

# INFANT MORTALITY IN TARRANT COUNTY 2003-2005



**Tarrant County Public Health**

*Safeguarding our community's health*



# Infant Mortality in Tarrant County, 2003-2005



## Tarrant County Public Health

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## I. INTRODUCTION

The caliber of a community is often measured by how well it cares for its most vulnerable inhabitants. That is why infant mortality is considered a definitive indicator in assessing the health and well-being of a population. The proportion of babies that do not make it to their first birthday is used as a barometer for maternal health status, quality of and access to medical care, socioeconomic conditions, and public health practices. For this reason, Tarrant County Public Health actively monitors infant mortality among our residents. Presented in this report is a detailed descriptive examination of infant mortality in Tarrant County. The information contained herein is a tool for raising awareness about infant mortality along with influencing program and policy development focused on positively impacting the lives of women, infants, and families in our community.

### TECHNICAL NOTES

Due to annual fluctuations and small sample sizes for individual years, data for the three year period 2003-2005 have been combined for analyses. Live birth and death data files were obtained from the Texas Department of State Health Services (TDSHS) after Institutional Review Board approval. These detailed records contain non-aggregate data retrieved from birth and death certificates.

Beginning in 2005, new information was collected on Texas birth certificates that was previously unavailable. As a result, selected sections of this report contain data from 2005 only and not for the combined years of 2003-2005. Some of these variables include maternal pre-pregnancy height and weight, breastfeeding status at hospital discharge, payment type, and enrollment in the Special Supplemental Nutrition Program for Women, Infants and Children. In conjunction with adding data elements to the birth certificate, other variables are no longer obtained including alcohol use during pregnancy and a wide range of maternal medical risk factors. At the time of this report, some aggregate data from 2006 were available for analyses and therefore have been included when applicable. Analyses were conducted using SPSS 17.0.

It should be noted regarding race/ethnicity categories that the terms "White", "Black", and "Hispanic" are used for reporting on birth and death certificates from the TDSHS. The ethnic category "Other" has been excluded from race-specific analyses, but has been included in calculations involving all races/ethnicities.



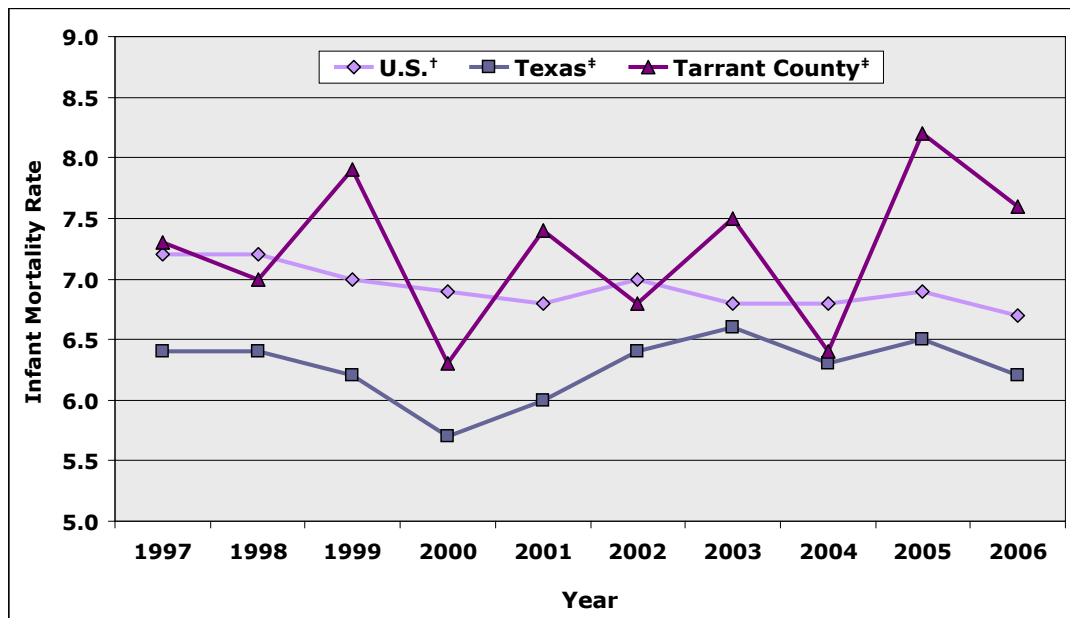
## GEOGRAPHIC COMPARISONS

In 2006, the infant mortality rate (IMR) in Tarrant County was 7.6 deaths per 1,000 live births. This rate was 23 percent higher than the IMR for Texas (6.2), 13 percent higher than the rate for the United States (6.7), and almost 70 percent higher than the *Healthy People 2010* objective of 4.5 infant deaths per 1,000 live births. The IMR in Tarrant County has consistently been higher than the state rate over the past decade and has been higher than the U.S. rate in six of the last ten years (Figure 1). As Figure 1 shows, the Tarrant County IMR has fluctuated each year since 1997 with the lowest rate occurring in 2000 (6.3) and the highest rate documented in 2005 (8.2). Overall, there has been a four percent increase in the Tarrant County IMR during the ten year period from 1997 to 2006.

***In 2006, Tarrant County had the highest infant mortality rate among Texas counties with 10,000 or more live births.<sup>†</sup>***

<sup>†</sup>Tied with Dallas County at 7.6 infant deaths per 1,000 live births

**Figure 1. Infant mortality rate in the United States, Texas, and Tarrant County, 1997-2006**



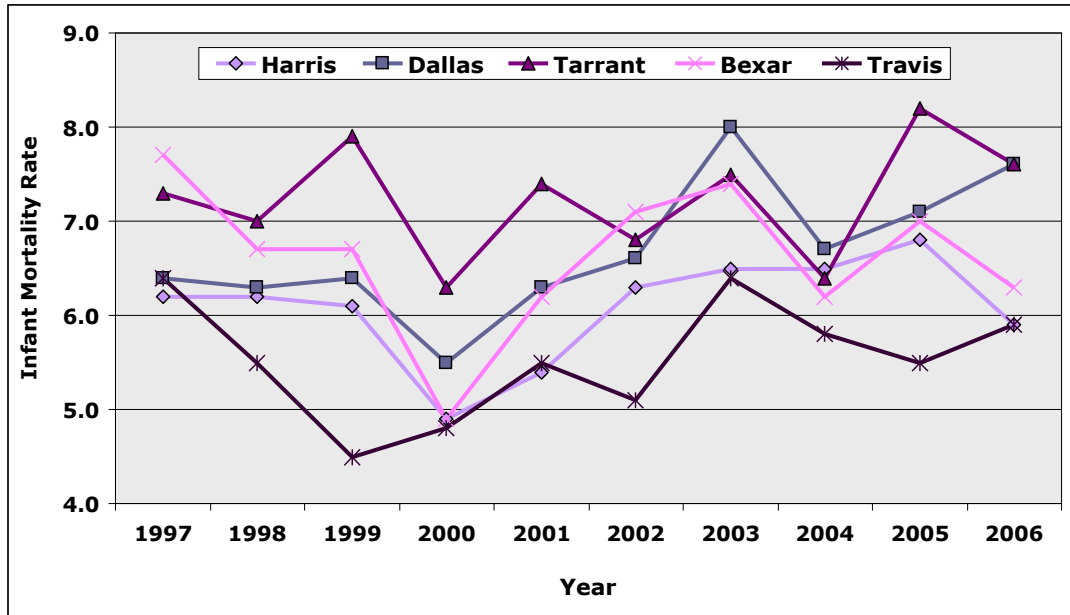
Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births

<sup>†</sup>Data source: National Center for Health Statistics

<sup>‡</sup>Data source: Texas Department of State Health Services

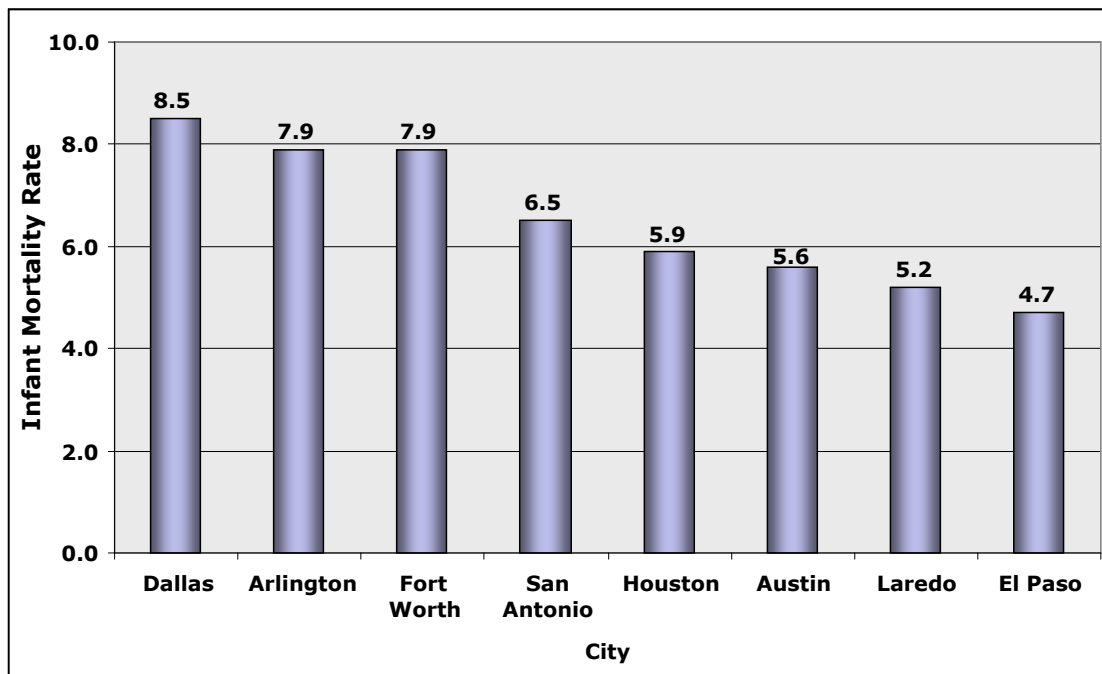
Among the five most populous counties in Texas, Tarrant County was tied with Dallas County for the highest IMR in 2006 (Figure 2). For nine out of ten years (from 1997 through 2006), the IMR in Tarrant County was higher than in Harris County, which is the largest county in Texas having more than twice the population size and number of births as Tarrant County. Bexar County had the second highest IMR at 6.3 infant deaths per 1,000 live births in 2006 with Harris and Travis counties tied for the lowest IMR at 5.9 each.

**Figure 2. Infant mortality rate among the five most populous Texas counties, 1997-2006**



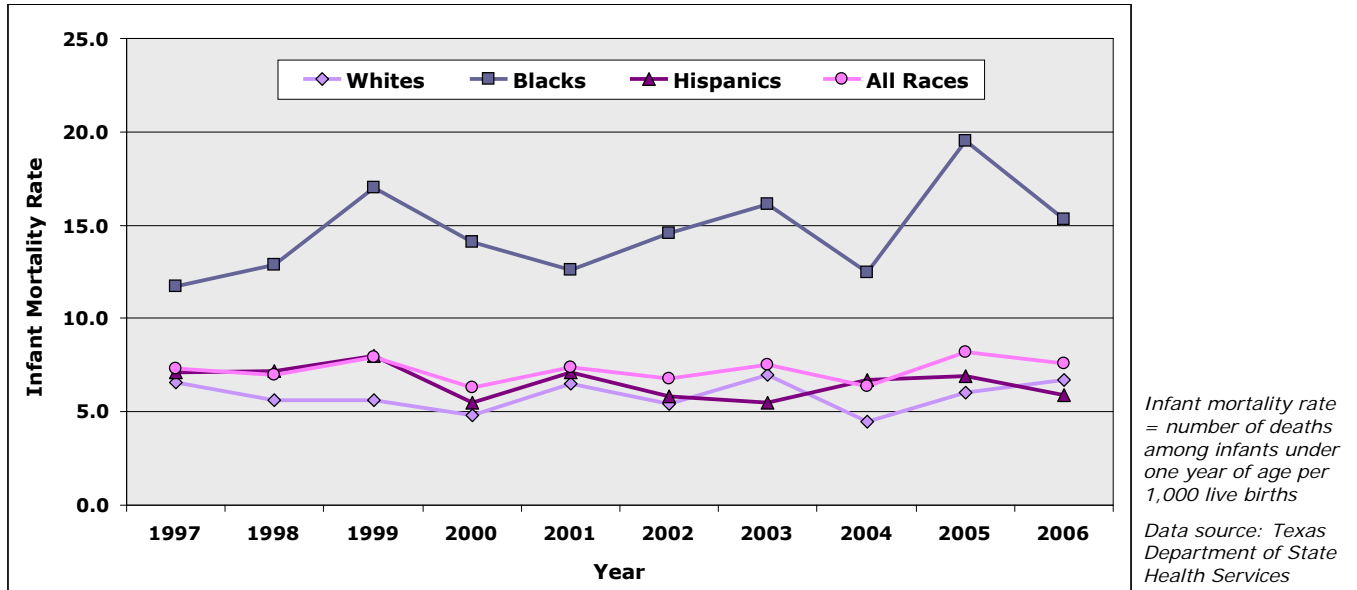
In 2006, eight Texas cities had at least 5,000 live births. Among those cities, Arlington and Fort Worth (both in Tarrant County) were tied for the second highest IMR (7.9) behind Dallas (8.5) (Figure 3.). The remaining five cities include San Antonio (6.5), Houston, (5.9), Austin (5.6), Laredo (5.2), and El Paso (4.7).

**Figure 3. Infant mortality rate among Texas cities with at least 5,000 live births, 2006**



As also seen at the state and national level, IMRs in Tarrant County are historically highest among babies born to non-Hispanic Black mothers (Figure 4). The IMR for Blacks in 2006 (15.3) was more than twice as high as rates for Whites and Hispanics (6.7 and 5.9, respectively). Tables 1 and 2 highlight the ten year trend in infant mortality by race/ethnicity in Texas and in Tarrant County from 1997 to 2006.

**Figure 4. Infant mortality rate by race/ethnicity of mother, Tarrant County, 1997-2006**



*The infant mortality rate for African Americans is more than twice as high as the rate among Caucasians and Hispanics.*

**Table 1. Infant mortality rate (IMR) by race/ethnicity of mother, Texas, 1997-2006**

Race/ Ethnicity	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
<b>Whites</b>										
Infant Deaths (n)	797	787	720	690	718	784	809	764	689	747
Live Births (n)	137,796	140,325	140,374	142,553	139,351	138,118	138,464	136,659	137,156	138,443
<b>IMR</b>	<b>5.8</b>	<b>5.6</b>	<b>5.1</b>	<b>4.8</b>	<b>5.2</b>	<b>5.7</b>	<b>5.8</b>	<b>5.6</b>	<b>5.0</b>	<b>5.4</b>
<b>Blacks</b>										
Infant Deaths (n)	430	466	502	468	489	561	576	537	590	564
Live Births (n)	39,406	40,123	40,005	41,180	40,602	41,520	41,700	42,117	42,355	45,877
<b>IMR</b>	<b>10.9</b>	<b>11.6</b>	<b>12.5</b>	<b>11.4</b>	<b>12.0</b>	<b>13.5</b>	<b>13.8</b>	<b>12.8</b>	<b>13.9</b>	<b>12.3</b>
<b>Hispanics</b>										
Infant Deaths (n)	883	885	902	876	927	986	1,032	1,043	1,190	1,072
Live Births (n)	146,147	151,116	157,329	166,440	171,790	178,474	182,528	187,784	191,488	198,162
<b>IMR</b>	<b>6.0</b>	<b>5.9</b>	<b>5.7</b>	<b>5.3</b>	<b>5.4</b>	<b>5.5</b>	<b>5.7</b>	<b>5.6</b>	<b>6.2</b>	<b>6.5</b>
<b>All Races</b>										
Infant Deaths (n)	2,148	2,180	2,160	2,064	2,181	2,369	2,483	2,398	2,515	2,476
Live Births (n)	333,829	342,199	349,157	363,325	365,092	372,369	377,374	381,441	385,537	399,309
<b>IMR</b>	<b>6.4</b>	<b>6.4</b>	<b>6.2</b>	<b>5.7</b>	<b>6.0</b>	<b>6.4</b>	<b>6.6</b>	<b>6.3</b>	<b>6.5</b>	<b>6.2</b>

*n = number*  
*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*  
*Data source: Texas Department of State Health Services*

**Table 2. Infant mortality rate (IMR) by race/ethnicity of mother, Tarrant County, 1997-2006**

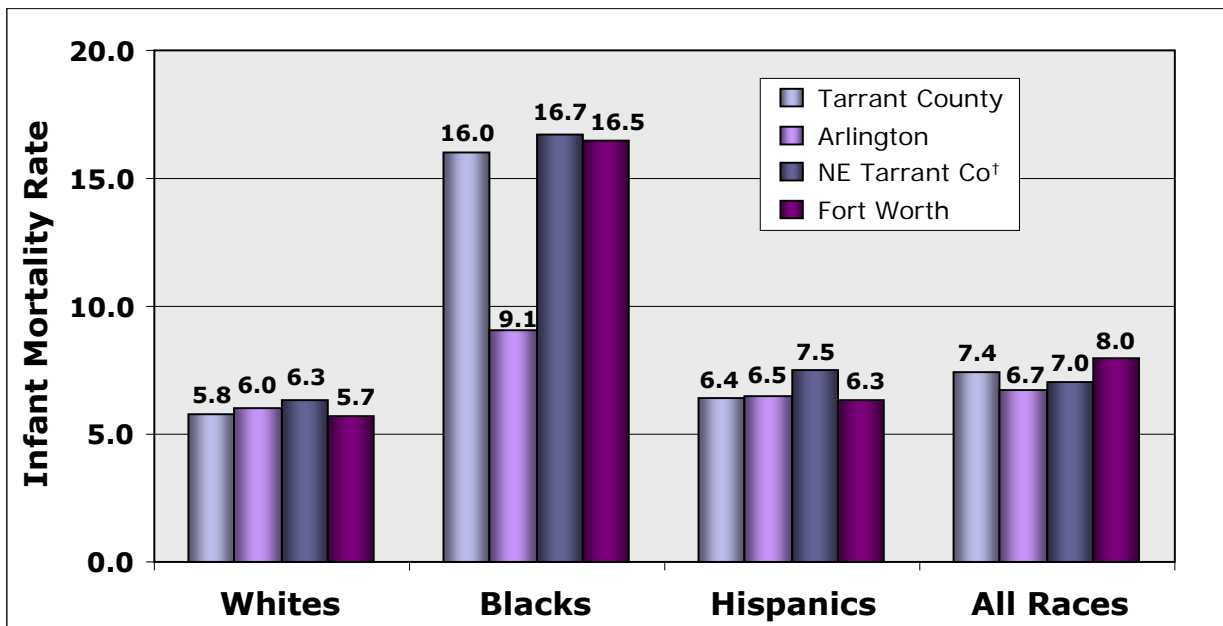
Race/ Ethnicity	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
<b>Whites</b>										
Infant Deaths (n)	81	69	71	60	81	65	85	54	73	82
Live Births (n)	12,331	12,378	12,584	12,504	12,458	12,054	12,206	11,995	12,097	12,272
<b>IMR</b>	<b>6.6</b>	<b>5.6</b>	<b>5.6</b>	<b>4.8</b>	<b>6.5</b>	<b>5.4</b>	<b>7.0</b>	<b>4.5</b>	<b>6.0</b>	<b>6.7</b>
<b>Blacks</b>										
Infant Deaths (n)	37	43	59	51	47	57	63	50	80	67
Live Births (n)	3,169	3,333	3,478	3,626	3,738	3,892	3,920	4,008	4,097	4,376
<b>IMR</b>	<b>11.7</b>	<b>12.9</b>	<b>17.0</b>	<b>14.1</b>	<b>12.6</b>	<b>14.6</b>	<b>16.1</b>	<b>12.5</b>	<b>19.5</b>	<b>15.3</b>
<b>Hispanics</b>										
Infant Deaths (n)	43	47	58	44	63	55	55	68	72	64
Live Births (n)	6,023	6,569	7,222	7,973	8,835	9,545	10,053	10,152	10,385	10,893
<b>IMR</b>	<b>7.1</b>	<b>7.2</b>	<b>8.0</b>	<b>5.5</b>	<b>7.1</b>	<b>5.8</b>	<b>5.5</b>	<b>6.7</b>	<b>6.9</b>	<b>5.9</b>
<b>All Races</b>										
Infant Deaths (n)	165	163	193	160	196	183	208	177	229	221
Live Births (n)	22,605	23,353	24,427	25,428	26,367	26,819	27,574	27,592	27,925	29,050
<b>IMR</b>	<b>7.3</b>	<b>7.0</b>	<b>7.9</b>	<b>6.3</b>	<b>7.4</b>	<b>6.8</b>	<b>7.5</b>	<b>6.4</b>	<b>8.2</b>	<b>7.6</b>

*n = number*  
*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*  
*Data source: Texas Department of State Health Services*

*Arlington has the lowest African American infant mortality rate among selected areas.*

Figure 5 presents a more detailed view of IMRs across major cities/areas of Tarrant County by race/ethnicity. Rates are given for Arlington, Fort Worth, and Northeast Tarrant County and are compared to Tarrant County as a whole. Cities included in Northeast Tarrant County are Bedford, Colleyville, Euless, Grapevine, Haltom City, Hurst, Keller, North Richland Hills, Richland Hills, Southlake, and Watauga. Infant mortality rates were highest among Blacks across all four major geographic areas. The overall IMR was highest in Fort Worth (8.0), but the highest rate for Blacks occurred in Northeast Tarrant County (16.7). Arlington had the lowest IMR among the selected territories (6.7); it also had the lowest rate among Blacks (9.1).

**Figure 5. Infant mortality rate by race/ethnicity of mother, Tarrant County, Arlington, Northeast Tarrant County, and Fort Worth, 2003-2005**



Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births  
 †Northeast Tarrant County includes the following cities: Bedford, Colleyville, Euless, Grapevine, Haltom City, Hurst, Keller, North Richland Hills, Richland Hills, Southlake, and Watauga.  
 Data source: Texas Department of State Health Services

## II. INFANT MORTALITY RATES BY BIRTH / INFANT CHARACTERISTICS

### GESTATIONAL AGE

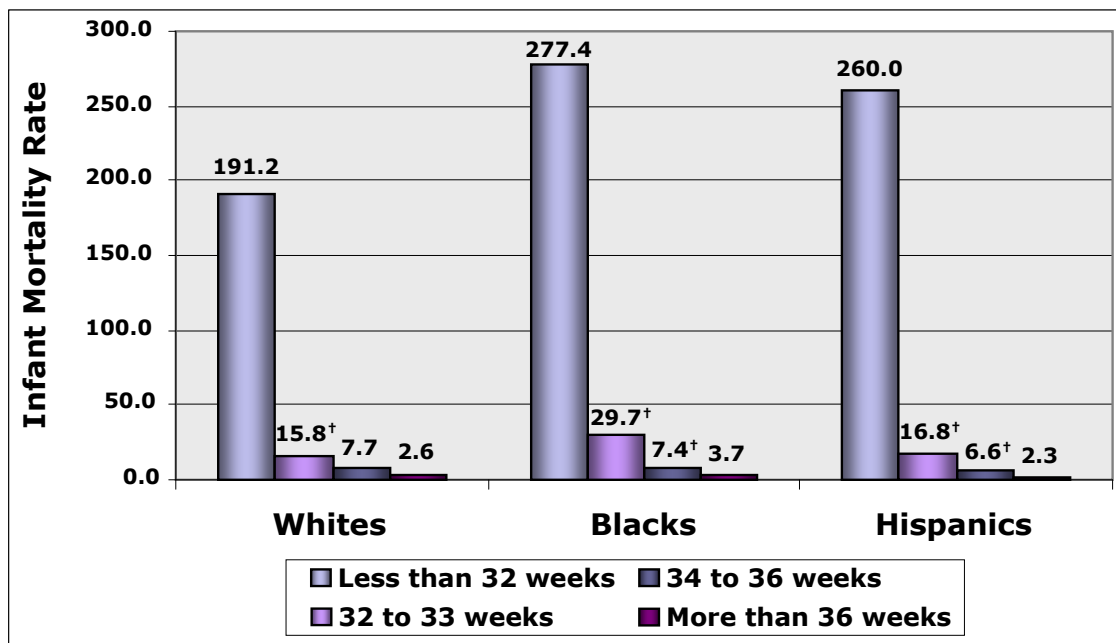
Gestational age is an extremely strong predictor of infant mortality, with IMRs for very preterm babies (less than 32 weeks gestation) nearly 100 times that of IMRs for full term babies (more than 36 weeks gestation) (Table 3). The majority (57%) of infant deaths in Tarrant County were among babies born at less than 32 weeks gestation. A similar association between IMRs and gestational age was also observed in all racial/ethnic groups considered (Figure 6 and Table 4).

**Table 3. Infant mortality rate by gestational age, Tarrant County, 2003-2005**

Gestational Age	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Less than 32 weeks	342 (56.9)	1,405 (1.7)	<b>235.9</b>
32 to 33 weeks	21 (3.5)	1,020 (1.2)	<b>20.6</b>
34 to 36 weeks	48 (8.0)	6,572 (7.9)	<b>7.3</b>
More than 36 weeks	190 (31.6)	74,049 (89.1)	<b>2.6</b>

*n = number*  
*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*  
*Data source: Texas Department of State Health Services*

**Figure 6. Infant mortality rate by gestational age and race/ethnicity of mother, Tarrant County, 2003-2005**



*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution*

*Data source: Texas Department of State Health Services*

**Table 4. Infant mortality rate by gestational age and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Gestational Age			
	Less than 32 Weeks	32 to 33 Weeks	34 to 36 Weeks	More than 36 Weeks
<b>Whites</b>				
Infant Deaths (n)	104	7	23	83
Live Births (n)	544	444	2,972	32,338
Infant Mortality Rate	<b>191.2</b>	<b>15.8<sup>†</sup></b>	<b>7.7</b>	<b>2.6</b>
<b>Blacks</b>				
Infant Deaths (n)	119	7	9	38
Live Births (n)	429	236	1,214	10,146
Infant Mortality Rate	<b>277.4</b>	<b>29.7<sup>†</sup></b>	<b>7.4<sup>†</sup></b>	<b>3.7</b>
<b>Hispanics</b>				
Infant Deaths (n)	110	5	14	63
Live Births (n)	423	298	2,107	27,762
Infant Mortality Rate	<b>260.0</b>	<b>16.8<sup>†</sup></b>	<b>6.6<sup>†</sup></b>	<b>2.3</b>

*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution*

*Data source: Texas Department of State Health Services*

## BIRTH WEIGHT

Birth weight less than 2,500 grams (5.5 lbs) and 1,500 grams (3.3 lbs) are classified as low birth weight (LBW) and very low birth weight (VLBW), respectively. Birth weight is documented to be directly related to gestational age and is one of the strongest predictors of infant death. Table 5 presents IMRs by birth weight. Overall, the IMR in the VLBW category was found to be more than 18 times higher than the IMR in the LBW category and 90 times higher than the adequate birth weight category (more than 2,500 grams).

**Table 5. Infant mortality rate by birth weight, Tarrant County, 2003-2005**

Birth Weight	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
<b>Very Low (<math>\leq 1,500</math> g)</b>	274 (50.4)	1,170 (1.4)	<b>234.2</b>
<b>Low (1,501-2,500 g)</b>	69 (12.7)	5,309 (6.4)	<b>13.0</b>
<b>Adequate (<math>&gt;2,500</math> g)</b>	201 (36.9)	76,537 (92.2)	<b>2.6</b>

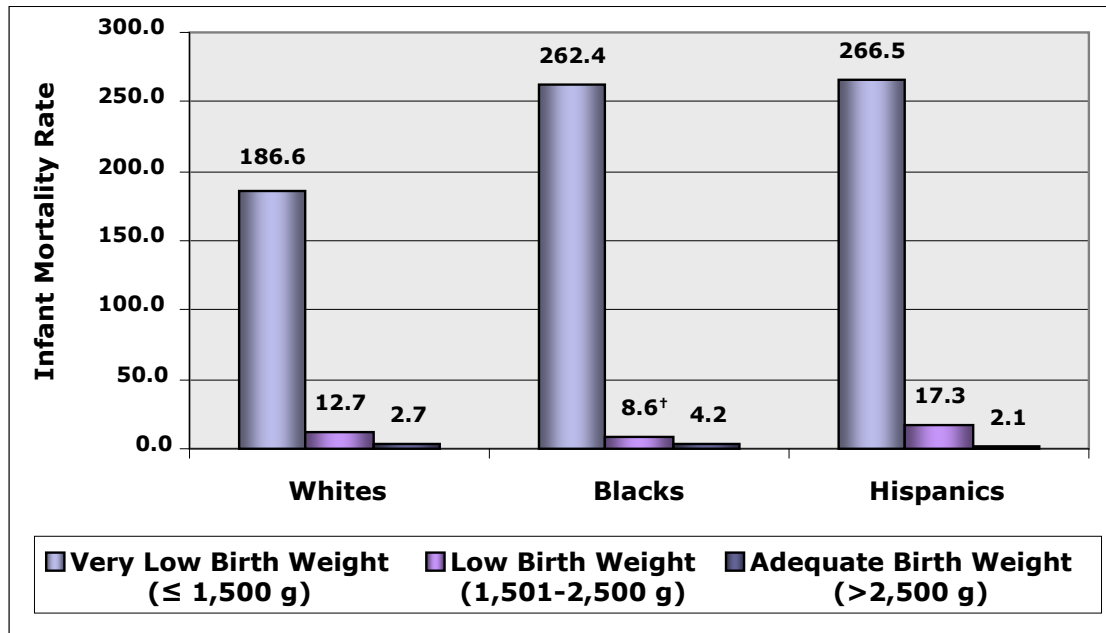
*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*Data source: Texas Department of State Health Services*

Infant mortality rates for VLBW infants remained consistently elevated for all races/ethnicities. However, the IMRs among VLBW Black and Hispanic infants was more than 40 percent higher than for VLBW White infants (Figure 7 and Table 6).

**Figure 7. Infant mortality rate by birth weight and race/ethnicity of mother, Tarrant County, 2003-2005**



**Table 6. Infant mortality rate by birth weight and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Birth Weight		
	Very Low ( $\leq 1,500$ g)	Low (1,501-2,500 g)	Adequate ( $>2,500$ g)
<b>Whites</b>			
Infant Deaths (n)	81	27	91
Live Births (n)	434	2,128	33,715
Infant Mortality Rate	<b>186.6</b>	<b>12.7</b>	<b>2.7</b>
<b>Blacks</b>			
Infant Deaths (n)	95	11	43
Live Births (n)	362	1,282	10,352
Infant Mortality Rate	<b>262.4</b>	<b>8.6<sup>†</sup></b>	<b>4.2</b>
<b>Hispanics</b>			
Infant Deaths (n)	89	28	60
Live Births (n)	334	1,619	28,622
Infant Mortality Rate	<b>266.5</b>	<b>17.3</b>	<b>2.1</b>

*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution*

*Data source: Texas Department of State Health Services*



*Preterm babies  
have infant  
mortality rates  
**18 times**  
that of  
full term babies.*



## INFANT GENDER

In the United States, there has been a well established trend of male disadvantage in infant mortality.<sup>1,2,3</sup> This disadvantage was also seen in Tarrant County where from 2003-2005 the infant death ratio of males to females was 1.19:1 versus a live birth ratio of 1.05:1. During this same time, the mortality rate for male infants was 13 percent higher than female infants (Table 7). This difference in gender was also seen among Blacks and Hispanics, but not among Whites (Figure 8 and Table 8). Although it is not fully understood why this gender difference exists, research has shown that slower lung maturation in males results in higher respiratory distress syndrome-related mortality.<sup>4</sup> Due to improvements in neonatal care, especially the availability of surfactant therapy, the gender gap is narrowing.<sup>5</sup>

**Table 7. Infant mortality rate by infant gender, Tarrant County, 2003-2005**

Infant Gender	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
<b>Male</b>	326 (54.2)	42,565 (51.2)	<b>7.7</b>
<b>Female</b>	275 (45.8)	40,526 (48.8)	<b>6.8</b>

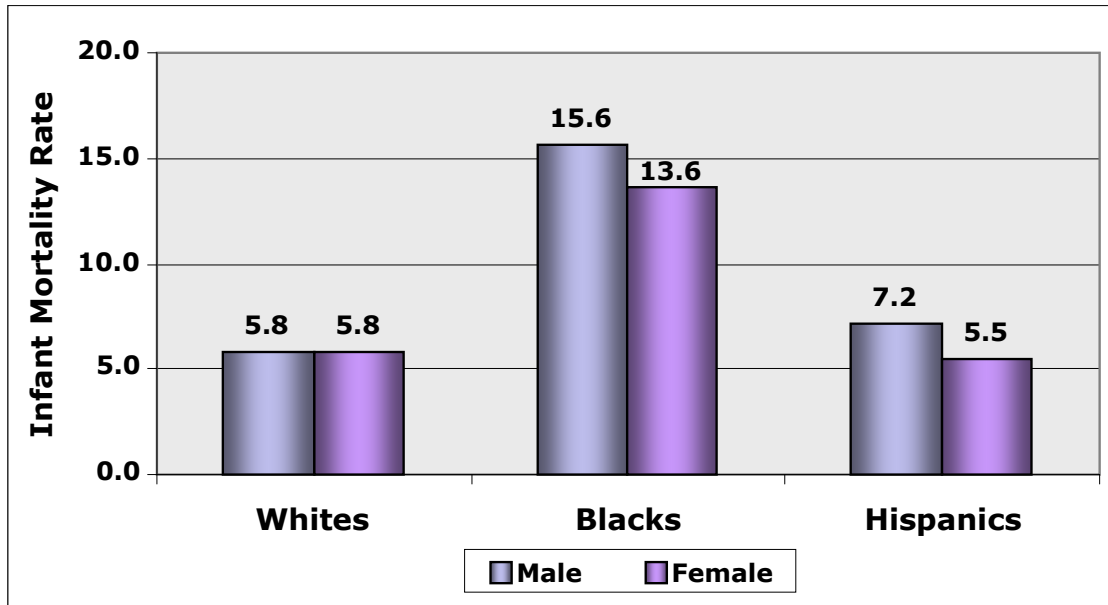
*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*Data source: Texas Department of State Health Services*

1. Naeye RI, et al. Neonatal mortality, the male disadvantage. *Pediatrics*, 1971;48(6):902-6.
2. Fanaroff AA, et al. Very low birth weight outcomes of the National Institute of child Health and Human Development Neonatal Research Network, May 1991 through December 1992. *Am J Obstet Gynecol.*, 1995;173(5):1423-31.
3. Chen SJ, et al. Effects of birth order, gender, and intrauterine grown retardation on the outcome of very low birth weight twins *J Pediatr*, 1993;123(1):132-6.
4. Khoury MJ, et al. Factors affecting the sex differential in neonatal mortality: the role of respiratory distress syndrome. *Am J Obstet Gynecol*, 1985;151(6):777-82.
5. Bhaumik U, et al. Narrowing of sex differences in infant mortality in Massachusetts. *J Perinatol*, 2004;24(2):94-9.

**Figure 8. Infant mortality rate by infant gender and race/ethnicity of mother, Tarrant County, 2003-2005**



Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births

Data source: Texas Department of State Health Services

*Male infants have a higher infant mortality rate than female infants.*

**Table 8. Infant mortality rate by infant gender and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Infant Gender	
	Male	Female
<b>Whites</b>		
Infant Deaths (n)	109	103
Live Births (n)	18,676	17,622
Infant Mortality Rate	<b>5.8</b>	<b>5.8</b>
<b>Blacks</b>		
Infant Deaths (n)	95	81
Live Births (n)	6,078	5,947
Infant Mortality Rate	<b>15.6</b>	<b>13.6</b>
<b>Hispanics</b>		
Infant Deaths (n)	112	83
Live Births (n)	15,624	14,966
Infant Mortality Rate	<b>7.2</b>	<b>5.5</b>

n = number

Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births

Data source: Texas Department of State Health Services

## BIRTH ORDER

Overall in Tarrant County, the IMR for firstborns (8.0 infant deaths per 1,000 live births) was higher than those infants second in order of birth (5.8). The IMR then increased as birth order increased with birth orders of five or higher having an IMR twice that of second births (Table 9). This general trend was seen regardless of race/ethnicity (Figure 9, Table 10). An increased infant mortality with increased birth order may be contributed to older maternal age, lower socioeconomic status, and multiple births in one pregnancy.<sup>1</sup>

**Table 9. Infant mortality rate by birth order, Tarrant County, 2003-2005**

Birth Order	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
<b>1st</b>	247 (42.3)	30,807 (37.8)	<b>8.0</b>
<b>2nd</b>	157 (26.9)	26,847 (32.9)	<b>5.8</b>
<b>3rd</b>	99 (17.0)	14,712 (18.1)	<b>6.7</b>
<b>4th</b>	43 (7.4)	5,824 (7.1)	<b>7.4</b>
<b>5th or more</b>	38 (6.5)	3,310 (4.1)	<b>11.5</b>

*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

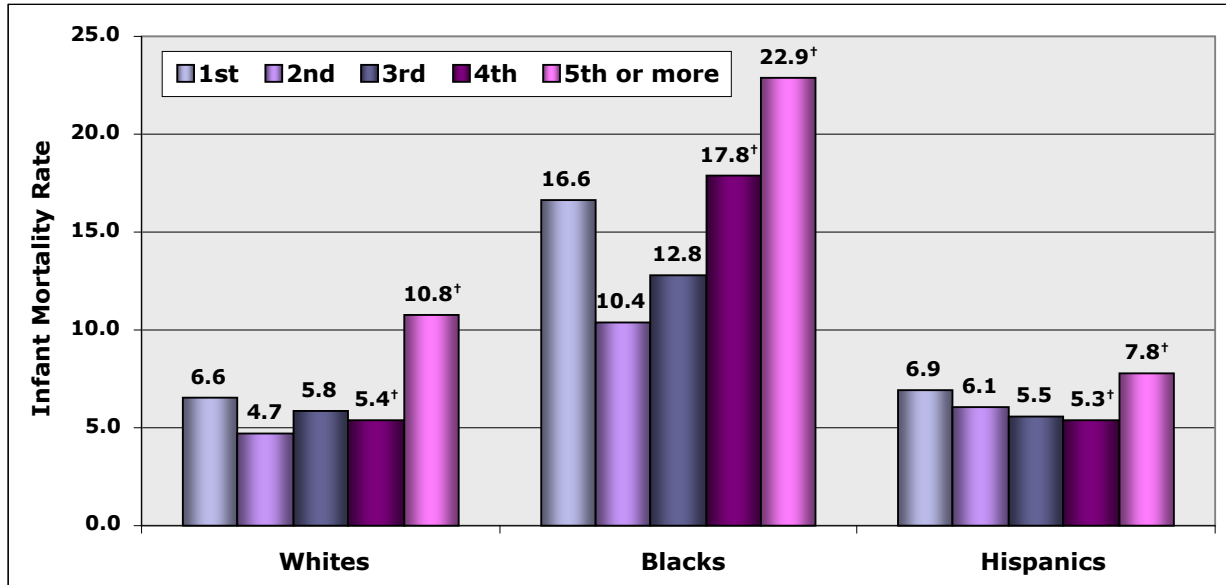
*Data source: Texas Department of State Health Services*

*After the second child, infant mortality rates increase as birth order increases.*



1. Matthews TJ, MacDorman MF. Infant mortality statistics from the 2006 period linked birth/infant death data set. *National Vital Statistics Reports*, 2010;58(17).

**Figure 9. Infant mortality rate by birth order and race/ethnicity of mother, Tarrant County, 2003-2005**



Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births  
<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution  
 Data source: Texas Department of State Health Services

**Table 10. Infant mortality rate by birth order and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Birth Order				
	1st	2nd	3rd	4th	5th or more
<b>Whites</b>					
Infant Deaths (n)	97	58	33	10	9
Live Births (n)	14,769	12,334	5,672	1,860	834
Infant Mortality Rate	<b>6.6</b>	<b>4.7</b>	<b>5.8</b>	<b>5.4<sup>†</sup></b>	<b>10.8<sup>†</sup></b>
<b>Blacks</b>					
Infant Deaths (n)	71	38	27	17	16
Live Births (n)	4,277	3,663	2,115	953	700
Infant Mortality Rate	<b>16.6</b>	<b>10.4</b>	<b>12.8</b>	<b>17.8<sup>†</sup></b>	<b>22.9<sup>†</sup></b>
<b>Hispanics</b>					
Infant Deaths (n)	70	57	35	15	13
Live Births (n)	10,073	9,412	6,322	2,806	1,667
Infant Mortality Rate	<b>6.9</b>	<b>6.7</b>	<b>5.5</b>	<b>5.3<sup>†</sup></b>	<b>7.8<sup>†</sup></b>

n = number  
 Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births  
<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution  
 Data source: Texas Department of State Health Services

### III. INFANT MORTALITY RATES BY MATERNAL CHARACTERISTICS

#### MATERNAL AGE

In Tarrant County from 2003-2005, infants born to mothers less than 20 years old accounted for 17 percent of all infant deaths and 12 percent of all live births (Table 11). They also had the highest IMR across the five age groups (10.1 infant deaths per 1,000 live births). Infants born to mothers between the ages of 25 to 29 years had the lowest IMR (6.6) and comprised a quarter of all infant deaths. Infant mortality rates by maternal age varied according to the race/ethnicity of the mother (Figure 10, Table 12). Much like the overall infant mortality trend by maternal age, Whites and Hispanics had the highest IMRs among the youngest maternal age group (9.8 and 8.1 infant deaths per 1,000 live births, respectively). However, for Blacks the highest IMR emerged among those mothers between the ages of 25 to 29 years (15.6), followed by mothers 35 years and older (15.1), and then mothers aged less than 20 years (14.4). Black mothers aged 25 to 29 years had an IMR almost four times higher than White mothers and over twice as high as Hispanic mothers of the same age group.



*Infants born to mothers less than 20 years old account for 17 percent of all infant deaths and 12 percent of all live births.*

**Table 11. Infant mortality rate by maternal age, Tarrant County, 2003-2005**

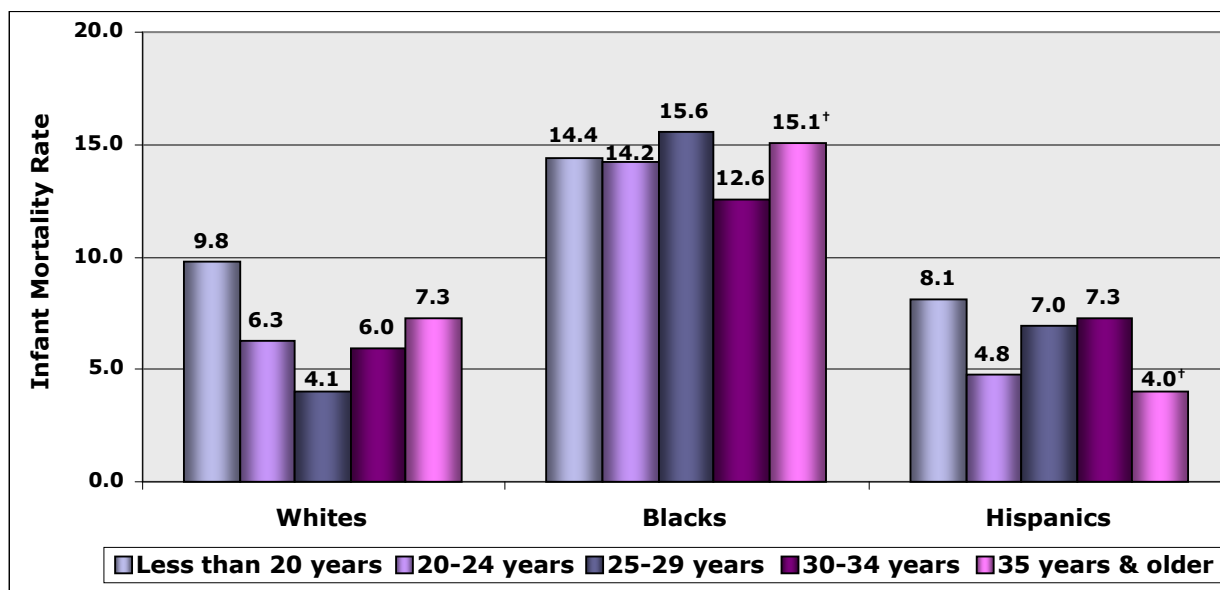
Age of Mother	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Less than 20 years	100 (16.6)	9,935 (12.0)	<b>10.1</b>
20 to 24 years	156 (26.0)	22,051 (26.5)	<b>7.1</b>
25 to 29 years	151 (25.1)	22,955 (27.6)	<b>6.6</b>
30 to 34 years	126 (21.0)	18,396 (22.1)	<b>6.8</b>
35 years and older	68 (11.3)	9,749 (11.7)	<b>7.0</b>

*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*Data source: Texas Department of State Health Services*

**Figure 10. Infant mortality rate by maternal age and race/ethnicity of mother, Tarrant County, 2003-2005**



Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births  
<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution  
 Data source: Texas Department of State Health Services

**Table 12. Infant mortality rate by maternal age and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Age of Mother				
	Less than 20 years old	20 to 24 years	25 to 29 years	30 to 34 years	35 years and older
<b>Whites</b>					
Infant Deaths (n)	28	52	43	56	38
Live Births (n)	2,866	8,231	10,603	9,403	5,193
Infant Mortality Rate	<b>9.8</b>	<b>6.3</b>	<b>4.1</b>	<b>6.0</b>	<b>7.3</b>
<b>Blacks</b>					
Infant Deaths (n)	30	57	46	24	16
Live Births (n)	2,088	4,007	2,957	1,910	1,063
Infant Mortality Rate	<b>14.4</b>	<b>14.2</b>	<b>15.6</b>	<b>12.6</b>	<b>15.1<sup>†</sup></b>
<b>Hispanics</b>					
Infant Deaths (n)	39	44	57	41	11
Live Births (n)	4,808	9,246	8,159	5,640	2,736
Infant Mortality Rate	<b>8.1</b>	<b>4.8</b>	<b>7.0</b>	<b>7.3</b>	<b>4.0<sup>†</sup></b>

n = number  
 Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births  
<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution  
 Data source: Texas Department of State Health Services

## MATERNAL EDUCATION

Major differences in IMRs were not apparent when stratified by maternal education level, although mothers with some college, a college degree, or graduate work tended to have lower IMRs (Table 13). This tendency continued across racial/ethnic groups with college educated mothers having the lowest IMRs (Figure 11, Table 14). Nevertheless, college educated Black mothers still had an IMR almost twice as high as Whites and Hispanics with less than a high school education.

**Table 13. Infant mortality rate by maternal education, Tarrant County, 2003-2005**

Education Level	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Less than HS Diploma	199 (33.7)	25,094 (30.3)	<b>7.9</b>
High School Diploma	204 (34.6)	23,604 (2805)	<b>8.6</b>
Some College/Degree	187 (31.7)	34,057 (41.2)	<b>5.5</b>

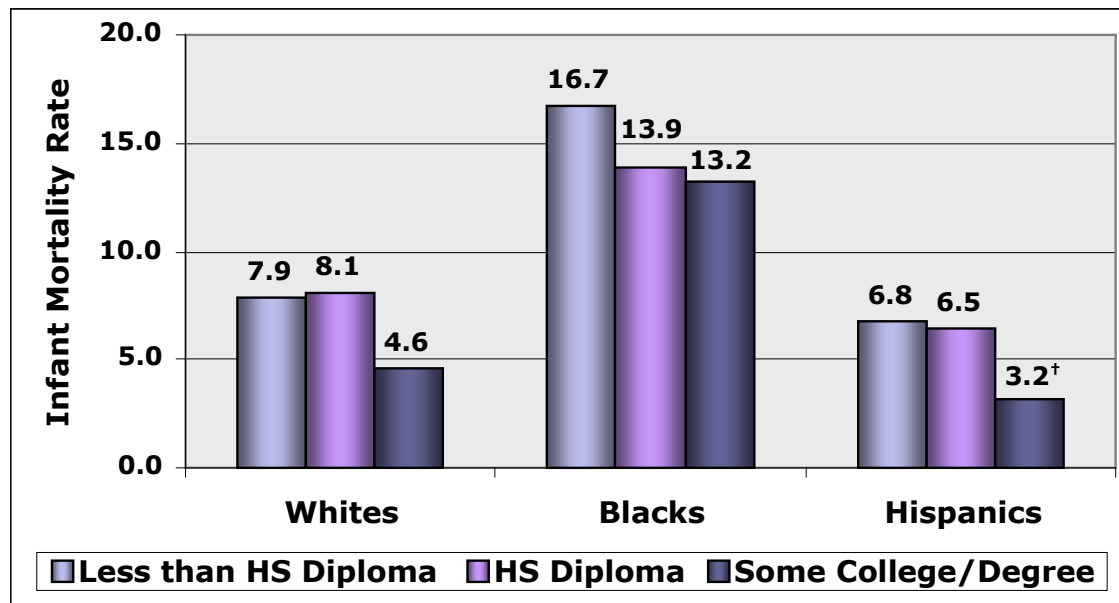
*n = number*

*HS = high school*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*Data source: Texas Department of State Health Services*

**Figure 11. Infant mortality rate by maternal education and race/ethnicity of mother, Tarrant County, 2003-2005**



*HS = high school*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution*

*Data source: Texas Department of State Health Services*

**Table 14. Infant mortality rate by maternal education and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Maternal Education Level		
	Less than HS Diploma	High School Diploma	Some College/Degree
<b>Whites</b>			
Infant Deaths (n)	34	79	102
Live Births (n)	4,229	9,742	22,151
Infant Mortality Rate	<b>7.9</b>	<b>8.1</b>	<b>4.6</b>
<b>Blacks</b>			
Infant Deaths (n)	42	66	62
Live Births (n)	2,513	4,760	4,683
Infant Mortality Rate	<b>16.7</b>	<b>13.9</b>	<b>13.2</b>
<b>Hispanics</b>			
Infant Deaths (n)	121	52	15
Live Births (n)	17,769	7,956	4,749
Infant Mortality Rate	<b>6.8</b>	<b>6.5</b>	<b>3.2<sup>†</sup></b>

*n = number, HS = high school*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution*

*Data source: Texas Department of State Health Services*

## MARITAL STATUS

A number of studies have shown an association between birth outcomes and marital status.<sup>1,2,3,4</sup> Infants born to unwed mothers are at higher risk for preterm delivery, low birth weight, and death during the postneonatal period (21 days to 1 year after birth). Marriage may be an indicator of social, economical, and emotional well-being, which in turn may have an impact of infant mortality. From 2003-2005, unmarried mothers in Tarrant County had an IMR 64 percent higher than married mothers (5.9 vs. 9.7 per 1,000 live births) (Table 15). Unwed Whites, Blacks, and Hispanics all had higher IMRs than their married counterparts, but the greatest difference was seen among Whites, with an IMR 65 percent higher for those who were unmarried compared to married. (Figure 12, Table 16).

1. Arntzen, A, et al. Marital status as a risk factor for fetal and infant mortality. *Scan J Public Health*, 1996; 24(1):36-42.

2. Feldman PJ, et al. Maternal social support predicts birth weight and fetal growth in human pregnancy. *Psychosom Med*, 2000; 62(5):715-25.

3. Luo ZC, et al. Disparities in pregnancy outcomes according to marital and cohabitation status. *Obstet Gynecol*, 2004; 103(6):1300-7.

4. Raatikainen K, et al. Marriage still protects pregnancy. *BJOG*, 2005; 112(10):1411-6.



**Table 15. Infant mortality rate by maternal marital status, Tarrant County, 2003-2005**

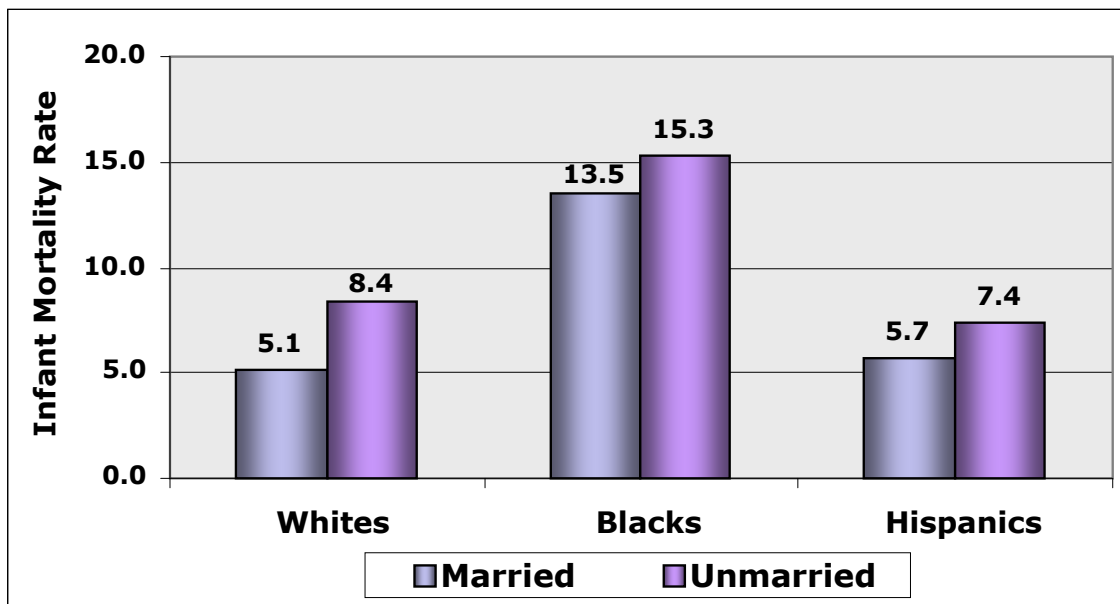
Marital Status	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
<b>Married</b>	318 (52.9)	53,902 (64.9)	<b>5.9</b>
<b>Unmarried</b>	283 (47.1)	29,159 (35.1)	<b>9.7</b>

*n = number*  
*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*  
*Data source: Texas Department of State Health Services*



*Mortality among babies of unmarried mothers is 64% higher than among babies whose mothers are married.*

**Figure 12. Infant mortality rate by maternal marital status and race/ethnicity of mother, Tarrant County, 2003-2005**



*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*  
*Data source: Texas Department of State Health Services*

**Table 16. Infant mortality rate by maternal marital status and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Marital Status	
	Married	Unmarried
<b>Whites</b>		
Infant Deaths (n)	140	72
Live Births (n)	27,694	8,595
Infant Mortality Rate	<b>5.1</b>	<b>8.4</b>
<b>Blacks</b>		
Infant Deaths (n)	60	116
Live Births (n)	4,434	7,588
Infant Mortality Rate	<b>13.5</b>	<b>15.3</b>
<b>Hispanics</b>		
Infant Deaths (n)	104	91
Live Births (n)	18,234	12,344
Infant Mortality Rate	<b>5.7</b>	<b>7.4</b>

*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*Data source: Texas Department of State Health Services*

## MATERNAL BIRTHPLACE

Overall, Tarrant County mothers born outside the United States (the 50 states and the District of Columbia) had infants with lower mortality rates than mothers born in this country (Table 17). While this held true among Blacks and Hispanics, White foreign-born mothers fared worse in infant mortality than U.S.-born Whites (Figure 13 and Table 18). Explanations have been proposed for the difference in U.S.- versus foreign-born IMRs including variations in risk behaviors, social support, and the healthy immigrant effect.<sup>1,2</sup>

**Table 17. Infant mortality rate by maternal birthplace, Tarrant County, 2003-2005**

Mother's Place of Birth	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
<b>Born in the United States<sup>†</sup></b>	439 (74.3)	56,887 (68.5)	<b>7.7</b>
<b>Born elsewhere</b>	152 (25.7)	26,136 (31.5)	<b>5.8</b>

*n = number*

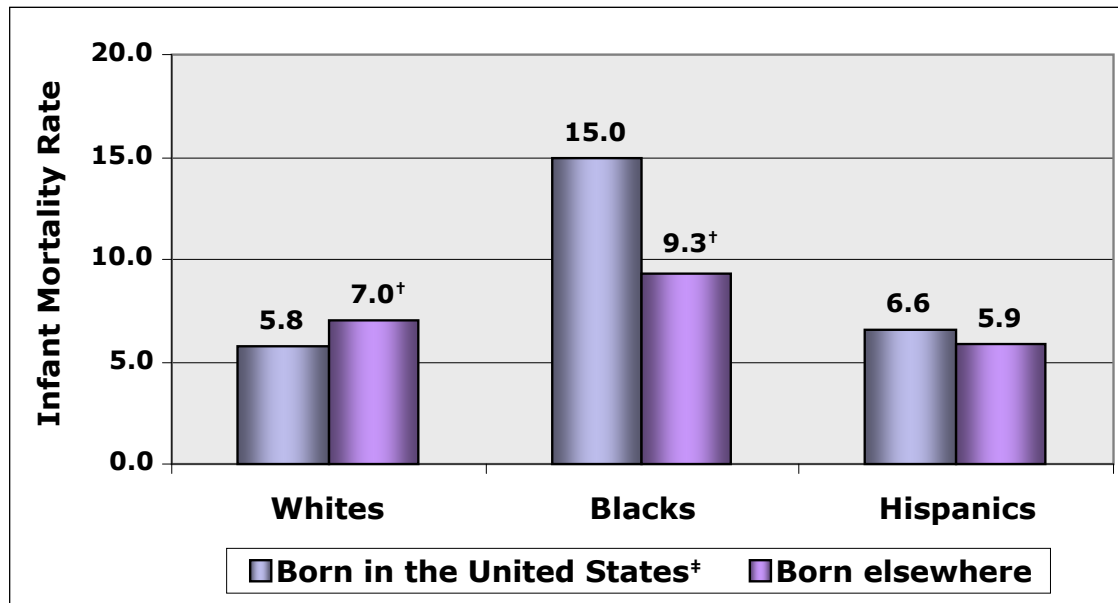
*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

<sup>†</sup>The 50 states and the District of Columbia

*Data source: Texas Department of State Health Services*

1. Singh GK, Yu SM. Adverse pregnancy outcomes; differences between U.S.- and foreign-born women in major U.S. racial and ethnic groups. *Am J Public Health, 1996;86(6):837-43.*
2. Liu KL, Laraque F. Higher mortality rate among infants of U.S.-born mothers compared to foreign-born mothers in New York City. *J Immigr Minor Health, 2006;8(3):281-9.*

**Figure 13. Infant mortality rate by maternal birthplace and race/ethnicity of mother, Tarrant County, 2003-2005**



Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births  
<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution  
<sup>‡</sup>The 50 states and the District of Columbia  
 Data source: Texas Department of State Health Services

**Table 18. Infant mortality rate by maternal birthplace and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Mother's Place of Birth	
	Born in the United States <sup>‡</sup>	Born elsewhere
<b>Whites</b>		
Infant Deaths (n)	198	14
Live Births (n)	34,285	1,991
Infant Mortality Rate	<b>5.8</b>	<b>7.0<sup>†</sup></b>
<b>Blacks</b>		
Infant Deaths (n)	161	12
Live Births (n)	10,722	1,287
Infant Mortality Rate	<b>15.0</b>	<b>9.3<sup>†</sup></b>
<b>Hispanics</b>		
Infant Deaths (n)	74	115
Live Births (n)	11,192	19,377
Infant Mortality Rate	<b>6.6</b>	<b>5.9</b>

*Foreign-born mothers in Tarrant County have a lower infant mortality rate than U.S.-born mothers.*

n = number  
 Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births  
<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution  
<sup>‡</sup>The 50 states and the District of Columbia  
 Data source: Texas Department of State Health Services

## PRE-PREGNANCY WEIGHT

Using the pre-pregnancy height and weight variables from the 2005 birth certificate, the body mass index (BMI) for each mother was calculated and then categorized into underweight (BMI less than 18.5), healthy weight (BMI 18.5-24.9), overweight (BMI 25.0-29.9), and obese (BMI 30.0 and higher). Infant mortality rates increased with each subsequent BMI category (Table 19). Even though underweight mothers had the lowest IMR, the small number of deaths in this pre-pregnancy BMI category created an unstable rate and should be interpreted with caution. Women who were obese before getting pregnant had an infant mortality rate over 75 percent higher than women who began their pregnancy at a healthy weight (11.0 vs. 6.2 infant deaths per 1,000 live births). Maternal obesity has been linked to an increased risk of neonatal death<sup>1</sup> and may be considered a suitable preconception focus area for improving birth outcomes. Since only one year of data was available for BMI calculation, results are not presented categorized further by race/ethnicity.

**Table 19. Infant mortality rate by maternal pre-pregnancy body mass index (BMI), Tarrant County, 2005**

Pre-pregnancy BMI	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
<b>Less than 18.5 (Underweight)</b>	7 (3.6)	1,319 (4.8)	<b>5.3<sup>†</sup></b>
<b>18.5-24.9 (Healthy Weight)</b>	85 (43.1)	13,815 (50.4)	<b>6.2</b>
<b>25.0-29.9 (Overweight)</b>	45 (22.8)	6,873 (25.1)	<b>6.5</b>
<b>30.0 and higher (Obese)</b>	60 (30.5)	5,430 (19.8)	<b>11.0</b>

*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*Data source: Texas Department of State Health Services*

## PRENATAL CARE STATUS

Prenatal care is considered an important determinant in reducing medical risks in both mothers and infants; these medical risks can contribute to increased risk of infant mortality. The data presented in Table 20 infer an inverse correlation between the trimester in which prenatal care was initiated and infant mortality. On the contrary, the IMR among mothers who did not receive prenatal care exceeded those who received such care by 252 percent. It should be noted that information regarding prenatal care status is extracted from the birth record and

1. Chen, A, et al. Maternal obesity and the risk of infant death in the United States. *Epidemiology*, 2009;20(1):74-81.

these data are usually self-reported and reliant on maternal recall and/or partner's knowledge. This information may also be impacted by medical records protocols and transcription procedures used by the clinic, prenatal care facility, or hospital.

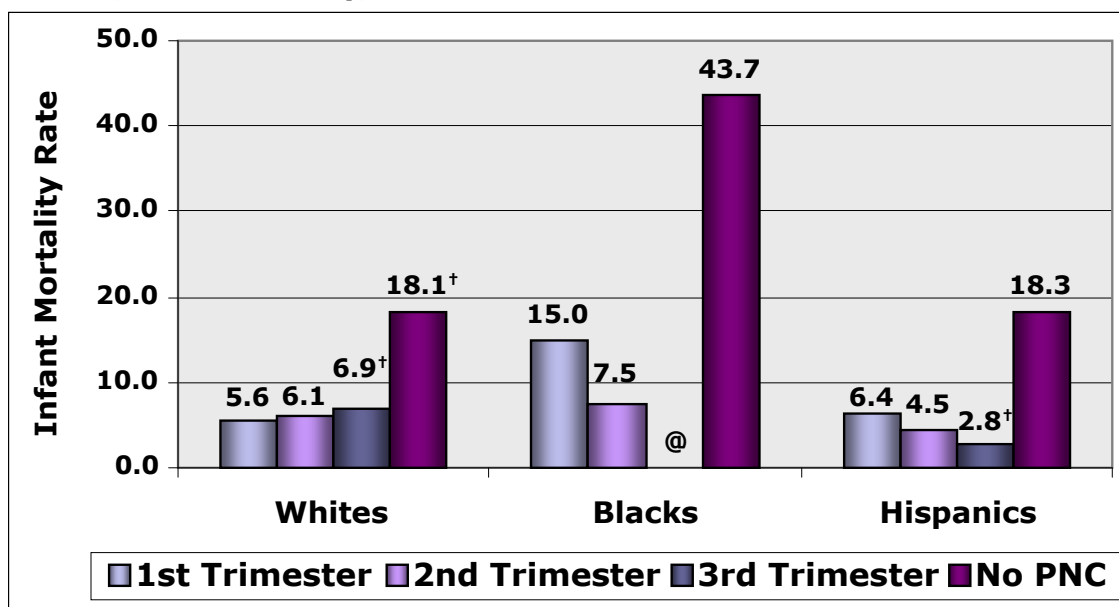
**Table 20. Infant mortality rate by prenatal care (PNC) status, Tarrant County, 2003-2005**

Trimester PNC Began	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
<b>1st Trimester</b>	421 (72.3)	59,758 (72.6)	<b>7.0</b>
<b>2nd Trimester</b>	88 (15.1)	16,124 (19.6)	<b>5.5</b>
<b>3rd Trimester</b>	15 (2.6)	3,969 (4.8)	<b>3.8<sup>†</sup></b>
<b>No Prenatal Care</b>	58 (10.0)	2,457 (3.0)	<b>23.6</b>

*n = number*  
*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*  
<sup>†</sup>*Rates based on less than 20 deaths are considered unstable and should be interpreted with caution*  
*Data source: Texas Department of State Health Services*

In Figure 14 and Table 21, the IMRs are divided by race/ethnicity, and the pattern shown for Tarrant County as a whole is evident among Blacks and Hispanics. Among Whites, however, the IMR steadily increased with delay in initiation of prenatal care.

**Figure 14. Infant mortality rate by prenatal care (PNC) status and race/ethnicity of mother, Tarrant County, 2003-2005**



*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*  
<sup>†</sup>*Rates based on less than 20 deaths are considered unstable and should be interpreted with caution*  
 @ = rate not calculated for less than five deaths  
 Data source: Texas Department of State Health Services

**Table 21. Infant mortality rate by prenatal care status and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Trimester Prenatal Care Began			
	1st Trimester	2nd Trimester	3rd Trimester	No Prenatal Care
<b>Whites</b>				
Infant Deaths (n)	169	26	7	10
Live Births (n)	30,133	4,245	1,013	554
Infant Mortality Rate	<b>5.6</b>	<b>6.1</b>	<b>6.9<sup>†</sup></b>	<b>18.1<sup>†</sup></b>
<b>Blacks</b>				
Infant Deaths (n)	126	18	< 5	20
Live Births (n)	8,423	2,388	633	458
Infant Mortality Rate	<b>15.0</b>	<b>7.5<sup>†</sup></b>	<b>@</b>	<b>43.7</b>
<b>Hispanics</b>				
Infant Deaths (n)	115	40	6	25
Live Births (n)	17,985	8,870	2,134	1,367
Infant Mortality Rate	<b>6.4</b>	<b>4.5</b>	<b>2.8<sup>†</sup></b>	<b>18.3</b>

*n* = number

Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births

<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution

@ = rate not calculated for less than five deaths

Data source: Texas Department of State Health Services

*Mothers who do not receive prenatal care have an infant mortality rate 252% higher than mothers who do receive such care.*



## SOURCE OF PRENATAL CARE

**Table 22. Infant mortality rate by source of prenatal care, Tarrant County, 2003-2005**

Source of Prenatal Care	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Hospital Clinic	123 (22.9)	19,433 (24.0)	<b>6.3</b>
Public Health Clinic	8 (1.5)	1,326 (1.6)	<b>6.0<sup>†</sup></b>
Private Physician	397 (74.1)	57,997 (71.7)	<b>6.8</b>
Midwife	7 (1.3)	1,870 (2.3)	<b>3.7<sup>†</sup></b>
Other	< 5 (-)	264 (0.3)	@

*n* = number

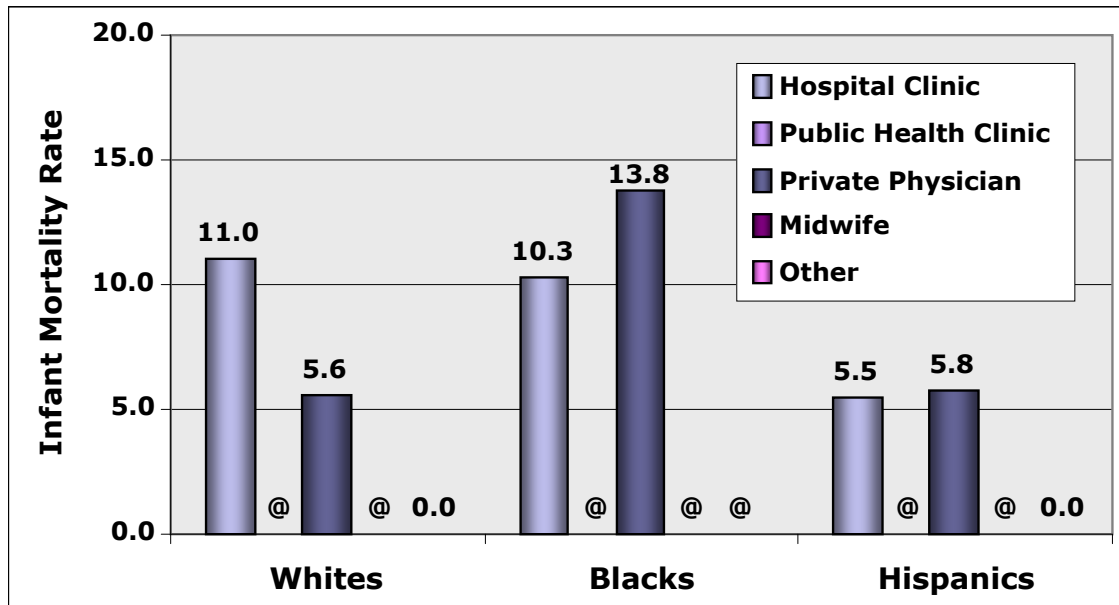
Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births

<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution

@ = rate not calculated for less than five deaths

Data source: Texas Department of State Health Services

**Figure 15. Infant mortality rate by source of prenatal care and race/ethnicity of mother, Tarrant County, 2003-2005**



Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births

@ = rate not calculated for less than five deaths

Data source: Texas Department of State Health Services

**Table 23. Infant mortality rate by source of prenatal care and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Source of Prenatal Care				
	Hospital Clinic	Public Health	Private Physician	Midwife	Other
<b>Whites</b>					
Infant Deaths (n)	20	< 5	182	< 5	0
Live Births (n)	1,823	437	32,658	840	130
Infant Mortality Rate	<b>11.0</b>	@	<b>5.6</b>	@	<b>0.0</b>
<b>Blacks</b>					
Infant Deaths (n)	20	< 5	124	< 5	< 5
Live Births (n)	1,951	232	8,991	386	49
Infant Mortality Rate	<b>10.3</b>	@	<b>13.8</b>	@	@
<b>Hispanics</b>					
Infant Deaths (n)	82	< 5	76	< 5	0
Live Births (n)	14,988	590	13,047	589	67
Infant Mortality Rate	<b>5.5</b>	@	<b>5.8</b>	@	<b>0.0</b>

*n* = number

Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births

Less than five deaths not reported; @ = rate not calculated for less than five deaths

Data source: Texas Department of State Health Services

## ADEQUACY OF PRENATAL CARE UTILIZATION

The Adequacy of Prenatal Care Utilization Index is a multidimensional tool that measures both the adequacy of prenatal care initiation and services received. Prenatal care initiation is directly related to the month prenatal care began. Adequacy of received services is characterized by the ratio of the actual number of prenatal visits to the expected number of visits (as determined by the American College of Obstetricians and Gynecologists). The index is then divided into four categories:

- **Inadequate** - prenatal care initiated after the first trimester or less than 50% of recommended visits,
- **Intermediate** - prenatal care initiated within the first trimester and 50%-79% of recommended visits,
- **Adequate** - prenatal care initiated in the first trimester and 80%-109% of recommended visits, and
- **Adequate Plus** - prenatal care initiated in the first trimester and 110% or more of recommended visits.

It is important to note that the index **does not measure the quality of care received**, merely its utilization.



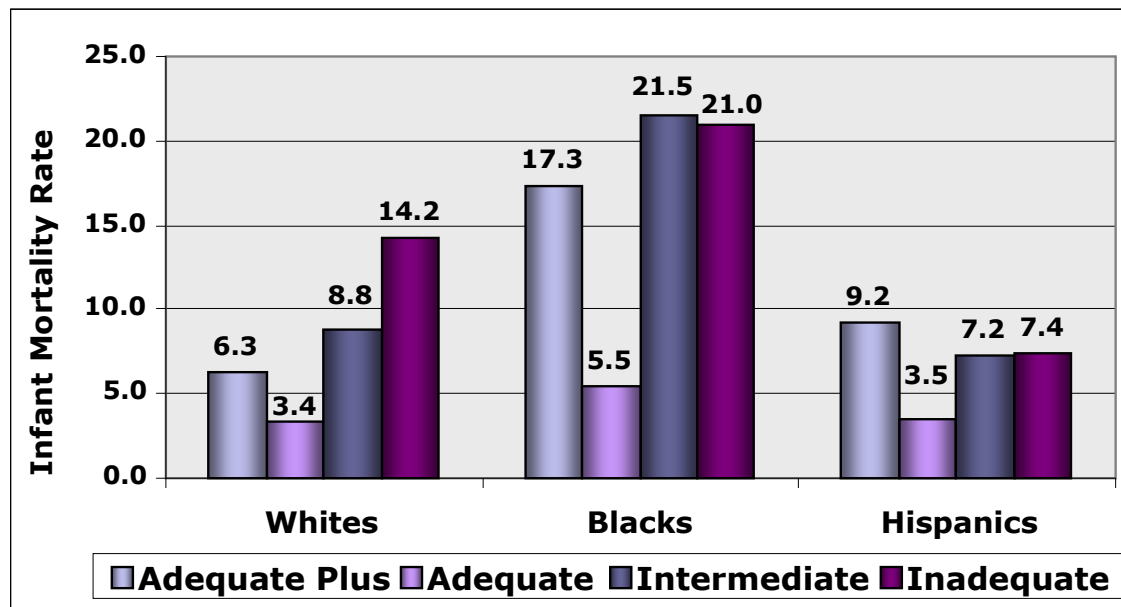
The overall IMRs by adequacy of prenatal care utilization (APNCU) for Tarrant County are shown in Table 24. Figure 16 and Table 25 highlight IMR by APNCU by race/ethnicity.

**Table 24. Infant mortality rate by adequacy of prenatal care utilization (APNCU), Tarrant County, 2003-2005**

APNCU	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
<b>Adequate Plus</b>	182 (31.7)	21,331 (26.0)	<b>8.5</b>
<b>Adequate</b>	141 (24.6)	37,972 (46.2)	<b>3.7</b>
<b>Intermediate</b>	72 (12.5)	7,429 (9.0)	<b>9.7</b>
<b>Inadequate</b>	179 (31.2)	15,412 (18.8)	<b>11.6</b>

*n = number*  
*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*  
*Data source: Texas Department of State Health Services*

**Figure 16. Infant mortality rate by adequacy of prenatal care utilization and race/ethnicity of mother, Tarrant County, 2003-2005**



*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*  
*Data source: Texas Department of State Health Services*

**Table 25. Infant mortality rate by adequacy of prenatal care utilization and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Adequacy of Prenatal Care Utilization			
	Adequate Plus	Adequate	Intermediate	Inadequate
<b>Whites</b>				
Infant Deaths (n)	71	62	23	55
Live Births (n)	11,219	18,147	2,627	3,875
Infant Mortality Rate	<b>6.3</b>	<b>3.4</b>	<b>8.8</b>	<b>14.2</b>
<b>Blacks</b>				
Infant Deaths (n)	51	28	26	55
Live Births (n)	2,942	5,107	1,211	2,613
Infant Mortality Rate	<b>17.3</b>	<b>5.5</b>	<b>21.5</b>	<b>21.0</b>
<b>Hispanics</b>				
Infant Deaths (n)	55	45	23	62
Live Births (n)	5,997	12,794	3,180	8,336
Infant Mortality Rate	<b>9.2</b>	<b>3.5</b>	<b>7.2</b>	<b>7.4</b>

*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*Data source: Texas Department of State Health Services*

## BREASTFEEDING STATUS AT HOSPITAL DISCHARGE

Breastfeeding is universally accepted as the optimum way to feed an infant and provides health benefits extending far into adulthood. Research confers strong evidence that breastfeeding reduces the risk of not only infectious diseases such as bacterial meningitis, otitis media, and respiratory tract infection, but also chronic diseases like diabetes,



*The mortality rate is seven times greater for those infants not being breastfed at the time of hospital discharge compared to those that are being breastfed.*

leukemia, obesity, and asthma.<sup>1</sup> The World Health Organization recommends exclusive breastfeeding for the first six months of life as a way of reducing the risk of infant and child mortality and improving the overall health of children and mothers.<sup>2</sup>

1. American Academy of Pediatrics, Work Group on Breastfeeding. *Breastfeeding and the use of human milk*. *Pediatrics*, 2005;115(2):496-506.  
 2. World Health Organization. *Child and adolescent health and development: Breastfeeding*. [http://www.who.int/child\\_adolescent\\_health/topics/prevention\\_care/child/nutrition/breastfeeding](http://www.who.int/child_adolescent_health/topics/prevention_care/child/nutrition/breastfeeding)

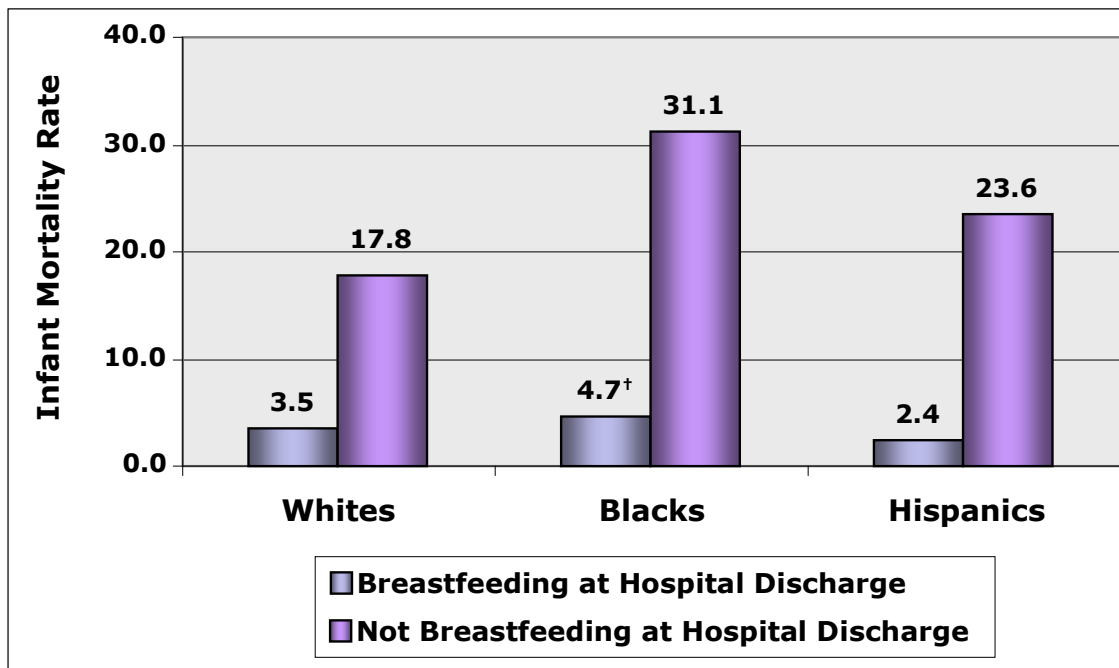
In Tarrant County in 2005, 79 percent of live births were reported as breastfeeding at time of hospital discharge, as opposed to 35 percent among infants who died before age one (Table 26). The mortality rate was seven times greater for those infants not breastfed at discharge compared to those that were breastfed. Depending on race/ethnicity, IMRs ranged from five to ten times higher among those not breastfed versus those who were (Figure 17 and Table 27).

**Table 26. Infant mortality rate by breastfeeding status at time of hospital discharge, Tarrant County, 2005**

Breastfeeding at Discharge	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
<b>Yes</b>	71 (34.5)	21,740 (78.8)	<b>3.3</b>
<b>No</b>	135 (65.5)	5,846 (21.2)	<b>23.1</b>

*n = number*  
*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*  
*Data source: Texas Department of State Health Services*

**Figure 17. Infant mortality rate by breastfeeding status at time of hospital discharge and race/ethnicity of mother, Tarrant County, 2005**



*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*  
<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution  
*Data source: Texas Department of State Health Services*

**Table 27. Infant mortality rate by breastfeeding status at time of hospital discharge and race/ethnicity of mother, Tarrant County, 2005**

Race/Ethnicity	Breastfeeding at Discharge	
	Yes	No
<b>Whites</b>		
Infant Deaths (n)	34	42
Live Births (n)	9,669	2,364
Infant Mortality Rate	<b>3.5</b>	<b>17.8</b>
<b>Blacks</b>		
Infant Deaths (n)	12	47
Live Births (n)	2,538	1,511
Infant Mortality Rate	<b>4.7<sup>†</sup></b>	<b>31.1</b>
<b>Hispanics</b>		
Infant Deaths (n)	20	41
Live Births (n)	8,434	1,740
Infant Mortality Rate	<b>2.4</b>	<b>23.6</b>

*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution*

*Data source: Texas Department of State Health Services*

Some limitations in analyzing this variable as it relates to infant mortality include being restricted to only one year of data, the lack of knowledge of duration of breastfeeding beyond the time of hospital discharge, no indication of breastfeeding exclusivity, and the higher infant mortality rate among those not breastfed may be confounded by prematurity or medical risk factors that prevent an infant from receiving or accepting breast milk.

## PAYMENT TYPE

Starting with the 2005 Texas birth certificates, data were collected on the principle source of payment for infant delivery costs. Payment types were characterized as private insurance, Medicaid, self-pay, or other. Table 28 summarizes the infant mortality rate for each of these payment types and also shows the percentage of infant deaths and live births for each grouping. Even though Medicaid recipients had the highest infant mortality rate (8.8) and those with private insurance had the lowest (6.5), no large gap occurred among the four divisions. A race/ethnicity breakdown was not provided considering the diminished data capacity of just one year's worth of birth records.

**Table 28. Infant mortality rate by delivery payment type, Tarrant County, 2005**

Payment Type	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Private Insurance	81 (39.1)	12,424 (45.0)	<b>6.5</b>
Medicaid	83 (40.1)	9,383 (34.0)	<b>8.8</b>
Self-Pay	27 (13.0)	3,349 (12.1)	<b>8.1</b>
Other	16 (7.7)	2,433 (8.8)	<b>6.6<sup>†</sup></b>

*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution*

*Data source: Texas Department of State Health Services*

## WIC ENROLLMENT DURING PREGNANCY

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a federally funded program which provides food, healthy eating information, and health care referrals for low-income families with children up to the age of five. Lower IMRs for WIC participants compared to non-WIC participants has been illustrated at both state and national levels.<sup>1,2</sup> Locally here in Tarrant County, mothers enrolled in the nutrition intervention program during their pregnancy had slightly lower IMR than those mothers who were not enrolled in WIC (Table 29). The greatest impact was seen among Blacks where the rate of mortality for non-WIC infants was 2.6 times that of WIC infants (Figure 18, Table 30). This was not the case however among Whites who instead saw an increase in infant mortality with WIC participation.

**Table 29. Infant mortality rate by WIC enrollment status during pregnancy, Tarrant County, 2005**

Enrolled in WIC During Pregnancy	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Yes	78 (38.4)	13,225 (47.6)	<b>5.9</b>
No	125 (61.6)	14,539 (52.4)	<b>8.6</b>

*n = number*

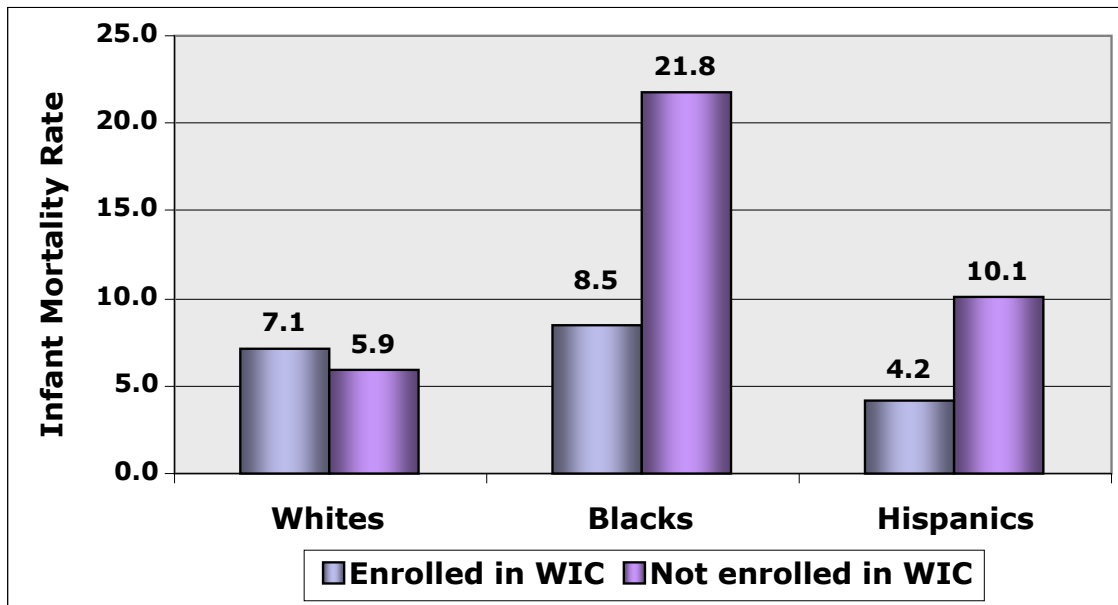
*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*Data source: Texas Department of State Health Services*

1. Moss N, Carver K. The effect of WIC and Medicaid on infant mortality in the United States. *Am J Public Health*, 1998;88(9):1354-61.

2. Khanani I, et al. The impact of prenatal WIC participation on infant mortality and racial disparities. *Am J Public Health*, 2010;100(S1):S204-9

**Figure 18. Infant mortality rate by WIC enrollment status during pregnancy and race/ethnicity of mother, Tarrant County, 2005**



Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births  
 Data source: Texas Department of State Health Services

**Table 30. Infant mortality rate by WIC enrollment status during pregnancy and race/ethnicity of mother, Tarrant County, 2005**

Race/Ethnicity	Enrolled in WIC During Pregnancy	
	Yes	No
<b>Whites</b>		
Infant Deaths (n)	23	52
Live Births (n)	3,247	8,818
Infant Mortality Rate	<b>7.1</b>	<b>5.9</b>
<b>Blacks</b>		
Infant Deaths (n)	21	35
Live Births (n)	2,474	1,603
Infant Mortality Rate	<b>8.5</b>	<b>21.8</b>
<b>Hispanics</b>		
Infant Deaths (n)	30	32
Live Births (n)	7,107	3,177
Infant Mortality Rate	<b>4.2</b>	<b>10.1</b>

*n* = number  
 Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births  
 Data source: Texas Department of State Health Services

*African Americans and Hispanics enrolled in WIC have a lower infant mortality rate than those not enrolled.*

## MATERNAL TOBACCO USE

Infants born to mothers who smoke are known to have poorer quality birth and health outcomes than babies born in a tobacco-free environment. Smoke-exposed infants have 30 percent greater odds of prematurity, are more prone to be of low birth weight, and are up to three times more likely to die of SIDS.<sup>1</sup>

From 2003 to 2005, infants born in Tarrant County to mothers who smoked had a 71 percent higher IMR than those born to mothers who did not smoke (Table 31). The mortality rates differed across maternal race/ethnicity as presented in Table 32 and Figure 19, but consistently remained highest among those mothers who chose to smoke during pregnancy. White mothers smoked to a greater extent (11.0%) than both Blacks (5.4%) and Hispanics (1.8%).

**Table 31. Infant mortality rate by maternal tobacco use during pregnancy, Tarrant County, 2003-2005**

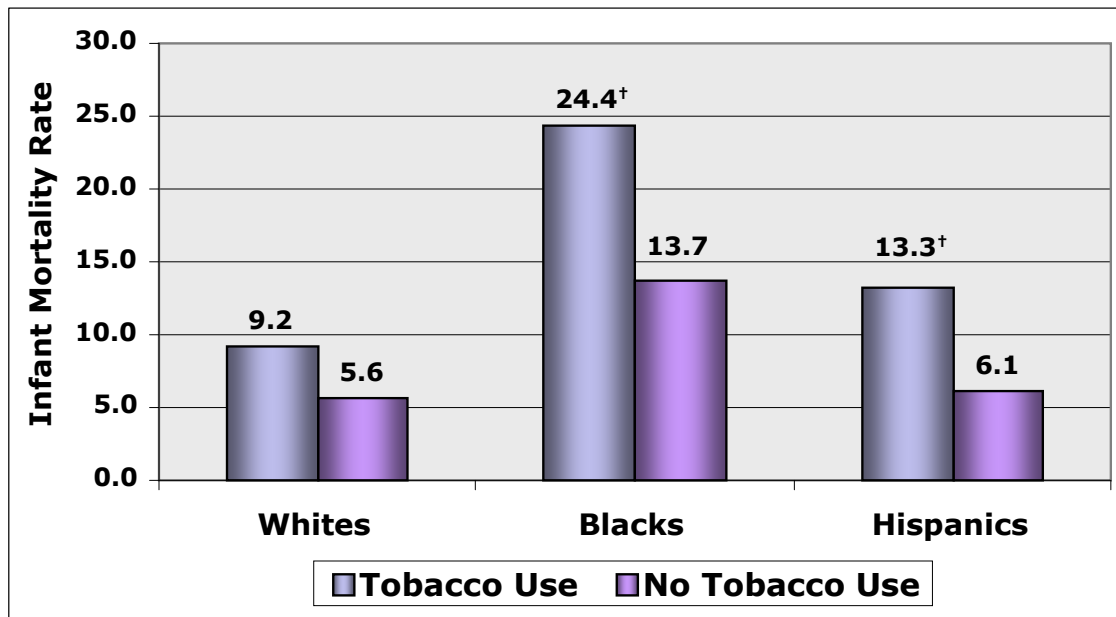
Maternal Tobacco Use	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Yes	57 (9.5)	4,841 (5.8)	<b>11.8</b>
No	540 (90.5)	78,204 (94.2)	<b>6.9</b>

*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*Data source: Texas Department of State Health Services*

**Figure 19. Infant mortality rate by maternal tobacco use during pregnancy and race/ethnicity of mother, Tarrant County, 2003-2005**



*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution*

*Data source: Texas Department of State Health Services*

1. Division of Reproductive Health, Centers for Disease Control and Prevention. Preventing smoking and exposure to secondhand smoke before, during, and after pregnancy: <http://www.cdc.gov/nccdphp/publications/factsheets/Prevention/pdf/smoking.pdf>

*Mothers who **smoke** during pregnancy have a **71% higher** infant mortality rate than those who do not smoke.*



**Table 32. Infant mortality rate by maternal tobacco use during pregnancy and race/ethnicity of mother, Tarrant County, 2003-2005**

Race/Ethnicity	Maternal Tobacco Use	
	Yes	No
<b>Whites</b>		
Infant Deaths (n)	33	184
Live Births (n)	3,599	32,684
Infant Mortality Rate	<b>9.2</b>	<b>5.6</b>
<b>Blacks</b>		
Infant Deaths (n)	15	156
Live Births (n)	614	11,404
Infant Mortality Rate	<b>24.4<sup>†</sup></b>	<b>13.7</b>
<b>Hispanics</b>		
Infant Deaths (n)	7	184
Live Births (n)	526	30,054
Infant Mortality Rate	<b>13.3<sup>†</sup></b>	<b>6.1</b>

*n = number*

*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

*<sup>†</sup>Rates based on less than 20 deaths are considered unstable and should be interpreted with caution*

*Data source: Texas Department of State Health Services*



## IV. CAUSES OF INFANT MORTALITY

### NEONATAL DEATHS AND POSTNEONATAL DEATHS

Stratifying infant deaths into age categories imparts insight into possible causes of and risk factors associated with infant mortality. Three distinct categories for age at death are often used when analyzing infant demise: the early neonatal, late neonatal, and postneonatal periods. An early neonatal death occurs when the infant is less than seven days old. When an infant dies between the age of 7 and 27 days, it is classified as a late neonatal death. Prematurity, birth defects, and complications of pregnancy are predominate determinates of neonatal deaths. Deaths from 28 days to 1 year after birth occur in the postneonatal period. Sudden Infant Death Syndrome, birth defects, and unintentional injuries are common causes of postneonatal deaths.<sup>1</sup> Table 33 presents the relationship between infant age at death and race/ethnicity in Tarrant County.

**Table 33. Early neonatal, late neonatal, and postneonatal deaths by race/ethnicity of mother, Tarrant County, 2003-2005**

Age at Death	Whites n (%)	Blacks n (%)	Hispanics n (%)	All Races n (%)
<b>Early Neonatal (less than 7 days)</b>	108 (49.8)	102 (59.0)	112 (58.3)	332 (55.2)
<b>Late Neonatal (between 7 and 27 days)</b>	31 (14.3)	23 (13.3)	25 (13.0)	82 (13.6)
<b>Postneonatal (between 28 days and 1 year)</b>	78 (35.9)	48 (27.7)	55 (28.6)	187 (31.1)

*n = number*

*Data source: Texas Department of State Health Services*

Among all infant deaths from 2003-2005, the majority (55.2%) occurred within the first week of life as shown in Table 33. The percent of late neonatal deaths was less for Hispanics (13.0%) than for Blacks (13.3%) and Whites (14.3%). The highest percentage of infants who died between one month of age and one year was found among Whites (35.9%), followed by Hispanics (28.6%) and then Blacks (27.7%).

1. Heron M. Deaths: Leading causes for 2006. *National vital statistics reports, 2010:58(14)*

## LEADING CAUSES OF INFANT MORTALITY

The three leading causes of death overall for Tarrant County infants from 2003-2005 were 1] congenital malformations (birth defects), 2] newborn affected by maternal factors and by complications of pregnancy, labor, and delivery, and 3] Sudden Infant Death Syndrome (SIDS). Variations across race/ethnicity were seen as evident in Table 34. Whites and Hispanics endured the same leading cause and number three cause of death (congenital malformations and respiratory and cardiovascular disorders specific to the perinatal period, respectively) whereas the leading cause of death among Blacks was related to maternal factors and complications of pregnancy, labor, and delivery. Diseases related to length of gestation and fetal growth corresponded to the number two leading cause of death for both Blacks and Hispanics. SIDS ranked second among Whites, but was not found within the top three causes for Blacks and Hispanics.

*The leading cause of infant death in Tarrant County is birth defects.*

**Table 34. Leading causes of infant mortality by race/ethnicity of mother, Tarrant County, 2003-2005**

Rank	Whites n (%)	Blacks n (%)	Hispanics n (%)	All Races n (%)
1	Congenital malformations (Birth defects) 49 (22.6)	Newborn affected by maternal factors and by complications of pregnancy, labor, and delivery 42 (24.3)	Congenital malformations (Birth defects) 46 (24.0)	Congenital malformations (Birth defects) 121 (20.1)
2	Sudden Infant Death Syndrome 42 (19.4)	Diseases related to length of gestation and fetal growth 31 (17.9)	Diseases related to length of gestation and fetal growth 32 (16.7)	Newborn affected by maternal factors and by complications of pregnancy, labor, and delivery 89 (14.8)
3	Respiratory and cardiovascular disorders specific to the perinatal period 23 (10.6)	Congenital malformations (Birth defects) 20 (11.6)	Respiratory and cardiovascular disorders specific to the perinatal period 25 (13.0)	Sudden Infant Death Syndrome 86 (14.3)

*n = number*

*Data source: Texas Department of State Health Services*

## PRETERM-RELATED CAUSES OF DEATH

Given the dramatically higher infant mortality rate of preterm infants as demonstrated in Section II of this report (see page 7), researchers at the Centers for Disease Control and Prevention (CDC) created a method for better assessing the impact of preterm births on infant mortality by formulating a unique infant death grouping designated as *preterm-related causes of death*. A death is classified as preterm-related if “75 percent or more of infants whose deaths were attributed to that cause were born at less than 37 weeks of gestation, and the cause of death was a direct consequence of preterm birth based on a clinical evaluation and review of the literature.”<sup>1</sup> A listing of the preterm-related *International Classification of Diseases, Tenth Revision* (ICD-10) codes are included in the footnote for Table 35 and Figure 20. In spite of this new cause of death categorization, the burden of preterm births on infant mortality is most likely underestimated due to the allocation of infant deaths to non-specific ICD-10 classifications as a result of the inability to sufficiently identify an association with prematurity.

As displayed in Table 35, over a third of all infant deaths in Tarrant County for the years 2003-2005 were preterm-related. A disproportionately higher percentage of deaths and mortality rate related to prematurity were observed among Blacks (48%, 7.0 infant deaths per 1,000 live births) when compared to Hispanics (40%, 2.5) and Whites (28%, 1.6). The preterm-related IMR for Blacks was almost three times greater than it was for Hispanics and over four times greater than for Whites (Figure 19).

**Table 35. Preterm-related infant deaths by race/ethnicity of mother, Tarrant County, 2003-2005<sup>†</sup>**

	Whites	Blacks	Hispanics	All Races
<b>Number of preterm-related infant deaths</b>	59	84	77	225
<b>Percent of total infant deaths that are preterm-related</b>	27.8	43.5	39.5	36.6
<b>Preterm-related infant mortality rate</b>	1.6	7.0	2.5	2.7

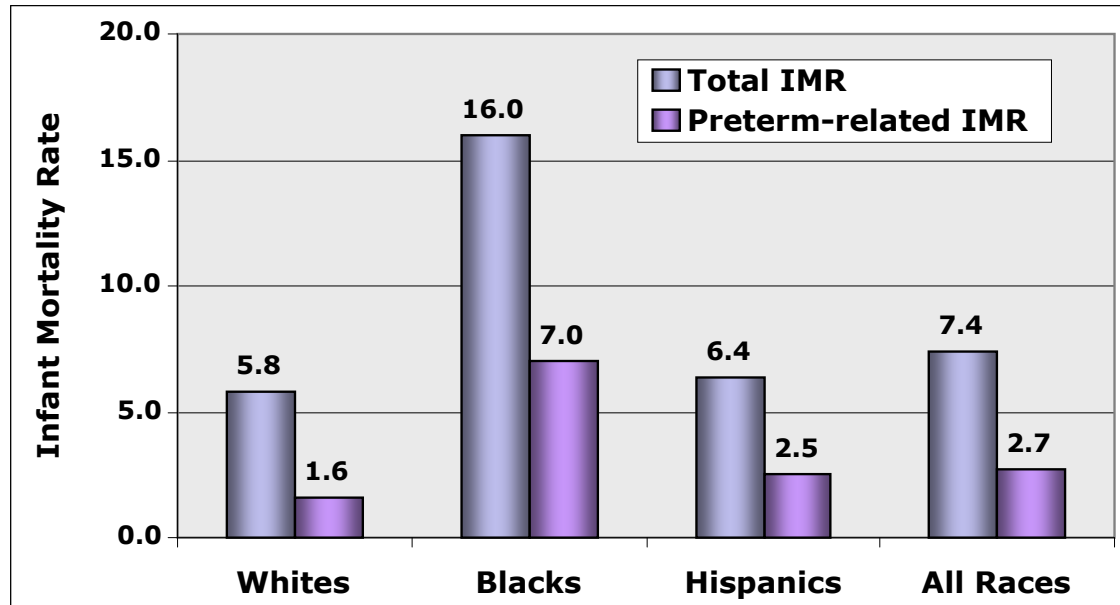
*Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births*

<sup>†</sup>Preterm-related deaths are those where the infant was born preterm (before 37 weeks gestation) with an underlying cause of death identified as one of the following *International Classification of Diseases, Tenth Revision* (ICD-10) categories: K550, P000, P010, P011, P015, P020, P021, P027, P070-P073, P102, P220-P229, P250-P279, P280, P281, P360-P369, P250-P523, and P77

Data source: Texas Department of State Health Services

1. Matthews TJ, MacDorman MF. Infant mortality statistics from the 2006 period linked birth/infant death data set. *National Vital Statistics Reports*, 2010:58(17).

**Figure 20. Total and preterm-related infant mortality rates (IMR) by race/ethnicity of mother, Tarrant County, 2003-2005<sup>†</sup>**



Infant mortality rate = number of deaths among infants under one year of age per 1,000 live births

<sup>†</sup>Preterm-related deaths are those where the infant was born preterm (before 37 weeks gestation) with an underlying cause of death identified as one of the following *International Classification of Diseases, Tenth Revision (ICD-10)* categories: K550, P000, P010, P011, P015, P020, P021, P027, P070-P073, P102, P220-P229, P250-P279, P280, P281, P360-P369, P250-P523, and P77

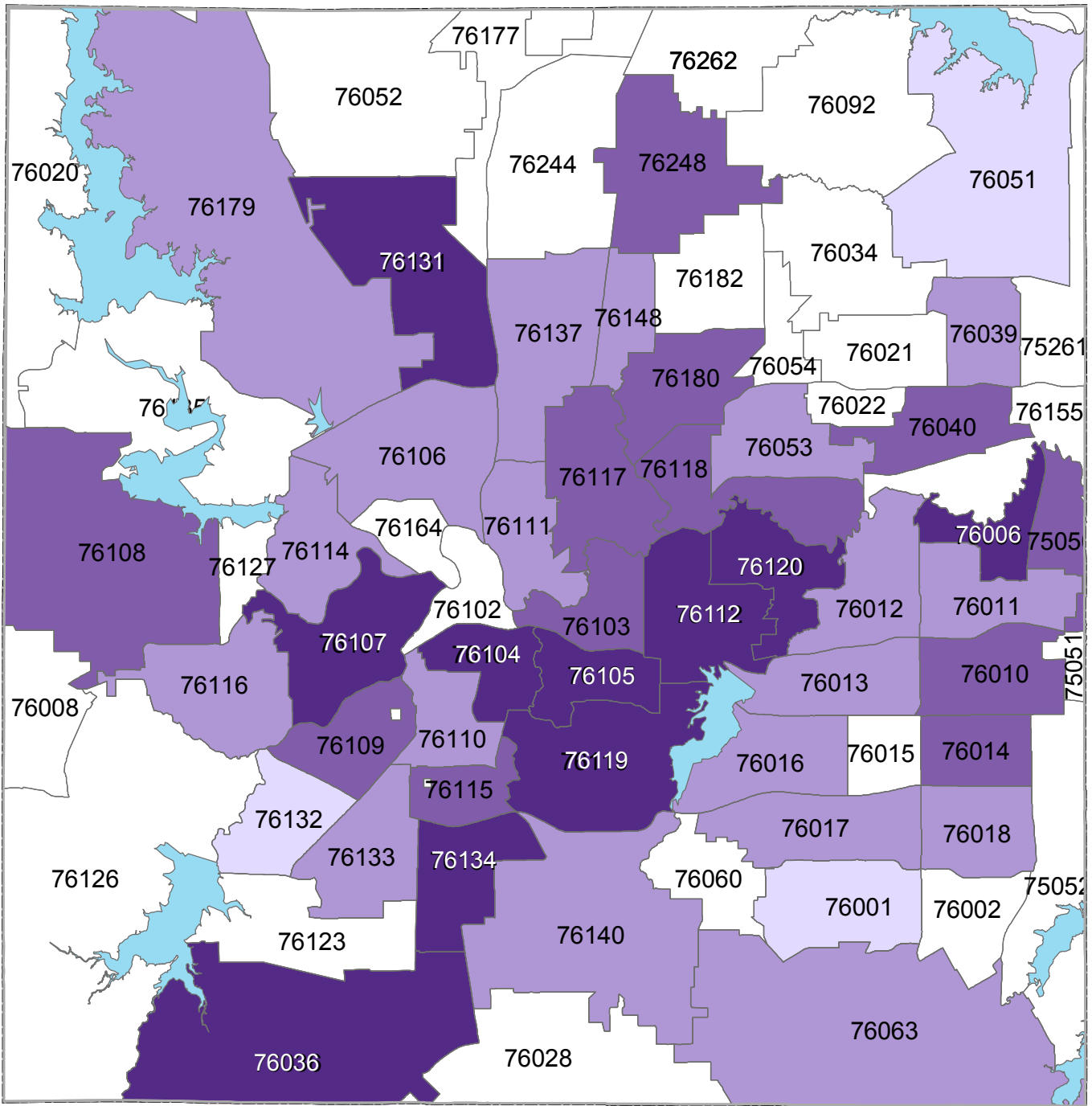
Data source: Texas Department of State Health Services

With closer examination of the data, it is possible to determine the contribution preterm-related infant deaths have on the differences seen across racial/ethnic groups. For example, 53 percent of the difference between Black and White infant mortality rates was due to preterm-related causes. In other words, if preterm-related mortality among Black infants were reduced to levels comparable with White infants, the difference between Black and White infant mortality would be reduced by 53 percent. Comparisons such as this offer a broadened view of infant mortality and may be of assistance when targeting prevention efforts.

## V. GEOGRAPHIC DISTRIBUTION OF INFANT MORTALITY

Figure 21 is a geographic distribution of infant mortality in Tarrant County by ZIP Code for the combined years of 2003, 2004, and 2005. The highest rates range from 10.2 to 16.1 infant deaths per 1,000 live births with a cluster of high rates in central Tarrant County.

**Figure 21. Infant Mortality Rates by ZIP Code Distribution, Tarrant County, 2003 - 2005**



**Rate per 1,000 live births**

- 3.50 - 4.50**  
*the lowest rate of the dataset up to the Healthy People 2010 goal (4.5)*

**4.51 - 6.80**  
*the national infant mortality rate (6.8)*

**6.81 - 10.19**  
*between the national rate and the Healthy Start Community qualifying rate*
- 10.20 - 16.10**  
*the Healthy Start Community Qualifying Rate (1.5 times the national rate 2003 - 2005) and ends with the highest rate of the dataset*

**No Case**  
*these zipcodes may also have been suppressed if they had 5 or fewer deaths or less than 500 live births*

**Water**

These data were prepared by Tarrant County Public Health for its use, and may be revised any time, without notification. Tarrant County Public Health does not guarantee the correctness or accuracy of any features on this map. Tarrant County assumes no responsibility in connection therewith. Said data should not be edited by anyone other than designated personnel, or through written approval by GIS Manager. These data are for informational purposes only and should not create liability on the part of Tarrant County Government, any officer and/or employees thereof.



08/27/2010

Source: Mortality Data from TDSHS

## VI. LIMITATIONS

Although the data in this report provide an in-depth perspective on infant mortality at the local level, there are limitations. Above and beyond the variable specific restrictions previously discussed throughout this report, the greatest limitation is that the IMRs provided herein are crude estimates, hence caution must be exercised when interpreting the results and comparing the rates among sub-populations. Secondly, most of the variables collected on birth certificates are self-reported by the mother or at times another relative. Self-reporting introduces partiality such as recall bias when bringing to mind pre-pregnancy information and also reporting bias which may underestimate undesirable behaviors like smoking or other maternal risk factors. Finally, a fundamental limitation is the inability to link all infant deaths to a corresponding birth record. A number of factors contribute to this dilemma including name disagreement between birth and death records and reconciling information from another state when the residence of birth and death differ.

*“A wife who loses a husband is called a widow.  
A husband who loses a wife is called a widower.  
A child who loses his parents is called an orphan.  
But...there is no word for a parent who loses a child,  
that’s how awful the loss is.”*

*- Novelist Jay Neugeboren*

## VII. FAST FACTS

- In 2006, the infant mortality rate (IMR) in Tarrant County was 7.6 deaths per 1,000 live births; this was 23 percent higher than the IMR for Texas (6.2), 13 percent higher than the rate for the United States (6.7), and almost 70 percent higher than the *Health People 2010* objective of 4.5 infant deaths per 1,000 live births.
- Tarrant County infant mortality decreased 7.3 percent from a rate of 8.2 infant deaths per 1,000 live births in 2005 to 7.6 infant deaths per 1,000 live births in 2006.
- The IMR decreased 21.5 percent among Blacks and 14.5 percent Hispanics from 2005 to 2006, but increased 11.7 percent among Whites.
- Two of the three highest IMRs among Texas cities with at least 5,000 live births were in Tarrant County (Arlington and Fort Worth).
- College educated Black mothers had an IMR almost twice as high as Whites and Hispanics with less than a high school education.
- Mortality among babies of unmarried mothers was 64 percent higher than among babies whose mothers were married.
- Foreign-born mothers in Tarrant County had a 24.7 percent lower infant mortality rate than U.S.-born mothers.
- Women who were obese before getting pregnant had an IMR more than 75 percent higher than women who began their pregnancy at a healthy weight (11.0 vs. 6.2 infant deaths per 1,000 live births).
- A lack of prenatal care among Tarrant County mothers accounted for a 237 percent greater IMR compared to mothers who began prenatal care within the first three months of their pregnancy.
- Congenital malformations (birth defects) were the primary cause of infant death in Tarrant County followed by newborn affected by maternal factors and pregnancy/labor/delivery complications, and Sudden Infant Death Syndrome (SIDS).
- Over one-third of all infant deaths in Tarrant County for the years 2003-2005 were preterm-related.









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