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Term pregnancy: a period of heterogeneous risk for infant mortality

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Abstract

Objective—Term pregnancy (37–41 weeks of gestation) is generally regarded as a uniform period for pregnancy outcome. The purpose of this study was to estimate the trend of maternal racial/ethnic differences in mortality for early term (37 0/7 – 38 6/7 weeks of gestation) compared to full term births (39 0/7 – 41 6/7 weeks of gestation).

Methods—We analyzed 46,329,018 singleton live births using the National Center for Health Statistics (NCHS) U.S. period-linked birth/infant death data from 1995 to 2006. Infant mortality rates (IMR), neonatal mortality rates (NMR), and postneonatal mortality rates (PNMR) were calculated according to gestational age, race/ethnicity, and cause of death.

Results—Overall, IMR has decreased for early term and full term births between 1995 and 2006. At 37 weeks of gestation, Hispanics had the greatest decline in IMR, 35.4% (4.8/1000 to 3.1/1000), followed by 22.4% for whites (4.9/1000 to 3.8/1000), whereas blacks had the smallest decline, 6.8% (5.9/1000 to 5.5/1000), due to a stagnant NMR. When 37 weeks is compared to 40 weeks of gestation, NMR is increased : Hispanics: RR= 2.6 (95% CI 2.0–3.3); whites: RR= 2.6 (95% CI 2.2–3.1); and blacks: RR= 2.9 (2.2–3.8). There is still excess NMR at 38 weeks of gestation. At both early and full term gestations, NMR is 40% higher and PNMR is 80% higher for blacks whereas Hispanics have a reduced PNMR when compared to whites.

Conclusion—Early term births are associated with higher NMR, PNMR, and IMR compared to full term births, with concerning racial/ethnic disparity in rates and trends.

Introduction

Term pregnancy, defined as 37–41 weeks of gestation (260 – 294 days), is generally regarded as a period of homogeneous pregnancy risk. Studies that investigate perinatal outcomes often use deliveries that occur over the entire length of the term period as the

reference group. This definition of term gestation, however, was determined in a relatively arbitrary fashion. (1)

There is limited evidence that infants born between 37 0/7 and 38 6/7 weeks of gestation, referred to as “early” term births, have increased mortality and neonatal morbidity as compared with neonates born at later gestational age, referred to as “full” term. (2,3) An analysis of U.S. singleton term non- anomalous live births among non-Hispanic white women between 1995 and 2001 showed that the neonatal mortality rate decreased with increasing gestational age from 0.66 per 1,000 live births at 37 weeks to 0.33 per 1,000 live births at 39 weeks and then remained stable until 40 weeks.(3) The increased risk of neonatal, postneonatal and infant mortality associated with late preterm deliveries (34 to 36 weeks of gestation) persisted in the early term period (37 to 38 weeks of gestation) when compared to deliveries at 40 weeks of gestation.(3) Similar observations were made in a study of births from 1999–2004 in Utah (4). However, there is a public perception that the early term and full term periods are equivalent, a homogeneously low risk period. In a recent survey (n=650), over half of insured first time mothers who delivered within the past 18 months believed that full term was reached at 37–38 weeks of gestation and most believed it is safe to deliver before 39 weeks of gestation when there are no other medical complications requiring early delivery. (5)

The purpose of this study was to estimate the trend over the past decade for maternal racial and ethnic differences in neonatal, postneonatal and infant mortality for early term (37 0/7 – 38 6/7 weeks of gestation) when compared to full term births (39 0/7 – 41 6/7 weeks of gestation) . Furthermore, we estimated if the distribution of the causes of neonatal and postneonatal death differ for early term and full term births by maternal race and ethnicity.

Materials and Methods

We analyzed National Center for Health Statistics (NCHS) U.S. period-linked birth/infant death data for 1995 to 2006. Beginning in 1995, linked files were produced by NCHS using the period format and consist of all infant deaths in a specific year that had been linked to their corresponding birth certificates in the same or preceding year. NCHS applies a weight to records in the data file to account for those infant deaths that could not be linked to the corresponding birth certificate. (6) The linkage rate was >97% during the study period of 1995 to 2006.

Analysis was limited to singleton live births between 37 and 41 completed weeks of gestation. Gestational age in the period-linked file was reported by NCHS as completed weeks of gestation and measured as the interval between the first day of the mother’s last menstrual period (LMP) and the date of birth, except when gestational age is inconsistent with birth weight and plurality. In these cases, if only the month and year of the LMP are available, NCHS imputes the gestational age by assigning the weeks of gestation of the previous completed record in the file with a similar race and birth weight. (7) In cases where the month, year, or entire LMP is missing, or when the imputed gestational age appears to be inconsistent with birth weight, the clinical estimate of gestation is substituted, occurring in about 5% of live births primarily due to missing LMP.(6)

Term infants were defined as infants born between 37-0/7 and 41-6/7 weeks of gestation and categorized as early term and full term infants. Early term infants were defined as infants born between 37-0/7 and 38-6/7 weeks of gestation, and full term infants were defined as infants born between 39-0/7 and 41-6/7 weeks of gestation.

We examined infant deaths separating the neonatal and postneonatal period. Infant deaths were all those between 0 and 364 days of life. Neonatal deaths were those between 0 and 27 days of life and postneonatal deaths between 28 and 364 days. Infant mortality rates were calculated as the number of infant deaths by age at time of death per 1000 live births.

To estimate differences in cause-specific infant mortality rates by maternal race and ethnicity and age at time of infant death, we aggregated data for 2000 to 2006. Cause-specific infant mortality rates were defined as the number of infant deaths due to a specific cause of death per 100,000 live births. Rates for specific causes of death are based solely on the underlying cause of death. Multiple conditions or causes reported in the cause of death section of the death certificate are converted to a single underlying cause of death following the world Health Organization rules. Underlying causes of death were coded according to *International Statistical Classification of Diseases and Related Health Problems*, tenth revision (ICD-10) for 2000 to 2006. The ICD-10 130 selected causes of infant death were assigned 1 of 71 rankable causes of infant death as defined by NCHS. (8)

Rates of infant mortality by age at time of infant death between 1995 and 2006 were calculated for each gestational week for term Hispanic, non-Hispanic white and non-Hispanic black infants. Relative risk ratios by age at time of death and maternal race and ethnicity were calculated for infants born at 37, 38, 39 and 41 completed weeks of gestation compared to gestational age of 40 completed weeks for all deaths and deaths excluding birth defects. Relative risk ratios of infant mortality by age at time of death and early term and full term gestational age groups for 2006 were calculated for Hispanic and non-Hispanic black infants compared to non-Hispanic white infants. Five leading neonatal and postneonatal cause-specific mortality rates for 2000 – 2006 by maternal race and ethnicity were calculated for early term and full term infants.

Data analyses were conducted with SAS software version 9.1.3 (SAS Institute Inc., Cary, NC). P-values were computed by chi-square test for association between maternal characteristics and gestational age groups. We used Poisson regression to estimate the trend in mortality rates between 1995 and 2006 by using the number of deaths as the response variable with a population offset and added years to the model as an independent variable. To assess significance of the relative risk ratios, confidence intervals were constructed. Statistical significance was set a priori at a p value $< .05$.

Results

During the study period, 1995–2006, there were 46,779,901 singleton live births. 46,329,018 (99.0%) had gestational age reported, of which, 11,717,596 (25.3%) were early term and 26,450,038 (57.1%) were full term. In 1995, term deliveries represented 81.3% of singleton births; early term comprised 21.8% and full term comprised 59.5% of singleton deliveries.

On the other hand, there was a shift in 2006, with term deliveries representing 83.1% of singleton births; early term comprised 28.9% and full term comprised 54.2% of singleton deliveries.

The distribution of births for all racial/ethnic groups increased at 37–39 weeks of gestation and decreased at 40–41 weeks. The proportion of early term births out of all term births is consistently higher for non-Hispanic blacks compared to the other racial/ethnic groups: 31.4 % in 1995 increasing to 38.3% in 2006. The proportion of early term births out of all term births was 27.4% for Hispanics and 25% for non-Hispanic whites in 1995 increasing to 34.2% for both groups in 2006. Across all race/ethnicity groups early term births were more likely to be associated with advanced maternal age (> 35 years old), multiparity and married status compared to full term births (Table 1).

Early term infants (37 and 38 weeks of gestation) had higher infant mortality rates (IMR) when compared to full term infants (39 – 41 weeks of gestation) for every year of the study period. (Figure 1) Between 1995 and 2006, the IMR was highest at 37 weeks of gestation with a rate of 5.1/1000 in 1995 declining to 3.9/1000 in 2006. The IMR at 38 weeks of gestation was 3.4/1000 in 1995 declining to 2.5/1000 in 2006. These rates compare with an IMR at 40 weeks of gestation of 2.6/1000 in 1995 declining to 1.9/1000 in 2006. Mortality for infants born at 41 weeks of gestation decreased the least over this time period.

When examining early term IMR by race and ethnicity, there are differences in trends over the study period. Among births at 37 weeks of gestation, Hispanics had the greatest decline in IMR of 35.4% followed by a 22.4% decline for non-Hispanic whites. (Table 2) In contrast, the IMR among non- Hispanic blacks declined only 6.8%. This disparity is attributable to the divergent trends in neonatal mortality rates (NMR): the NMR at 37 weeks of gestation among Hispanics and non-Hispanic whites declined 34.8% and 33.3% respectively, while the NMR among non-Hispanic blacks increased by 15.8%.. (Table 2) While the increase is not statistically significant, there is clearly no reduction in the rate over time. In fact, the NMR for non-Hispanic black infants born at 37 weeks of gestation in 2006 is similar to the NMR in 1995 for non-Hispanic whites and Hispanics at 37 weeks of gestation. The pattern is somewhat different for postneonatal mortality (PNMR). At 37 weeks of gestation the PNMR declined between 1995 and 2006 by 36.0% for Hispanics followed by a decline of 22.0% for non-Hispanic blacks and 15.4% for non-Hispanic whites. (Table 2)

For infants born at 38 weeks of gestation, the decline in NMR among non-Hispanic blacks (14.3%) is less than that of non-Hispanic whites (35.7%) and Hispanics (23.1%). Similarly, the decline for PNMR is less for non-Hispanic blacks (14.3%) compared to non-Hispanic whites (26.3%) and Hispanics (25.0%). (Table 2)

Among all race/ethnicities, early term is a period of consistently higher neonatal mortality rates (NMR) when compared to full term. Figure 2 demonstrates that NMR is highest at 37 weeks of gestation, 1.5, 1.6, 2.2 per 1,000 live births in 2006 for Hispanics, non-Hispanic whites, and non-Hispanic blacks, respectively. Likewise, the neonatal mortality rate is lowest

at 40 weeks of gestation, 0.6, 0.6 and 0.8 per 1,000 live births for Hispanics, non-Hispanic whites, and non-Hispanic blacks, respectively.

The increased risk of neonatal death at 37 weeks compared to 40 weeks of gestation is as follows: Hispanics: RR= 2.6 (95% CI 2.0–3.3); non-Hispanic whites: RR= 2.6 (95% CI 2.2–3.1); and non-Hispanic blacks: RR= 2.9 (2.2–3.8). (Table 3) The excess risk in neonatal mortality at 38 weeks compared to 40 weeks of gestation declines significantly: Hispanics, RR= 1.7 (95% CI 1.3–2.1); non-Hispanic whites, RR= 1.5 (95% CI 1.3–1.8); and non-Hispanic blacks, RR= 1.5 (95% CI 1.2–2.0).

When deaths due to birth defects were excluded the magnitude of the increased risk of neonatal mortality for infants born at 37 weeks compared to 40 weeks remained the same for Hispanic and non-Hispanic black infants but declined from RR=2.6 to RR=1.8 (95% C.I. 1.5–2.3) for non-Hispanic white infants. When deaths due to birth defects were excluded there was still an excess risk of neonatal mortality for neonates born at 38 weeks compared to 40 weeks: Hispanics, RR= 1.6 (95% CI 1.1–2.3); non-Hispanic whites, RR= 1.2 (95% CI 1.0–1.5); and non-Hispanic blacks, RR= 1.3 (0.9–2.0) (data not shown).

Early term is also a period of consistently higher postneonatal mortality rates (PNMR) when compared to 39–41 weeks of gestation for all race/ethnicities. (Table 3). The increased relative risk (RR) of an infant born at 37 weeks dying in the postneonatal period compared to 40 weeks is as follows: Hispanics, RR= 1.7 (95% CI 1.3–2.1) ; non-Hispanic whites: RR= 1.8 (95% CI 1.6–2.1); and non-Hispanic blacks: RR= 1.6 (95% C.I. 1.3–1.9). The excess risk in postneonatal mortality at 38 weeks compared to 40 weeks is less: Hispanics, RR= 1.2 (95% CI 1.0–1.5); non-Hispanic whites, RR= 1.2 (95% 1.0–1.3); and non-Hispanic blacks, RR= 1.4 (95% C.I. 1.2–1.7). The magnitude of the excess risk of postneonatal mortality for infants born at 37 or 38 weeks compared to 40 weeks remained the same when deaths due to birth defects were excluded.

Table 4 examines racial disparity in NMR in 2006 by gestational age. The risk of neonatal mortality is 40% higher for non-Hispanic blacks compared to non-Hispanic whites, at both 37–38 and 39–41 weeks of gestation, RR= 1.4 (95% CI 1.2, 1.6). Hispanic neonatal mortality is equivalent to that of non-Hispanic whites for these intervals of gestation, RR= 1.0 (95% CI 0.9, 1.2) at 37–38 weeks of gestation and RR= 1.0 (95% CI 0.9, 1.1) at 39 – 41 weeks of gestation.

There is also racial disparity in PNMR by gestational age as seen in Table 4. The risk of postneonatal mortality is 80% higher among non-Hispanic blacks compared to non-Hispanic whites, RR= 1.8 (95% CI 1.6, 2.0) at both 37–38 weeks of gestation and 39–41 weeks of gestation. Hispanics have a reduced risk of postneonatal mortality, RR= 0.8 (95% CI 0.7, 0.9) at both 37–38 weeks of gestation and 39–41 weeks of gestation, when compared to non-Hispanic whites.

When cause of neonatal mortality is examined from 2000 – 2006 in singleton gestations, the distribution of causes of death are relatively similar across race/ethnicities (Table 5). Birth defects (congenital malformations, deformations and congenital anomalies) are the leading cause of neonatal death among all race/ethnicities between 37–41 weeks of gestation, with

the highest proportion among Hispanic neonatal deaths. The rate of neonatal death attributable to birth defects declines substantially between early term and full term for all race/ethnicities. For all race and ethnicities, intrauterine hypoxia, bacterial sepsis, and SIDS are in the top 5 causes of neonatal death. Accidents account for one of the top 5 causes of death for non-Hispanic whites and non-Hispanic blacks at 37–38 and 39–41; however, it is absent from the top 5 causes of neonatal death for Hispanics.

For early term and full term infants, birth defects are the leading cause of postneonatal death for Hispanics, while SIDS is the leading cause of postneonatal death for non-Hispanic whites and non-Hispanic blacks. Accidents are the third leading cause of postneonatal death regardless of gestational age or race/ethnicity. Assault accounts for one of the top 5 causes of postneonatal death in early and full term gestations for all racial and ethnic groups.

Discussion

Using the most recently available U.S. period-linked birth/infant death data, we demonstrated that the period of term gestation (37–41 weeks of gestation) is more heterogeneous in mortality risk than previously recognized. Although births at 37 and 38 completed weeks are considered term, these early term births are consistently associated with significantly higher neonatal and infant mortality rates when compared to births at 39 through 41 weeks of gestation over time.

When estimating the time trend, infant mortality for 37–41 completed weeks of gestation has decreased in the past decade across all race and ethnicities. However, the non-Hispanic black infant mortality rate has experienced the smallest decrease at 37 weeks of gestation when compared to improvements for non-Hispanic whites and Hispanics. This is because the neonatal mortality rate for non-Hispanic blacks at 37 weeks of gestation has not sustained any improvement, with an increase of 15.8% over the past decade. In addition, the declines in mortality for infants born at 38 weeks of gestation were less for non-Hispanic black infants compared to the other groups.

Alexander and colleagues analyzed singleton live births from 1995–2000 linked birth infant death cohort files and found for infants born at below 34 weeks of gestation, blacks had a survival advantage in infant mortality over whites. For births at 34–35 weeks of gestation the infant mortality rates were equivalent. For infants born at 36 weeks or greater, the black/white disparity increased with increasing gestation through 41 weeks (9). In our study, non-Hispanic black infants were 40% more likely die in the neonatal period and 80% in postneonatal period in 2006 compared to whites, if they were born at either early term or full term gestations. This is another reflection of the increasingly poor outcome over time for non-Hispanic black early term infants relative to non-Hispanic whites. The stagnation in the rate of these early term neonatal deaths requires further study in order to devise interventions to improve outcome.

The distribution of the leading five causes of neonatal death is relatively uniform across race and ethnicities with birth defects being the leading cause of death. However, the causes of postneonatal death vary by race and ethnicity. Accidents, assault and SIDS require further

targeting because these outcomes are amenable to intervention and are major contributors to the black/white disparity in postneonatal mortality in the United States.

The strength of the study is the use of a large sample size with recent data collected over one decade allowing for analysis of time trend and high power to detect differences in mortality rates. While there may be concerns regarding the inaccuracies of gestational age estimates in birth certificates, they are less frequent for term births (10).

Studies using vital statistics have tried to assess the independent risk of mortality for an infant born at 37 and 38 weeks compared to 40 weeks age after adjusting for maternal medical and pregnancy conditions, obstetric complications and history of prior preterm birth (3,11). There appears to be no change in the increased risk after adjustment. However, the limitation of vital statistics is the quality and completeness of data on medical history and obstetric or fetal complications. (12–14) Studies are needed in databases that have high quality medical record information to be able to understand the contribution of complications to the increased risk for infant mortality among births in the early term period and to the racial disparity in mortality rates. In particular, since births at 37 weeks have an exceptionally higher mortality rate, studies should be designed to examine the origin of the increased risk.

These data demonstrate that “term” pregnancy is not a period of uniform risk with early term deliveries (37 and 38 weeks of gestation) experiencing higher neonatal, postneonatal and infant mortality rates than full term deliveries (39 – 41 weeks of gestation). Because 40 weeks of gestation has the lowest infant mortality rates across all race and ethnicities, it should be regarded as the optimal gestational age to use as a control group rather than analyzing infants born over the entire term period. In addition, although there have been improvements in overall neonatal, postneonatal and infant mortality rates across the term period in the past decade, the unacceptable disparity in infant mortality remains for non-Hispanic blacks and must be targeted by intervention to decrease the mortality rate for this high-risk group.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
 Infant Mortality Rates by Gestational Age among Singleton Live Births: US, 1995 – 2006 *
 Percent changes in infant mortality rate between 1995 and 2006 were significant at $\alpha = 0.05$.

Figure 2.
Neonatal Mortality Rates by Gestational Age Weeks by Race/Ethnicity: Singletons, US, 2006

Table 1

Early and Full Term Singleton Live Births by Maternal Characteristics by Race/Ethnicity, 2006

	Hispanic (N= 828,281)			Non-Hispanic White(N=1,870,052)			Non -Hispanic Black (N = 461,562)		
	Early Term		Full Term	Early Term		Full Term	Early Term		Full Term
	N (Percent *)	N (Percent *)	p-value	N (Percent *)	N (Percent *)	p-value	N (Percent *)	N (Percent *)	p-value
Maternal Age(Yrs)									
<20	36687 (12.9)	79058 (14.5)	<.0001	41769 (6.5)	91167 (7.4)	<.0001	28002 (15.8)	50748 (17.8)	<.0001
20-24	78165 (27.6)	163744 (30.1)		139791 (21.8)	284236 (23.1)		55959 (31.7)	93879 (33.0)	
25-29	76226 (26.9)	149912 (27.5)		183136 (28.6)	363100 (29.5)		44898 (25.4)	71015 (24.9)	
30-34	56917 (20.1)	99673 (18.3)		161842 (25.3)	303471 (24.7)		28417 (16.1)	42999 (15.1)	
>=35	35590 (12.6)	52309 (9.6)		113709 (17.8)	187831 (15.3)		19435 (11.0)	26210 (9.2)	
Parity									
Primiparous	88153 (31.2)	210120 (38.7)	<.0001	225722 (35.4)	553144 (45.2)	<.0001	62211 (35.5)	121038 (43.0)	<.0001
Multiparous	194709 (68.8)	333103 (61.3)		411650 (64.6)	670161 (54.8)		112934 (64.5)	160706 (57.0)	
Marital Status									
Married	148779 (52.5)	273041 (50.1)	<.0001	480571 (75.1)	910126 (74.0)	<.0001	54938 (31.1)	84293 (29.6)	<.0001
Not Married	134806 (47.5)	271655 (49.9)		159676 (24.9)	319679 (26.0)		121773 (68.9)	200558 (70.4)	

* Percent of total live births; Totals exclude live births with unknown maternal characteristics.

Table 2

Gestational age specific infant mortality rate (IMR), neonatal mortality rate (NMR) and postneonatal mortality rate (PNMR) by race/ethnicity among singletons, 1995, 2000 and 2006, U.S.

Race/Ethni Year	IMR ¹					NMR ¹					PNMR ¹				
	37 weeks	38 weeks	39 weeks	40 weeks	41 weeks	37 weeks	38 weeks	39 weeks	40 weeks	41 weeks	37 weeks	38 weeks	39 weeks	40 weeks	41 weeks
Hispanic															
1995	4.8	2.8	2.4	2.5	2.1	2.3	1.3	0.9	1.0	0.9	2.5	1.6	1.4	1.5	1.3
2000	3.5	2.5	1.9	1.8	2.2	1.8	0.9	0.8	0.7	0.8	1.7	1.5	1.2	1.1	1.4
2006	3.1	2.2	1.7	1.5	1.9	1.5	1.0	0.6	0.6	0.8	1.6	1.2	1.0	0.9	1.0
% change ²	-35.4%	-21.4%	-29.2%	-40.0%	-9.5%	-34.8%	-23.1%	-33.3%	-40.0%	-11.1%	-36.0%	-25.0%	-28.6%	-40.0%	-23.1%
Non-Hispanic White															
1995	4.9	3.3	2.6	2.3	2.3	2.4	1.4	0.9	0.8	0.9	2.6	1.9	1.7	1.5	1.4
2000	4.1	2.8	2.2	1.9	2.0	1.8	1.1	0.9	0.7	0.8	2.3	1.8	1.3	1.2	1.2
2006	3.8	2.3	2.0	1.8	2.1	1.6	0.9	0.7	0.6	0.7	2.2	1.4	1.3	1.2	1.4
% change ²	-22.4%	-30.3%	-23.1%	-21.7%	-8.7%	-33.3%	-35.7%	-22.2%	-25.0%	-22.2%	-15.4%	-26.3%	-23.5%	-20.0%	0.0%
Non-Hispanic Black															
1995	5.9	4.9	4.5	4.4	4.2	1.9	1.4	1.3	1.3	1.2	4.1	3.5	3.2	3.0	3.0
2000	5.5	4.4	3.7	3.6	3.8	2.1	1.6	1.1	1.1	1.1	3.5	2.7	2.6	2.5	2.8
2006	5.5	4.1	3.3	2.8	3.9	2.2	1.2	0.9	0.8	1.2	3.2	3.0	2.3	2.0	2.8
% change ²	-6.8%	-16.3%	-26.7%	-36.4%	-7.1%	15.8% [*]	-14.3%	-30.8%	-38.5%	0.0%	-22.0%	-14.3%	-28.1%	-33.3%	-6.7%

¹ Rate per 1,000 live births.

² % change in rates between 1995 and 2006.

* % change was not statistically significant. Significance of % changes were tested by Poisson regression model at $\alpha = 0.05$.

Table 3

Relative risks of neonatal and post neonatal mortalities by gestational age and race/ethnicity, Singletons, 2006, U.S.

	Neonatal Death				Post Neonatal Death			
	Gestational Age	N	Rate [*]	RR (95% CI)	N	Rate [*]	RR (95% CI)	
Hispanic	37 weeks	137	1.5	2.6 (2.0, 3.3)	145	1.6	1.7 (1.3, 2.1)	
	38 weeks	186	1.0	1.7 (1.3, 2.1)	227	1.2	1.2 (1.0, 1.5)	
	39 weeks	163	0.6	1.1 (0.9, 1.4)	262	1.0	1.1 (0.9, 1.3)	
	40 weeks	116	0.6	Referent	188	0.9	Referent	
	41 weeks	76	0.8	1.5 (1.1, 1.9)	91	1.0	1.1 (0.8, 1.4)	
NH-White	37 weeks	314	1.6	2.6 (2.2, 3.1)	440	2.2	1.8 (1.6, 2.1)	
	38 weeks	405	0.9	1.5 (1.3, 1.8)	627	1.4	1.2 (1.0, 1.3)	
	39 weeks	400	0.7	1.1 (0.9, 1.3)	786	1.3	1.1 (1.0, 1.2)	
	40 weeks	267	0.6	Referent	529	1.2	Referent	
	41 weeks	145	0.7	1.2 (1.0, 1.5)	266	1.4	1.1 (1.0, 1.3)	
NH-Black	37 weeks	139	2.2	2.9 (2.2, 3.8)	199	3.2	1.6 (1.3, 1.9)	
	38 weeks	137	1.2	1.5 (1.2, 2.0)	338	3.0	1.4 (1.2, 1.7)	
	39 weeks	128	0.9	1.2 (0.9, 1.6)	329	2.3	1.1 (1.0, 1.4)	
	40 weeks	79	0.8	Referent	206	2.0	Referent	
	41 weeks	50	1.2	1.5 (1.0, 2.1)	120	2.8	1.4 (1.1, 1.7)	

* Rate per 1,000 live births.

Table 4

Infant, Neonatal and Postneonatal Mortality Rates and Relative Risks by Race/Ethnicity and Gestational Age Group, Singletons, US, 2006

Neonatal Death						
37–38 weeks				39–41 weeks		
N	Rate*	RR	(95% CI)	N	Rate*	RR (95% CI)
Hispanic	323	1.1	1.0 (0.9, 1.2)	355	0.7	1.0 (0.9, 1.1)
NH-White	719	1.1	Referent	813	0.7	Referent
NH-Black	276	1.6	1.4 (1.2, 1.6)	257	0.9	1.4 (1.2, 1.6)

Postneonatal Death						
37–38 weeks				39–41 weeks		
N	Rate*	RR	(95% CI)	N	Rate*	RR (95% CI)
Hispanic	372	1.3	0.8 (0.7, 0.9)	541	1.0	0.8 (0.7, 0.9)
NH-White	1067	1.7	Referent	1582	1.3	Referent
NH-Black	537	3.0	1.8 (1.6, 2.0)	655	2.3	1.8 (1.6, 2.0)

Infant Death						
37–38 weeks				39–41 weeks		
N	Rate*	RR	(95% CI)	N	Rate*	RR (95% CI)
Hispanic	695	2.5	0.9 (0.8, 1.0)	896	1.6	0.8 (0.8, 0.9)
NH-White	1786	2.8	Referent	2395	1.9	Referent
NH-Black	814	4.6	1.7 (1.5, 1.8)	912	3.2	1.6 (1.5, 1.8)

* Rate per 1,000 live births

Table 5
Five Leading Causes of Neonatal and Post Neonatal Death by Gestational Age, Singletons, US, 2000–2006 average

		Neonatal Death				Post Neonatal Death			
		37–38 weeks		39–41 weeks		37–38 weeks		39–41 weeks	
Rank	Cause of Death*	N	Rate [†]	Cause of Death*	N	Rate [†]	Cause of Death*	N	Rate [†]
Hispanic									
1	Birth defects	1153	71.5	Birth defects	1335	38.8	Birth defects	647	40.1
2	Intrauterine hypoxia, birth asphyxia	52	3.2	Intrauterine hypoxia, birth asphyxia	141	4.1	SIDS	413	25.6
3	Bacterial sepsis of newborn	50	3.1	Bacterial sepsis of newborn	58	1.7	Accidents	211	13.1
4	SIDS	42	2.6	SIDS	57	1.6	Diseases of the circulatory system	92	5.7
5	Diseases of the circulatory system	28	1.8	Complications of placenta/cord	54	1.6	Assault	84	5.2
Non-Hispanic White									
1	Birth defects	2813	67.4	Birth defects	2792	31.4	SIDS	2172	52.1
2	Intrauterine hypoxia, birth asphyxia	256	6.1	Intrauterine hypoxia, birth asphyxia	564	6.3	Birth defects	1525	36.6
3	SIDS	236	5.6	SIDS	338	3.8	Accidents	848	20.3
4	Bacterial sepsis of newborn	134	3.2	Complications of placenta/cord	202	2.3	Diseases of the circulatory system	257	6.2
5	Accidents	123	2.9	Accidents	179	2.0	Assault	224	5.4
Non-Hispanic Black									
1	Birth defects	777	70.8	Birth defects	832	42.3	SIDS	1046	95.3
2	Intrauterine hypoxia, birth asphyxia	85	7.7	SIDS	167	8.5	Birth defects	596	54.3
3	SIDS	81	7.4	Intrauterine hypoxia, birth asphyxia	127	6.4	Accidents	453	41.3
4	Accidents	47	4.3	Accidents	86	4.3	Diseases of the circulatory system	129	11.7
5	Bacterial sepsis of newborn	45	4.1	Complications of placenta/cord	53	2.7	Assault	121	11.0
							Diseases of the circulatory system	216	11.0

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per 100,000 live births.
* 71 rankable underlying cause of death

ICD-10 codes: Diseases of the circulatory system (I00-I99); Complications of placenta/cord (P02); Intrauterine hypoxia, birth asphyxia (P20-P21); Bacterial sepsis of newborn (P36); Birth defects (Q00-Q99); SIDS-Sudden infant death syndrome (R95); Accidents (V01-X59); Complications of placenta/cord (P02); Assault (X85-Y09)