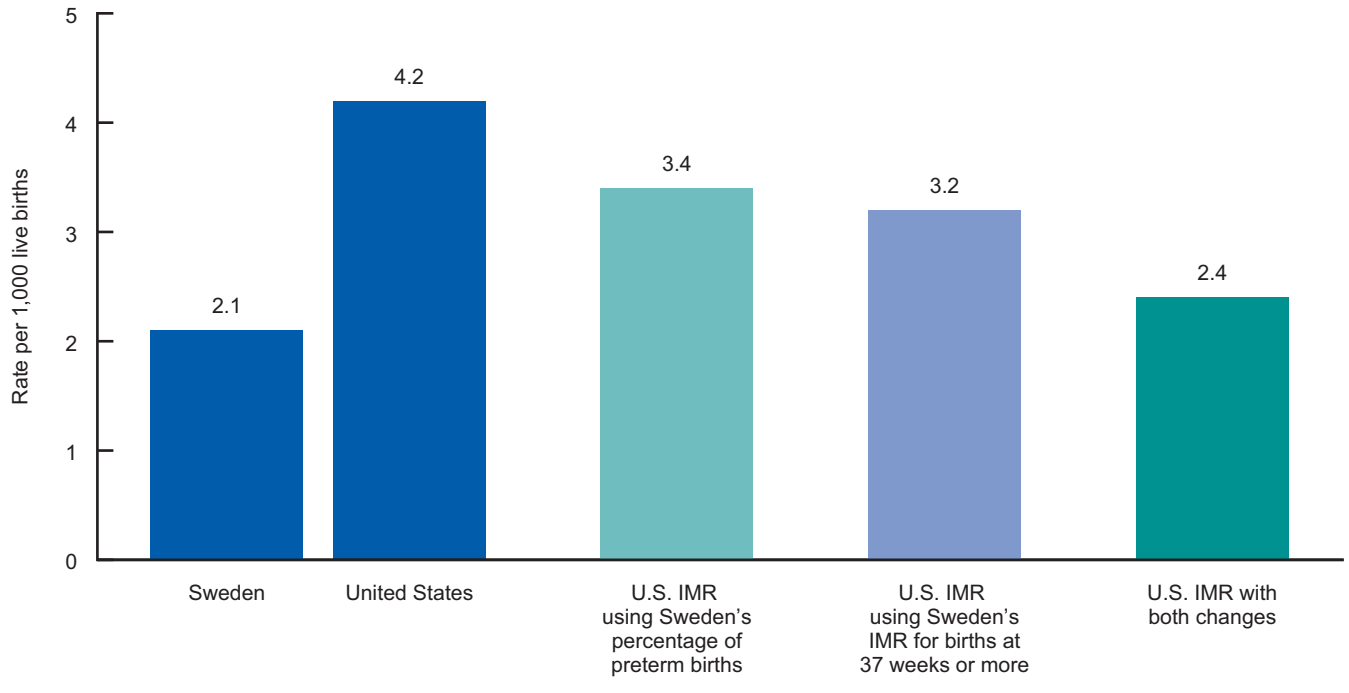
NOTES: Percentages are computed using Kitagawa analysis; see Methods. Data exclude births at less than 24 weeks of gestation.
SOURCES: CDC/NCHS, linked birth/infant death data set (U.S. data); and European Perinatal Health Report (European data).

Figure 4. Percent contribution of various factors to the higher U.S. infant mortality rate compared with that of Sweden

U.S. infant mortality rate at 37 weeks of gestation or more was highest among the countries studied, and about twice the rates for Denmark, Finland, Norway, Sweden, and Switzerland.

This study found that 39% of the United States' higher infant mortality rate, when compared with that of Sweden, was due to the higher U.S. percentage of preterm births, while 47% of the difference was due to the United States' higher infant mortality rate for infants at 37 weeks of gestation or more. A previous report found a larger effect for preterm birth (10), mostly due to the inclusion of births at 22–23 weeks of gestation in that report. Recent declines in the U.S. infant mortality rate and percentage of preterm births, and the use of the obstetric estimate to measure gestational age in the current report (compared with gestational age based on the last menstrual period used in the previous report), may have also contributed to the difference in findings between the two reports.

The findings from the current analysis suggest that declines in either the percentage of preterm births or in infant mortality rates at 37 weeks of gestation or more could have a substantial positive impact on the U.S. infant mortality rate. If both of these factors could be reduced to Sweden's levels, the U.S. infant mortality rate (excluding events at less than 24 weeks) would be reduced from 4.2 to 2.4—a decline of 43%. Such a decline would mean nearly 7,300 fewer infant deaths than actually occurred in the United States in 2010.



NOTES: IMR is infant mortality rate. Data exclude births at less than 24 weeks of gestation.
SOURCES: CDC/NCHS, linked birth/infant death data set (U.S. data); and European Perinatal Health Report (Sweden's data).

Figure 5. Infant mortality rates for United States and Sweden, and U.S. infant mortality rate under various modeling assumptions, 2010

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Contents

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