Infant Mortality Report

Tarrant County
2002-2004

Tarrant County Public Health

Safeguarding our community's health

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Tarrant County
Public Health

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I. EXECUTIVE SUMMARY

Infant Mortality Rate (IMR) is one of the most important indicators of the general level of health or well being in a community. It is a measure of the yearly rate of deaths in children less than one year old. Although overall infant mortality rates in most states and local jurisdictions have been declining during the past decade, the United States' infant mortality rose in 2002 for the first time since 1958. The infant mortality rate for Texas showed a gradual increase starting in 2000, but declined again in 2004. Tarrant County's infant mortality rate continues to fluctuate with each year. The magnitude of the infant mortality rate still poses a significant challenge to society and to the public health system.

Nationally and locally, infant mortality rates continue to be higher for Hispanics and highest for Blacks. To gain additional insight into associated or contributing factors for these disparities, further analyses of infant mortality rates are conducted for neonatal deaths (within the first month of life, <28 days) and post-neonatal deaths (from 28 days to less than a year). Different factors are known to contribute to neonatal and post-neonatal deaths. Heredity, prenatal development, and the birth process are major factors in neonatal deaths. Sudden Infant Death Syndrome (SIDS) and environmental factors such as nutrition, hygiene, and accidents, contribute to post-neonatal deaths. The proportion of neonatal mortality deaths in Whites (63.6%) was less than the proportions for Blacks (71.0%) and Hispanics (69.9%).

The primary cause of infant mortality in Tarrant County is congenital malformations. Approximately 54% of all neonatal deaths in Tarrant County occur within the first week. Neonatal infant deaths are further examined by early neonatal deaths (<7 days) and late neonatal deaths (between 7 and 27 days). Hispanics had the lowest proportion (11.4%) of late neonatal deaths, compared to Whites (14.6%) and Blacks (15.4%). Conversely, Hispanics (58.5%) and Blacks (55.6%) had the highest proportions of early neonatal deaths compared to Whites (49.0%). Infant mortality and morbidity due to congenital malformations result in emotional suffering and significant direct and indirect costs.

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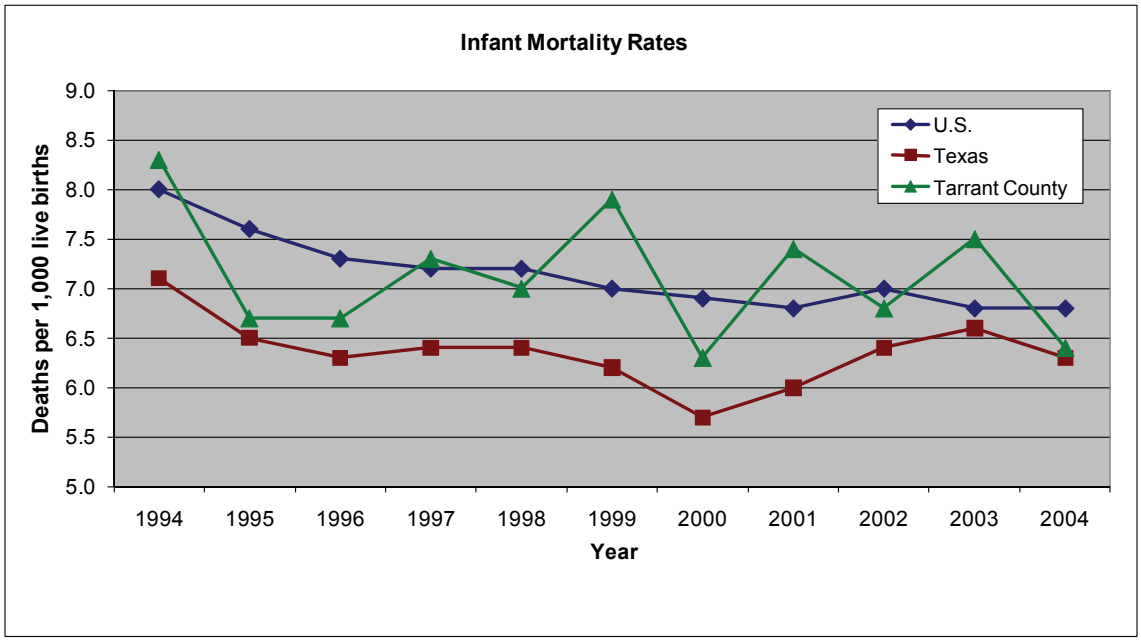
II. INTRODUCTION

Infant Mortality Rate (IMR) is one of the most important indicators of the general level of health or well being in a community. It is a measure of the yearly rate of deaths in children less than one year old. Of the more than 4 million infants that were born in the United States in 2004, 12.5% were born preterm.[1] The burden of preterm births on the United States economy in 2005 exceeded $26.5 billion.[1] Researchers have also found that the costs of care for extremely low birth weight infants (≤1,000g at birth) in the first two years of life was 25 times greater than the care for a normal birth weight infant.[2] Costs of care for children born preterm or with low birth weight in the US are $5.5 to $6 billion more than normal birth weight children during the first 15 years of life.[3]

Infant mortality rates are commonly divided into two categories, neonatal and post-neonatal deaths. Neonatal deaths occur in infants under 28 days of age, and post-neonatal deaths occur in infants between 28 days and one year of life. Infant mortality rates, neonatal death rates and post-neonatal death rates are calculated in relation to total live births within a given period and are expressed per 1,000 live births.

Figure 1: Infant Mortality Rates in Tarrant County, Texas, and the United States, 1994-2004



Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births
Data Source: Texas Department of State Health Services and National Center for Health Statistics

[1]Behrman, RE, Butler, AS, eds. *Preterm Birth: Causes, Consequences, and Prevention.* Washington, DC: The National Academies Press; 2007.
[2]Tommiska V, et al. Economic costs of care in extremely low birthweight infants during the first two years of life. *Pediatr Crit Care Med* 2003; 4(2):157-63.
[3]Lewitt EM, Baker LS, Corman H, et al. The direct costs of LBW. *Future Choices* 1995 Spring; 5(1):35-56.

Although overall infant mortality rates in most states and local jurisdictions, including Tarrant County, have been declining during the past decade, in 2002, infant mortality rose in the United States for the first time since 1958. A number of factors might have contributed to this rise: decreases in birth weight and gestational age in infants, possible increased medical risk factors in infants and mothers, possible changes in medical management of pregnancy and changes in reporting requirements in 2002, which required that some cases formerly classified as fetal deaths be reported as infant deaths.

In 2004, the infant mortality rate for Tarrant County (6.4 deaths per 1,000) was found to be lower than the IMR for the nation (6.8 deaths per 1,000), but higher than the IMR for Texas (6.3 deaths per 1,000), and the Healthy People 2010 objective (4.5 deaths per 1,000). The magnitude of the infant mortality rate still poses a significant challenge to society and to the public health system, especially in Tarrant County. Figure 1 highlights the trend in the infant mortality rate in Tarrant County, Texas and the United States from 1994 to 2004. It should be noted that the term "Black" includes all national origins, and is the term used for reporting on the Birth and Death certificates from the Department of State Health Services.

Table 1: Infant Mortality Rates (IMR) by Race/Ethnicity in Texas, 1994-2004

	Year										
Race/ Ethnicity	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Whites											
Infant Deaths (n)	868	796	803	797	787	720	690	718	784	809	764
Live Births (n)	139,392	138,061	139,081	137,796	140,325	140,374	142,553	139,351	138,118	138,464	136,659
IMR	**6.2**	**5.8**	**5.8**	**5.8**	**5.6**	**5.1**	**4.8**	**5.2**	**5.7**	**5.8**	**5.6**
Blacks											
Infant Deaths (n)	505	449	446	430	466	502	468	489	561	576	537
Live Births (n)	40,214	38,683	38,803	39,406	40,123	40,005	41,180	40,602	41,520	41,700	42,117
IMR	**12.6**	**11.6**	**11.5**	**10.9**	**11.6**	**12.5**	**11.4**	**12.0**	**13.5**	**13.8**	**12.8**
Hispanics											
Infant Deaths (n)	879	833	789	883	885	902	876	927	986	1,032	1,043
Live Births (n)	132,800	136,831	142,412	146,147	151,116	157,329	166,440	171,790	178,474	182,528	187,784
IMR	**6.6**	**6.1**	**5.5**	**6.0**	**5.9**	**5.7**	**5.3**	**5.4**	**5.5**	**5.7**	**5.6**
All Races											
Infant Deaths (n)	2,290	2,108	2,080	2,148	2,180	2,160	2,064	2,181	2,369	2,483	2,398
Live Births (n)	321,088	322,669	330,238	333,829	342,199	349,157	363,325	365,092	372,369	377,374	381,441
IMR	**7.1**	**6.5**	**6.3**	**6.4**	**6.4**	**6.2**	**5.7**	**6.0**	**6.4**	**6.6**	**6.3**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births
n=number
Data Source: Texas Department of State Health Services

Overall, the IMR for the United States declined by 15% from 8.0 deaths per 1,000 in 1994 to 6.8 deaths per 1,000 in 2004. Even though the infant mortality rate in Texas was consistently lower than that of the United States over those years, it did show a gradual increase from 2000 to 2003. From 1994 to 2004, there was an overall reduction in the infant mortality rate of 11%, but an increase of 16% from 2000 to 2003.

Table 1 highlights the trend in infant mortality rates in the state of Texas from 1994 to 2004. In Texas during that decade, the IMR for Blacks was over two times that for Whites and Hispanics.

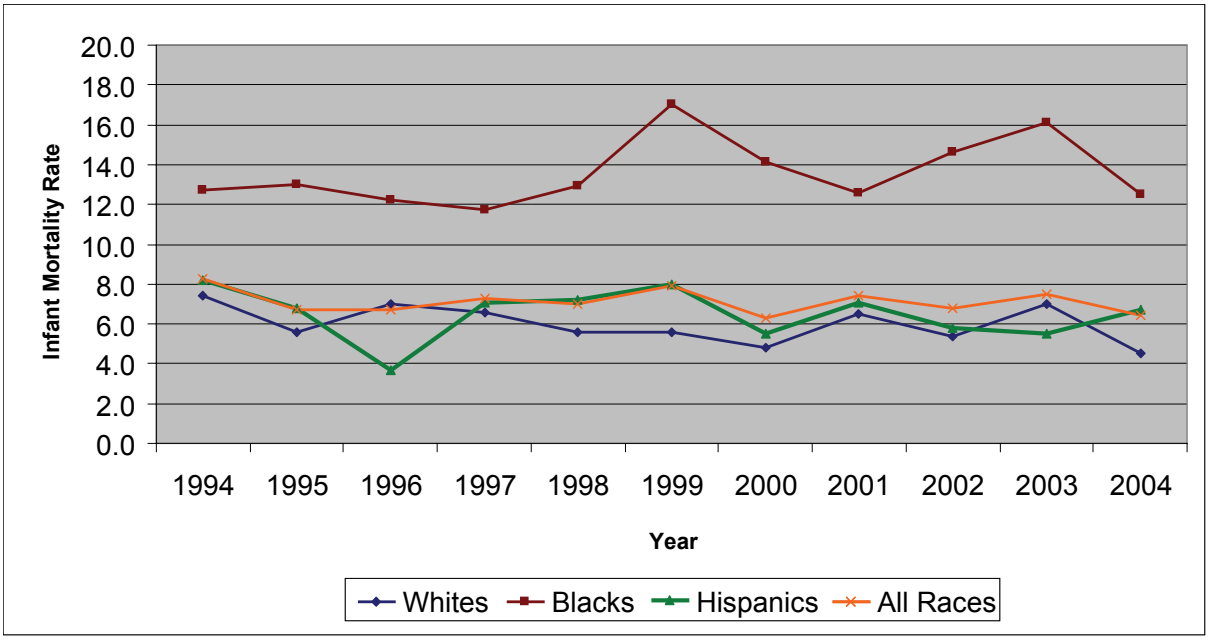
Table 2 highlights the trend in infant mortality rates in Tarrant County from 1994 to 2004. In the remainder of this report, the ethnic category "Other" was excluded from the race-specific calculations, but included for all-races/ethnicities computations. Among the combined all races/ethnicities group, the infant mortality rate in Tarrant County declined by approximately 23% from 8.3 deaths per 1,000 in 1994 to 6.4 deaths per 1,000 in 2004. The observed fluctuations in the IMR during that time span can be partially attributed to the small numbers for any particular year and ethnicity. Comparing infant mortality rates in Tarrant County for the years 1994 and 2004, IMR decreased by 39% for Whites, decreased by 2% for Blacks and decreased by 18% for Hispanics. Blacks have consistently had higher IMRs than both Whites and Hispanics for each of the years 1994 through 2004. In Tarrant County, the IMRs for Blacks each year were found to be twice as high as those for Whites and Hispanics. Figure 2 shows the trend in IMR for Tarrant County by race/ethnicity for each year from 1994 to 2004.

Table 2: Infant Mortality Rates (IMR) by Race/Ethnicity in Tarrant County, 1994-2004

Race/ Ethnicity	Year										
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Whites											
Infant Deaths (n)	95	70	88	81	69	71	60	81	65	85	54
Live Births (n)	12,774	12,509	12,651	12,331	12,378	12,584	12,504	12,458	12,054	12,206	11,995
IMR	**7.4**	**5.6**	**7.0**	**6.6**	**5.6**	**5.6**	**4.8**	**6.5**	**5.4**	**7.0**	**4.5**
Blacks											
Infant Deaths (n)	37	39	37	37	43	59	51	47	57	63	50
Live Births (n)	2,923	2,989	3,022	3,169	3,333	3,478	3,626	3,738	3,892	3,920	4,008
IMR	**12.7**	**13.0**	**12.2**	**11.7**	**12.9**	**17.0**	**14.1**	**12.6**	**14.6**	**16.1**	**12.5**
Hispanics											
Infant Deaths (n)	40	36	21	43	47	58	44	63	55	55	68
Live Births (n)	4,849	5,257	5,680	6,023	6,569	7,222	7,973	8,835	9,545	10,053	10,152
IMR	**8.2**	**6.8**	**3.7**	**7.1**	**7.2**	**8.0**	**5.5**	**7.1**	**5.8**	**5.5**	**6.7**
All Races											
Infant Deaths (n)	177	146	149	165	163	193	160	196	183	208	177
Live Births (n)	21,423	21,685	22,329	22,605	23,353	24,427	25,428	26,367	26,819	27,574	27,592
IMR	**8.3**	**6.7**	**6.7**	**7.3**	**7.0**	**7.9**	**6.3**	**7.4**	**6.8**	**7.5**	**6.4**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

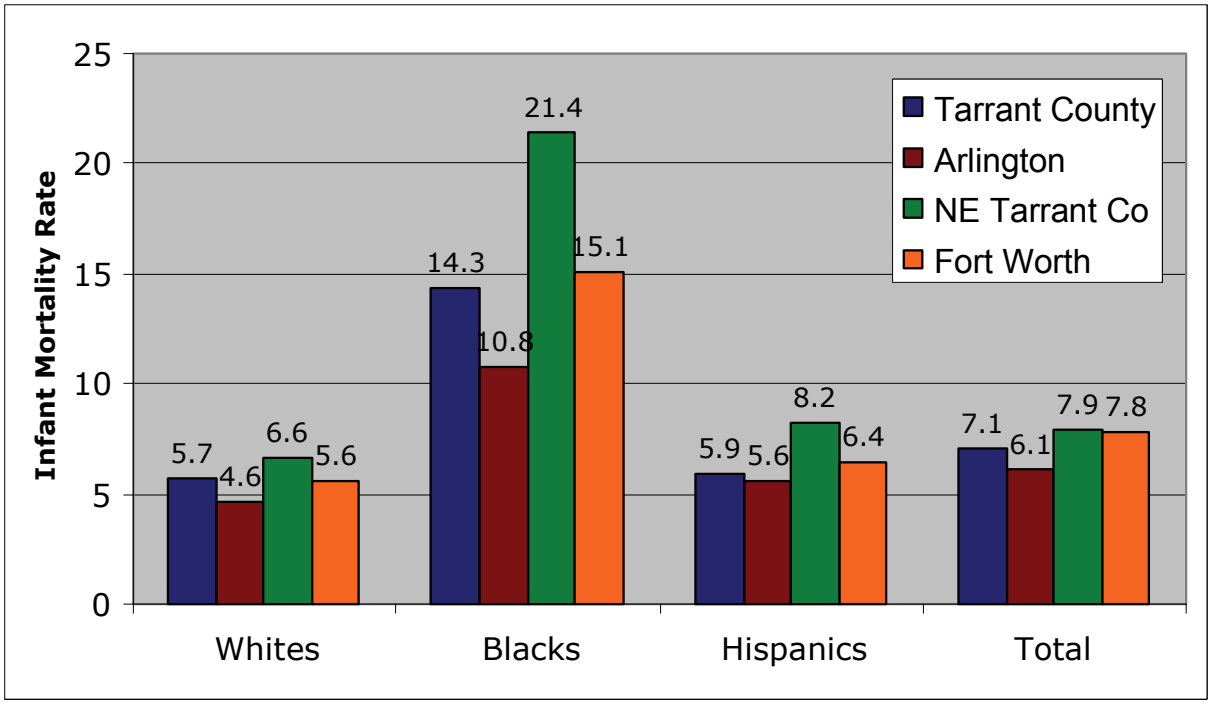
Figure 2: Infant Mortality Rates by Race/Ethnicity in Tarrant County, 1994-2004



Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births
Data Source: Texas Department of State Health Services and National Center for Health Statistics

Due to annual fluctuations and small sample sizes for individual years, data for the three year period 2002-2004 are combined. These combined data provide a larger, more robust sample size, especially for considering sub-population differences.

Figure 3: Infant Mortality Rates by Race/Ethnicity in Tarrant County, Arlington, Northeast Tarrant County, and Fort Worth, 2002-2004



Data Source: Texas Department of State Health Services

Figure 3 compares overall IMRs as well as the IMRs for the three largest racial/ethnic groups in Arlington, Northeast Tarrant County, and Fort Worth to that of Tarrant County. In each of the three areas, IMRs were highest for Blacks. Infant mortality rates for both Northeast Tarrant County and Fort Worth exceeded those of Tarrant County as a whole. Interestingly, IMR in Blacks was lowest in Arlington, but highest in Northeast Tarrant County.

III. INFANT MORTALITY RATES BY BIRTH/INFANT CHARACTERISTICS

Gestational Age

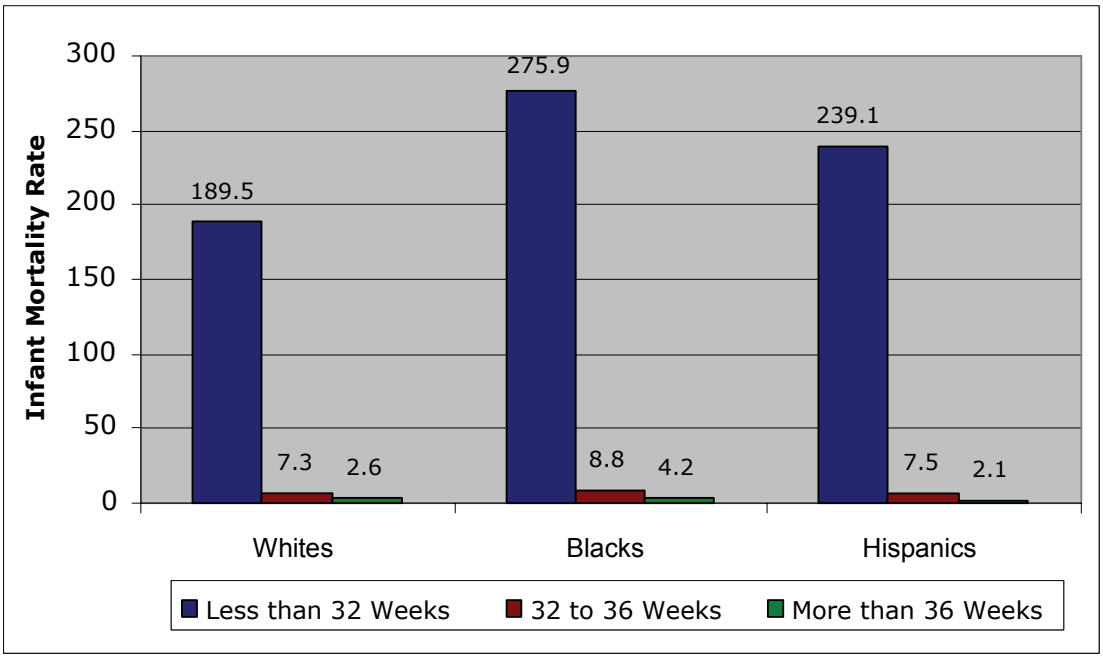
Gestational age is an extremely strong predictor of infant mortality, with IMRs for gestations of less than 32 weeks being nearly 100 times that of IMRs for full term babies over 37 weeks (Table 3). Over half of all infant deaths in Tarrant County were among babies born at less than 32 weeks gestation. A similar association between IMRs and gestational age was also observed in all racial/ethnic groups considered (Figure 4 and Table 4).

Table 3: Gestational Age, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Gestational Age	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Less than 32 weeks	316 (56.4)	1,384 (1.7)	**228.3**
32 to 36 weeks	57 (10.2)	7,344 (9.0)	**7.8**
More than 36 weeks	187 (33.4)	72,888 (89.3)	**2.6**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Figure 4: Gestational Age by Race/Ethnicity - Comparative Infant Mortality Rates in Tarrant County, 2002-2004



Data Source: Texas Department of State Health Services

**Table 4: Gestational Age and Race/Ethnicity -
Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004**

Race/ Ethnicity	Gestational Age		
	Less than 32 Weeks	32 to 36 Weeks	More than 36 Weeks
Whites			
Infant Deaths (n)	97	24	94
Live Births (n)	512	3,273	32,330
IMR	**189.5**	**7.3**	**2.9**
Blacks			
Infant Deaths (n)	112	12	42
Live Births (n)	406	1,369	9,985
IMR	**275.9**	**8.8**	**4.2**
Hispanics			
Infant Deaths (n)	99	18	57
Live Births (n)	414	2,397	26,806
IMR	**239.1**	**7.5**	**2.1**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Birth Weight

Birth weight less than 2500 grams and 1500 grams are classified as low birth weight (LBW) and very low birth weight (VLBW) respectively. Birth weight is documented to be directly related to the gestational age and is one of the strongest predictors of infant death. Table 5 presents IMRs by birth weight. Overall, IMR in the VLBW category was found to be more than 15 times higher than the IMR in the LBW category.

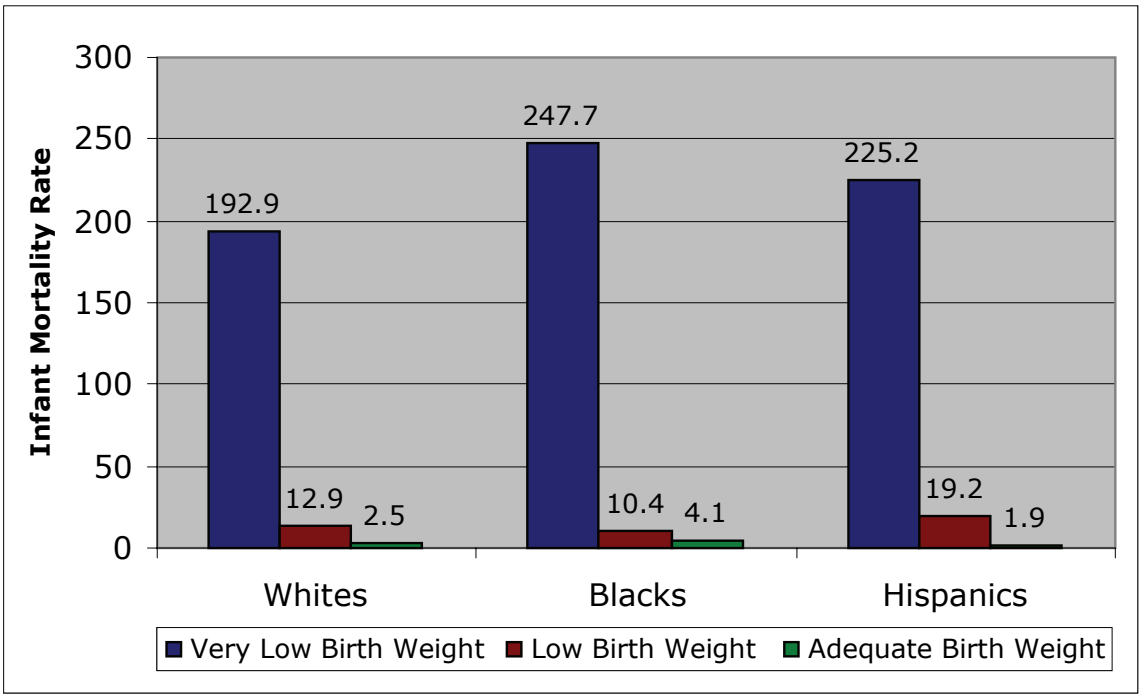
Table 5: Birth Weight, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Birth Weight	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Very Low (≤1500 gm)	239 (48.4)	1,095 (1.3)	**218.3**
Low (1501-2500 gm)	73 (14.8)	5,239 (6.4)	**13.9**
Adequate (>2500 gm)	182 (36.8)	75,555 (92.3)	**2.4**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

The extraordinarily high death rate for infants with very low birth weight (218.3 per 1,000 live births) is indicative of the correlation between this indicator and infant mortality. Conversely, those infants born at or above adequate birth weight experienced a death rate of 2.4 per 1,000 live births. These data suggest that interventions that ultimately impact adequate birth weight may help secure infant well-being.

Figure 5: Birth Weight by Race/Ethnicity -
Comparative Infant Mortality Rates in Tarrant County, 2002-2004



Data Source: Texas Department of State Health Services

Infant mortality rates for very low birth weight infants remain consistently elevated for all race/ethnicities. However, the infant mortality rate among very low birth weight Black infants is approximately 28% higher than Whites and 10% higher than Hispanics. (Figure 5). According to the National Center for Health Statistics, approximately 24% of all infants weighing less than 1500 grams die by age one. Very low birth weight infants who survive are at a significantly increased risk of various health problems, including physical and visual difficulties, developmental delays and cognitive impairment requiring increased levels of medical, educational and parental care.

Table 6: Birth Weight by Race/Ethnicity -
Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004

	Birth Weight		
Race/ Ethnicity	**Very Low (≤1500 gm)**	**Low (1501-2500 gm)**	**Adequate (>2500 gm)**
Whites			
Infant Deaths (n)	76	27	83
Live Births (n)	394	2,085	33,749
IMR	**192.9**	**12.9**	**2.5**
Blacks			
Infant Deaths (n)	81	13	42
Live Births (n)	327	1,246	10,208
IMR	**247.7**	**10.4**	**4.1**
Hispanics			
Infant Deaths (n)	75	31	52
Live Births (n)	333	1,618	27,780
IMR	**225.2**	**19.2**	**1.9**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Neonatal Deaths and Post-Neonatal Deaths

The IMR can be further analyzed by two distinct age categories: neonatal and post-neonatal period. Neonatal deaths are deaths within the first month of life (<28 days). Post-neonatal deaths occur in infants between 28 days and one year old. Different factors are known to contribute to neonatal and post-neonatal deaths. Heredity, prenatal development, and the birth process are major factors in neonatal deaths. Sudden Infant Death Syndrome (SIDS) and environmental factors such as nutrition, hygiene, and accidents contribute to post-neonatal

deaths. Table 7 presents the relationship between age of infant death and race/ethnicity in Tarrant County.

The percent of combined early and late neonatal deaths is less for Whites (63.6%) than for Hispanics (69.9%) and Blacks (71.0%) as shown in Table 7. This could be explored further by distinguishing between early and late neonatal deaths. Early neonatal death is defined as infant death within less than a week (<7 days) after birth. Late neonatal death is defined as infant death within the late neonatal period (1 week to <28 days after birth). Table 7 shows the stratification of age of death by race/ethnicity. Of all the neonatal deaths, the majority (54.1%) occurred within the first week. Hispanics had the lowest proportion (11.4%) of late neonatal deaths compared to Whites (14.6%) and Blacks (15.4%). Early neonatal deaths show a reverse pattern: Hispanics (58.5%) had the highest proportions of early neonatal deaths compared to Blacks (55.6%) and Whites (49.0%).

Table 7: Early Neonatal, Late Neonatal, and Post-Neonatal Deaths by Race/Ethnicity in Tarrant County, 2002-2004

Age at Death	Whites n (%)	Blacks n (%)	Hispanics n (%)	Tarrant County n (%)
Early Neonate (less than 7 days)	101 (49.0)	94 (55.6)	103 (58.5)	306 (54.1)
Late Neonate (between 7 and 27 days)	30 (14.6)	26 (15.4)	20 (11.4)	77 (13.6)
Post Neonate (between 28 days and 1 year)	75 (36.4)	49 (29.0)	53 (30.1)	183 (32.3)
Total	206 (100.0)	169 (100.0)	176 (100.0)	566 (100.0)

n=number
Data Source: Texas Department of State Health Services

IV. INFANT MORTALITY RATES BY MATERNAL CHARACTERISTICS

Maternal Age

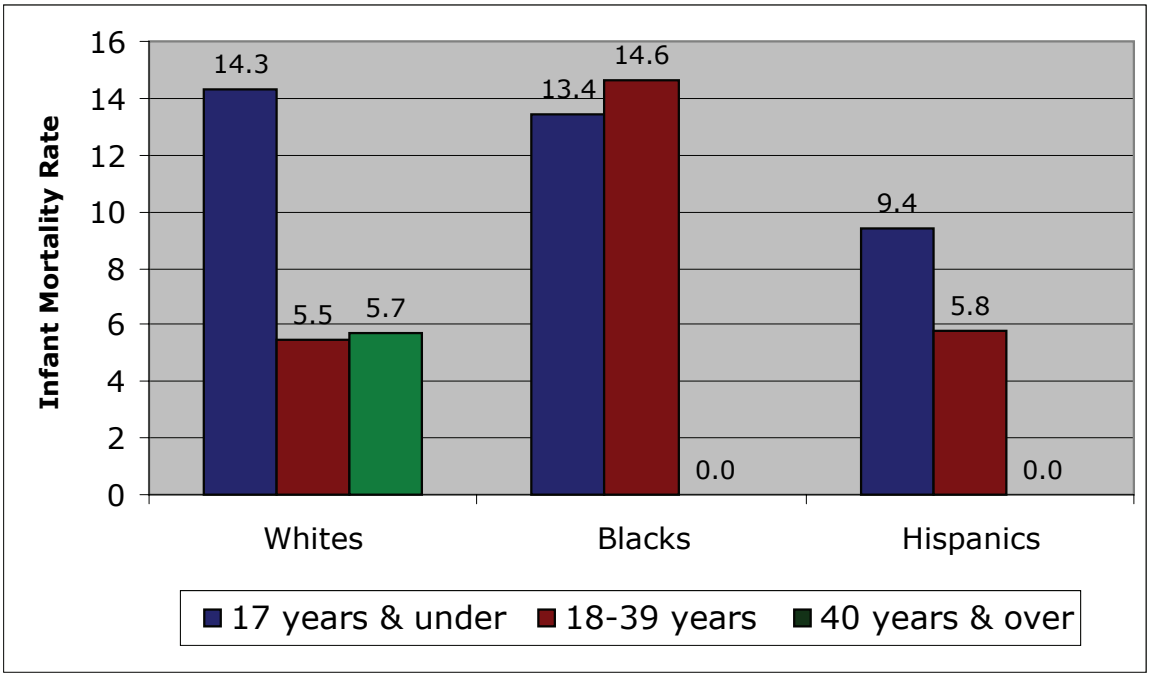
In Tarrant County, IMRs are highest among infants born to mothers aged 17 years and under, followed by those aged 18 to 39 years and those 40 years and above. (Table 8). A similar pattern is observed when stratified further by race/ethnicity, as shown in Figure 6 and Table 9. Among Whites and Hispanics, the highest IMRs were observed in the teenage group. However, among Blacks, the highest infant mortality rate occurred in mothers 18 to 39 years of age. There were no deaths recorded for infants born to Black or Hispanic mothers aged 40 years and older.

Table 8: Age of Mother, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Age of Mother	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
17 years and under	42 (7.4)	3,693 (4.5)	**11.4**
18 to 39 years	519 (91.7)	76,673 (93.5)	**6.8**
40 years and above	5 (0.9)	1,612 (2.0)	**3.1**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Figure 6: Age of Mother by Race/Ethnicity - Comparative Infant Mortality Rates in Tarrant County, 2002-2004



Data Source: Texas Department of State Health Services

Table 9: Age of Mother by Race/Ethnicity -
Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004

Race/ Ethnicity	Age of Mother		
	17 years and under	18 to 39 years	40 years and above
Whites			
Infant Deaths (n)	13	188	5
Live Births (n)	909	34,461	883
IMR	**14.3**	**5.5**	**5.7**
Blacks			
Infant Deaths (n)	11	158	0
Live Births (n)	821	10,797	202
IMR	**13.4**	**14.6**	**0.0**
Hispanics			
Infant Deaths (n)	18	158	0
Live Births (n)	1,917	27,419	411
IMR	**9.4**	**5.8**	**0.0**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Maternal Education

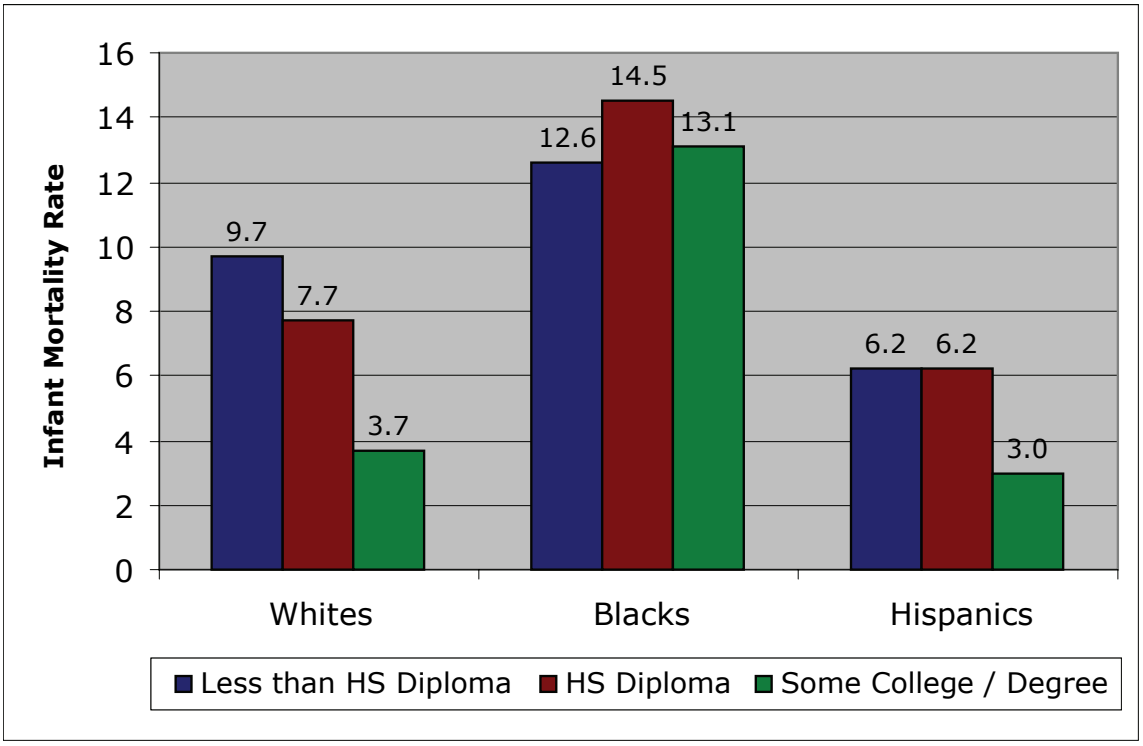
Major differences in infant mortality rates are not apparent when stratified by maternal education level, although mothers with some college, a college degree, or graduate work tend to have lower IMRs (Table 10). When further stratified by race/ethnicity, however, this trend only holds for White and Hispanic mothers. Surprisingly, Blacks with college or some college education have a higher infant mortality rate than mothers with less than a high school education, but still lower than those with a high school diploma (Figure 7 and Table 11).

Table 10: Maternal Education Level, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Education Level	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Less than HS Diploma	183 (33.6)	24,806 (30.5)	**7.4**
High School Diploma	228 (38.5)	24,686 (30.3)	**8.5**
Some College/Degree	172 (27.9)	31,849 (39.2)	**4.8**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Figure 7: Maternal Education Level by Race/Ethnicity - Comparative Infant Mortality Rates in Tarrant County, 2002-2004



Data Source: Texas Department of State Health Services

Table 11: Maternal Education Level by Race/Ethnicity - Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004

	Maternal Education Level		
Race/ Ethnicity	**Less than HS Diploma**	**High School Diploma**	**Some College/Degree**
Whites			
Infant Deaths (n)	43	81	79
Live Births (n)	4,445	10,475	21,094
IMR	**9.7**	**7.7**	**3.7**
Blacks			
Infant Deaths (n)	31	73	55
Live Births (n)	2,467	5,042	4,184
IMR	**12.6**	**14.5**	**13.1**
Hispanics			
Infant Deaths (n)	108	49	13
Live Births (n)	17,395	7,883	4,282
IMR	**6.2**	**6.2**	**3.0**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Prenatal Care Status

Prenatal care is considered an important factor in reducing medical risks in both mothers and infants which can contribute to increased risk of infant mortality. The data presented in Table 12 infers an inverse correlation between the trimester prenatal care was initiated and infant mortality. A lack of prenatal care is correlated with a substantially greater risk of infant mortality (20.0 deaths per 1,000 live births). In fact, those who did not receive any prenatal care had infant mortality rates almost three times that of those who began prenatal care in the first trimester of pregnancy. It should be noted that information regarding prenatal care status is extracted from the birth record and that 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.

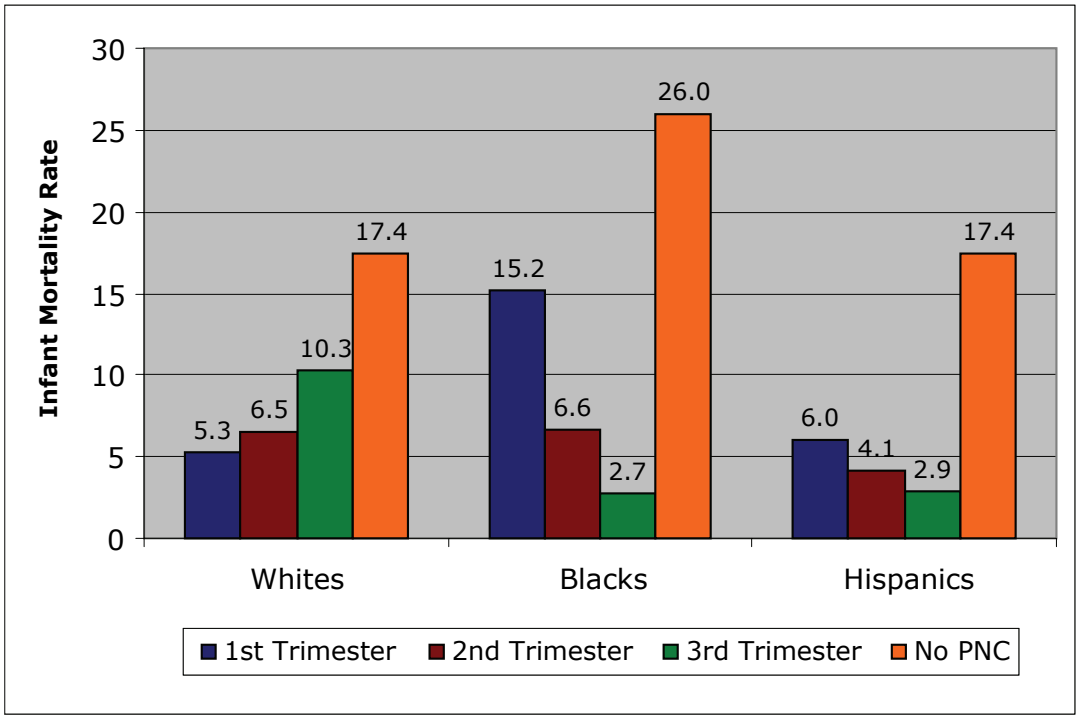
In Figure 8 and Table 13, the rates are stratified by race/ethnicity, and the pattern shown for Tarrant County as a whole is evident among Blacks and Hispanics. Among Whites, however the infant mortality rate steadily increased with delay in initiation of the prenatal care.

Table 12: Trimester Prenatal Care Began, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Trimester PNC Began	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
1st Trimester	438 (79.5)	64,455 (79.3)	**6.8**
2nd Trimester	62 (11.3)	12,357 (15.2)	**5.0**
3rd Trimester	12 (2.2)	2,533 (3.1)	**4.7**
No Prenatal Care	39 (7.1)	1,946 (2.4)	**20.0**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
PNC = Prenatal Care
Data Source: Texas Department of State Health Services

Figure 8: Trimester Prenatal Care Began by Race/Ethnicity - Comparative Infant Mortality Rates in Tarrant County, 2002-2004



PNC = Prenatal Care
Data Source: Texas Department of State Health Services

Table 13: Trimester Prenatal Care Began by Race/Ethnicity - Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004

Race/ Ethnicity	Trimester Prenatal Care Began			
	1st Trimester	2nd Trimester	3rd Trimester	No Prenatal Care
Whites				
Infant Deaths (n)	167	21	7	7
Live Births (n)	31,656	3,213	677	402
IMR	**5.3**	**6.5**	**10.3**	**17.4**
Blacks				
Infant Deaths (n)	139	12	1	10
Live Births (n)	9,122	1,823	375	385
IMR	**15.2**	**6.6**	**2.7**	**26.0**
Hispanics				
Infant Deaths (n)	122	28	4	19
Live Births (n)	20,256	6,845	1,362	1,089
IMR	**6.0**	**4.1**	**2.9**	**17.4**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

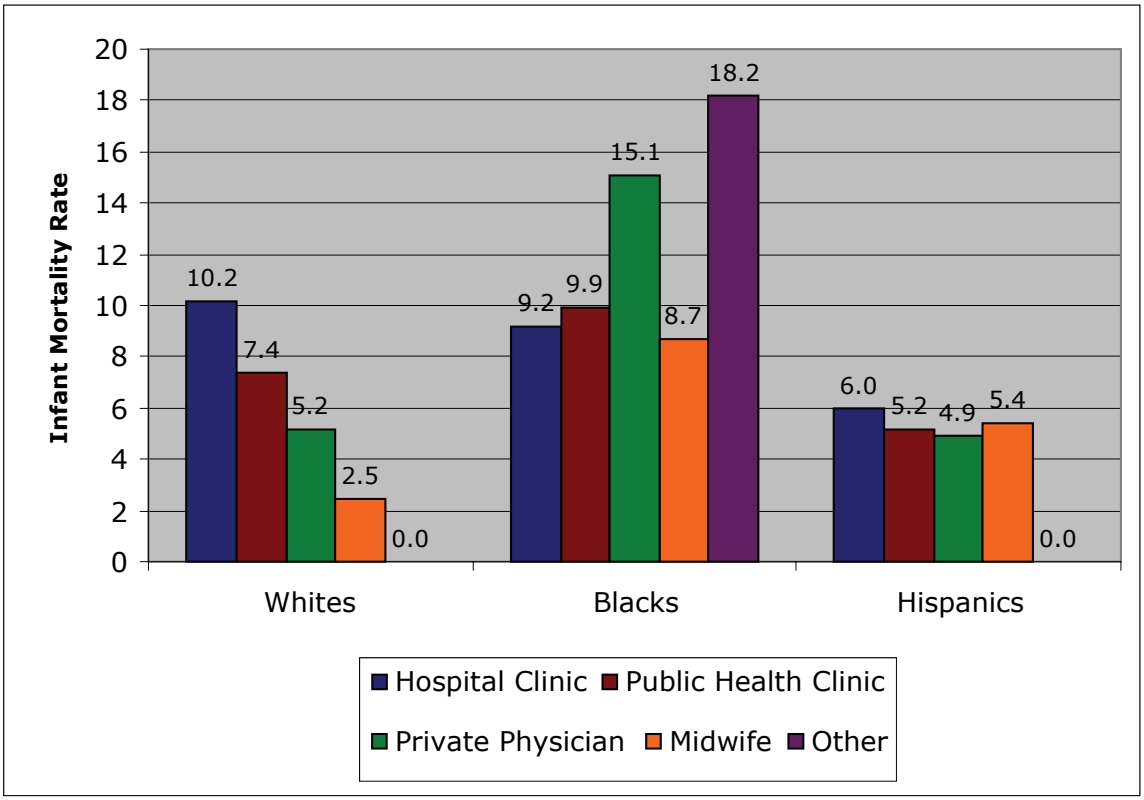
Source of Prenatal Care

Table 14: Source of Prenatal Care, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Source of Prenatal Care	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Hospital Clinic	131 (25.3)	20,060 (25.1)	**6.5**
Public Health Clinic	10 (1.9)	1,559 (2.0)	**6.4**
Private Physician	368 (71.0)	56,236 (70.4)	**6.5**
Midwife	8 (1.5)	1763 (2.2)	**4.5**
Other	1 (0.2)	279 (0.3)	**3.6**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Figure 9: Source of Prenatal Care by Race/Ethnicity - Comparative Infant Mortality Rates in Tarrant County, 2002-2004



Data Source: Texas Department of State Health Services

Table 15: Source of Prenatal Care by Race/Ethnicity - Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004

	Source of Prenatal Care				
Race/ Ethnicity	**Hospital Clinic**	**Public Health**	**Private Physician**	**Midwife**	**Other**
Whites					
Infant Deaths (n)	21	3	169	2	0
Live Births (n)	2,067	408	32,426	808	134
IMR	**10.2**	**7.4**	**5.2**	**2.5**	**0.0**
Blacks					
Infant Deaths (n)	20	3	128	3	1
Live Births (n)	2,185	302	8,502	345	55
IMR	**9.2**	**9.9**	**15.1**	**8.7**	**18.2**
Hispanics					
Infant Deaths (n)	90	4	59	3	0
Live Births (n)	15,101	772	12,103	556	69
IMR	**6.0**	**5.2**	**4.9**	**5.4**	**0.0**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
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 stratified into five 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.

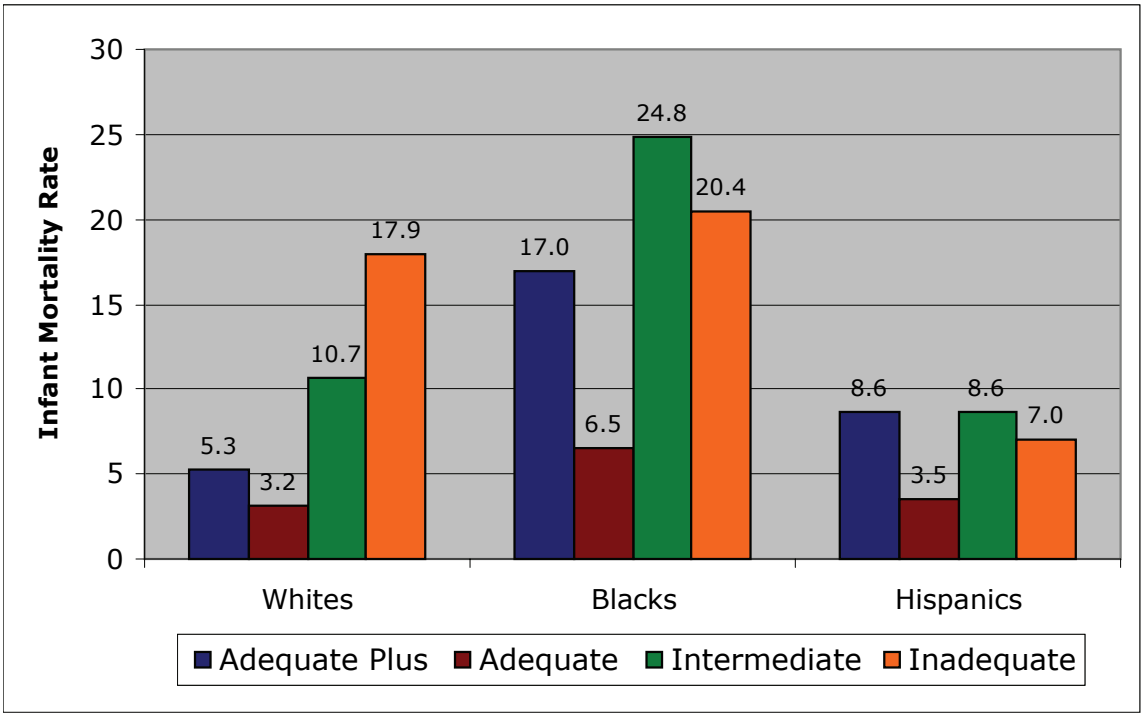
The overall IMRs by Adequacy of Prenatal Care Utilization (APNCU) for Tarrant County are shown in Table 16. Figure 10 and Table 17 highlight IMR by APNCU by race/ethnicity.

Table 16: Adequacy of Prenatal Care Utilization (APNCU), Infant Deaths, and Live Births in Tarrant County, 2002-2004

APNCU	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Adequate Plus	165 (30.2)	21,407 (26.3)	**7.7**
Adequate	147 (26.9)	40,423 (49.7)	**3.6**
Intermediate	89 (16.3)	7,543 (9.3)	**11.8**
Inadequate	145 (26.6)	11,911 (14.7)	**12.2**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Figure 10: Adequacy of Prenatal Care Utilization by Race/Ethnicity - Comparative Infant Mortality Rates in Tarrant County, 2002-2004



Data Source: Texas Department of State Health Services

Table 17: Adequacy of Prenatal Care Utilization by Race/Ethnicity - Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004

	Adequacy of Prenatal Care Utilization			
Race/ Ethnicity	**Adequate Plus**	**Adequate**	**Intermediate**	**Inadequate**
Whites				
Infant Deaths (n)	60	60	26	56
Live Births (n)	11,399	18,974	2,438	3,136
IMR	**5.3**	**3.2**	**10.7**	**17.9**
Blacks				
Infant Deaths (n)	49	36	31	41
Live Births (n)	2,881	5,554	1,252	2,013
IMR	**17.0**	**6.5**	**24.8**	**20.4**
Hispanics				
Infant Deaths (n)	51	48	30	44
Live Births (n)	5,943	13,852	3,480	6,277
IMR	**8.6**	**3.5**	**8.6**	**7.0**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

V. LEADING CAUSES OF INFANT MORTALITY AND MATERNAL RISK FACTORS

This section examines leading causes of infant mortality, five leading medical risks linked to infant deaths and IMRs associated with other maternal risk factors such as alcohol use and tobacco use.

The three leading causes of death for White infants in Tarrant County were, in order, congenital malformations, sudden infant death syndrome (SIDS), and diseases related to the length of gestation and fetal nutrition. The three leading causes of death for Black infants in Tarrant County were, in order, diseases related to the length of gestation and fetal nutrition, newborn affected by maternal factors and by complications of pregnancy, labor and delivery, and sudden infant death syndrome (SIDS). The three leading causes of death for Hispanic infants in Tarrant County were, in order, congenital malformations, diseases related to the length of gestation and fetal nutrition, and respiratory and cardiovascular disorders specific to the perinatal period (Table 18).

Table 18: Three Leading Causes of Infant Mortality by Race/Ethnicity in Tarrant County, 2002-2004

Rank	Whites n (%)	Blacks n (%)	Hispanics n (%)
1	Congenital malformations 46 (22.3)	Diseases related to length of gestation and fetal nutrition 36 (21.3)	Congenital malformations 43 (24.4)
2	Sudden infant death syndrome 39 (18.9)	Newborn affected by maternal factors and by complications of pregnancy, labor and delivery 32 (18.9)	Diseases related to length of gestation and fetal nutrition 30 (17.0)
3	Diseases related to length of gestation and fetal nutrition 21 (10.2)	Sudden infant death syndrome 21 (12.4)	Respiratory and cardiovascular disorders specific to the perinatal period 27 (15.3)

n=number
Data Source: Texas Department of State Health Services

Table 19 shows the five leading medical risk factors linked to infant deaths in Tarrant County. The most common medical risk factor was preterm labor (17.8%), followed by preterm membrane rupture, hydramnios (condition during pregnancy characterized by excessive amniotic fluid in the amniotic sac), pregnancy associated hypertension, and anemia.

Table 19: Five Leading Medical Risks Linked to Infant Deaths in Tarrant County, 2002-2004

Rank	Medical Risks	Infant Deaths n	(%)
1	Preterm Labor	101	(17.8)
2	Preterm Membrane Rupture	50	(8.8)
3	Hydramnios	26	(4.6)
4	Pregnancy Associated Hypertension	15	(2.7)
5	Anemia	13	(2.3)

n=number
Data Source: Texas Department of State Health Services

Tables 20-29 and figures 11-15 present the IMRs by the five leading medical risks linked to infant deaths, by race/ethnicity in Tarrant County.

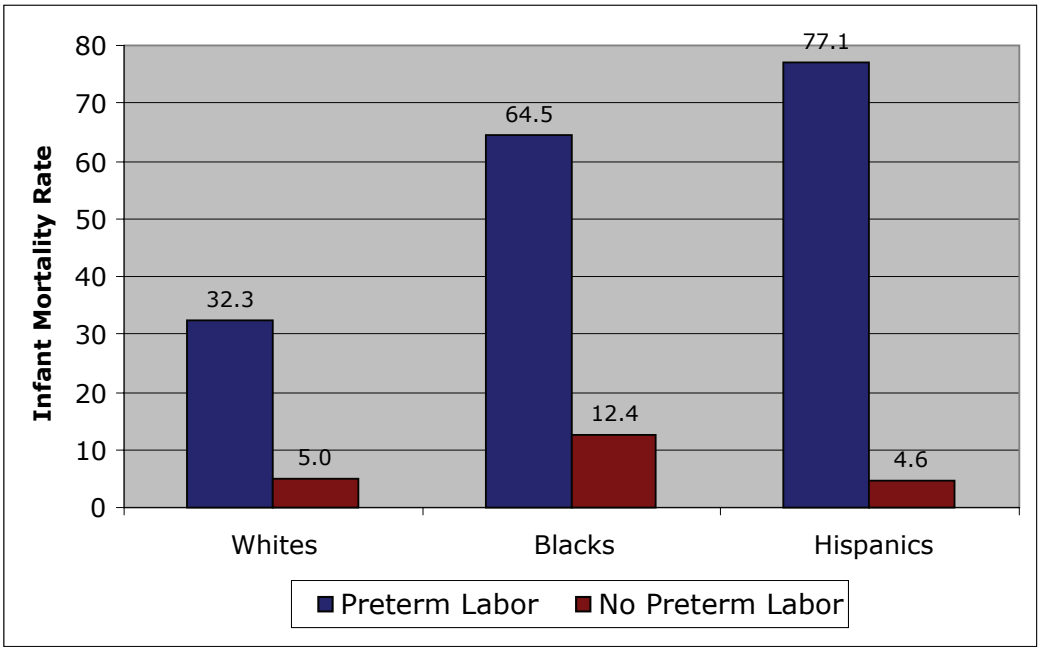
Preterm Labor

Table 20: Preterm Labor, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Preterm Labor	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Yes	101 (17.8)	2,003 (2.4)	**50.4**
No	465 (82.2)	79,981 (97.6)	**5.8**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

**Figure 11: Preterm Labor by Race/Ethnicity -
Comparative Infant Mortality Rates in Tarrant County, 2002-2004**



Data Source: Texas Department of State Health Services

**Table 21: Preterm Labor by Race/Ethnicity -
Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004**

	Preterm Labor	
Race/ Ethnicity	**Yes**	**No**
Whites		
Infant Deaths (n)	30	176
Live Births (n)	929	35,326
IMR	**32.3**	**5.0**
Blacks		
Infant Deaths (n)	28	141
Live Births (n)	434	11,386
IMR	**64.5**	**12.4**
Hispanics		
Infant Deaths (n)	41	135
Live Births (n)	532	29,217
IMR	**77.1**	**4.6**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

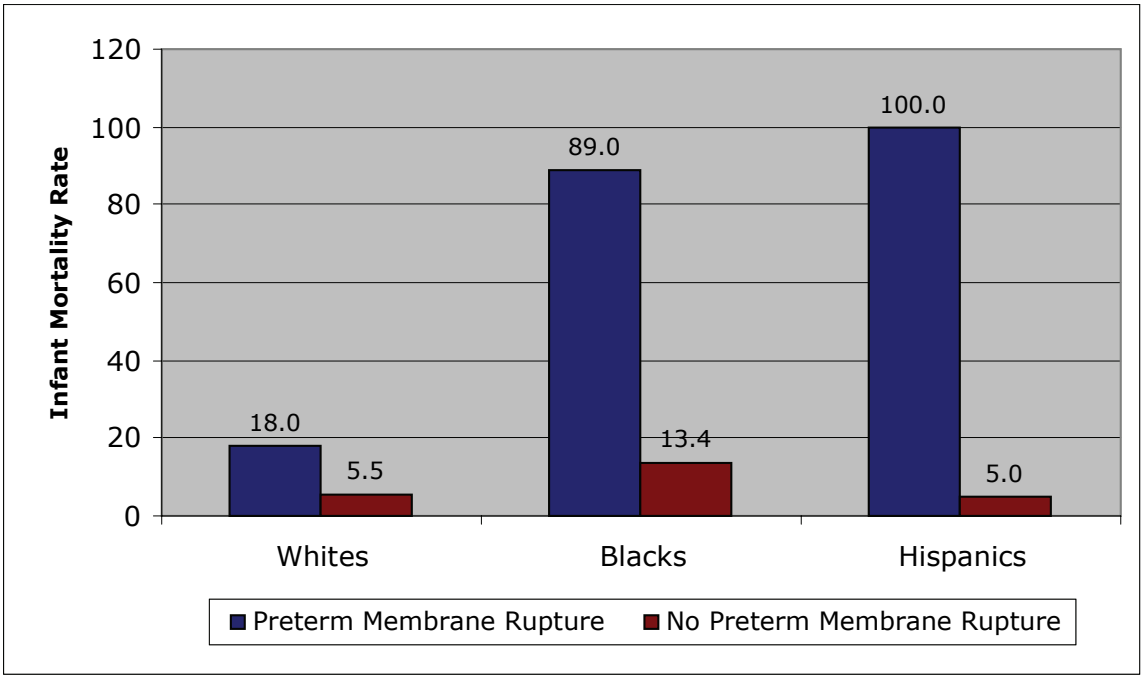
Preterm Membrane Rupture

Table 22: Preterm Membrane Rupture, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Preterm Membrane Rupture	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Yes	50 (8.8)	863 (1.1)	**57.9**
No	516 (91.2)	81,121 (98.9)	**6.4**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Figure 12: Preterm Membrane Rupture by Race/Ethnicity - Comparative Infant Mortality Rates in Tarrant County, 2002-2004



Data Source: Texas Department of State Health Services

Table 23: Preterm Membrane Rupture by Race/Ethnicity - Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004

Race/ Ethnicity	Preterm Membrane Rupture Yes	No
Whites		
Infant Deaths (n)	7	199
Live Births (n)	388	35,867
IMR	**18.0**	**5.5**
Blacks		
Infant Deaths (n)	13	156
Live Births (n)	146	11,674
IMR	**89.0**	**13.4**
Hispanics		
Infant Deaths (n)	29	147
Live Births (n)	290	29,459
IMR	**100.0**	**5.0**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

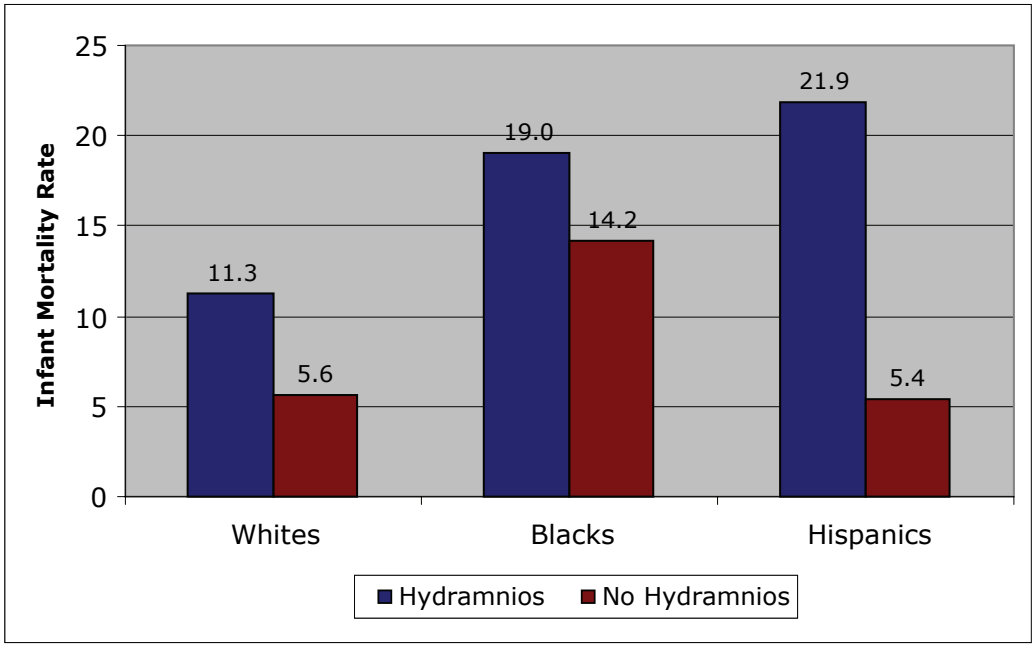
Hydramnios

Table 24: Hydramnios, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Hydramnios	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Yes	26 (4.6)	1,377 (1.7)	**18.9**
No	540 (95.4)	80,607 (98.3)	**6.7**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

**Figure 13: Hydramnios by Race/Ethnicity -
Comparative Infant Mortality Rates in Tarrant County, 2002-2004**



Data Source: Texas Department of State Health Services

**Table 25: Hydramnios by Race/Ethnicity -
Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004**

Race/ Ethnicity	Hydramnios Yes	Hydramnios No
Whites		
Infant Deaths (n)	3	203
Live Births (n)	266	35,989
IMR	**11.3**	**5.6**
Blacks		
Infant Deaths (n)	3	166
Live Births (n)	158	11,662
IMR	**19.0**	**14.2**
Hispanics		
Infant Deaths (n)	20	156
Live Births (n)	912	28,837
IMR	**21.9**	**5.4**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

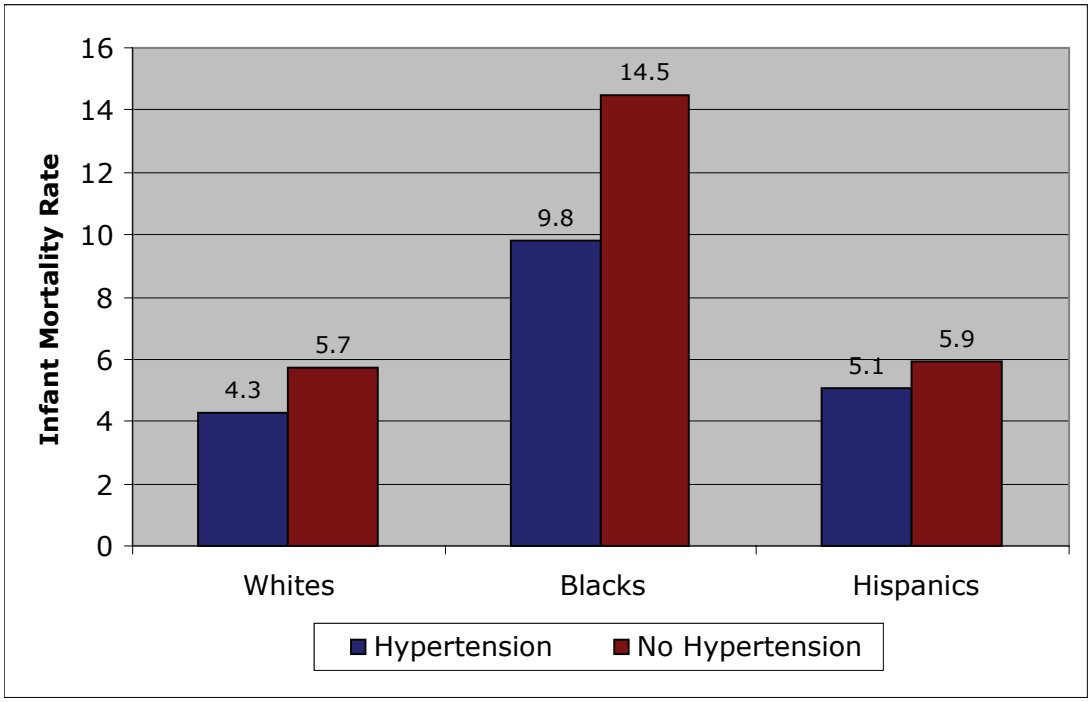
Pregnancy Associated Hypertension

Table 26: Pregnancy Associated Hypertension, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Pregnancy Associated Hypertension	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Yes	15 (2.7)	2,797 (3.4)	**5.4**
No	551 (97.3)	79,187 (96.6)	**7.0**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Figure 14: Pregnancy Associated Hypertension by Race/Ethnicity - Comparative Infant Mortality Rates in Tarrant County, 2002-2004



Data Source: Texas Department of State Health Services

Table 27: Pregnancy Associated Hypertension by Race/Ethnicity - Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004

Race/ Ethnicity	Pregnancy Associated Hypertension Yes	No
Whites		
Infant Deaths (n)	5	201
Live Births (n)	1,157	35,098
IMR	**4.3**	**5.7**
Blacks		
Infant Deaths (n)	4	165
Live Births (n)	407	11,413
IMR	**9.8**	**14.5**
Hispanics		
Infant Deaths (n)	6	170
Live Births (n)	1,168	28,581
IMR	**5.1**	**5.9**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

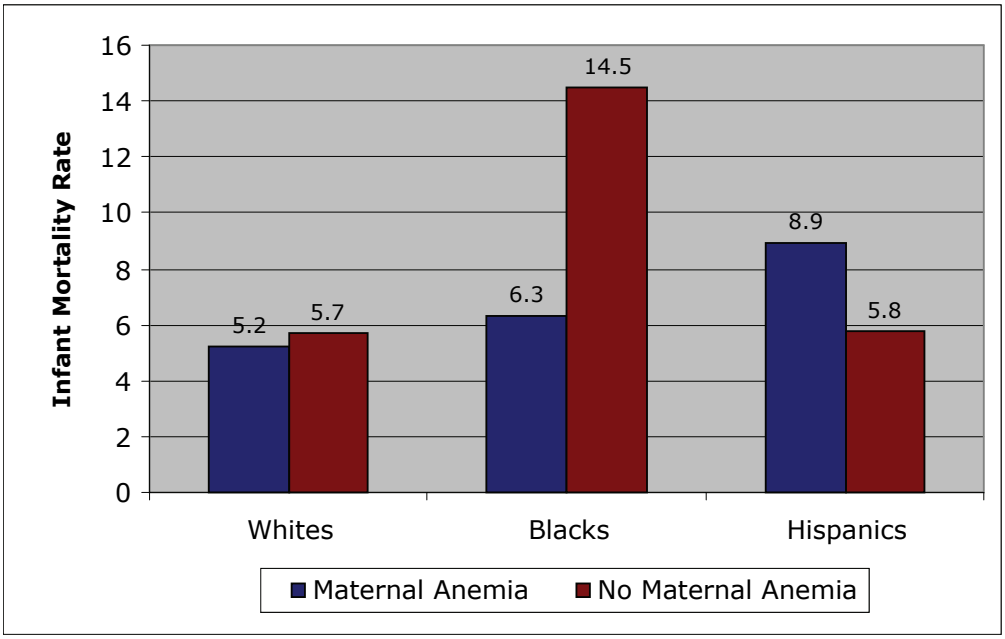
Anemia

Table 28: Anemia, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Anemia	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Yes	13 (2.3)	1,868 (2.3)	**7.0**
No	553 (97.7)	80,116 (97.7)	**6.9**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

**Figure 15: Anemia by Race/Ethnicity -
Comparative Infant Mortality Rates in Tarrant County, 2002-2004**



Data Source: Texas Department of State Health Services

**Table 29: Anemia by Race/Ethnicity -
Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004**

	Anemia	
Race/ Ethnicity	**Yes**	**No**
Whites		
Infant Deaths (n)	3	203
Live Births (n)	581	35,674
IMR	**5.2**	**5.7**
Blacks		
Infant Deaths (n)	2	167
Live Births (n)	320	11,500
IMR	**6.3**	**14.5**
Hispanics		
Infant Deaths (n)	8	168
Live Births (n)	899	28,850
IMR	**8.9**	**5.8**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Other Maternal Risk Factors – Alcohol and Tobacco Use

Two other maternal risk factors considered were alcohol and tobacco use. There is a possibility that these two maternal risk factors might be underestimated due to the self-reporting nature of the data. Tables 30-33 and figures 16-17 present the IMRs by alcohol and tobacco use by race/ethnicity in Tarrant County.

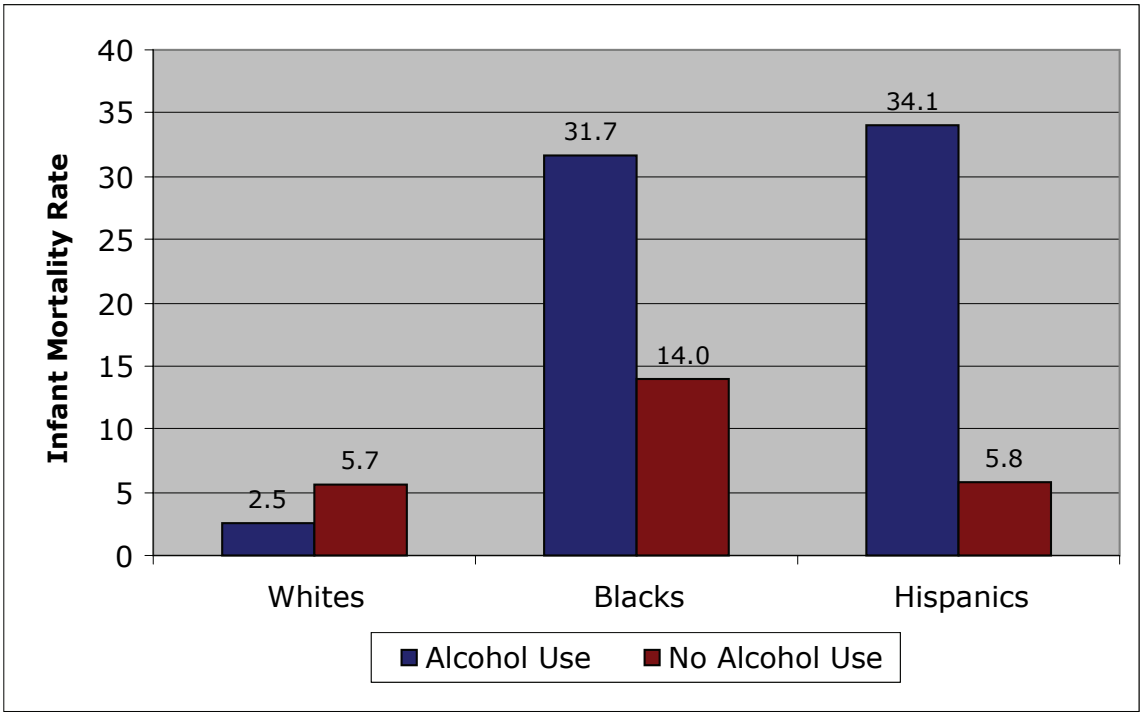
Alcohol Use

Table 30: Alcohol Use, Infant Deaths, and Live Births in Tarrant County, 2002-2004

Maternal Alcohol Use	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Yes	6 (1.1)	570 (0.7)	**10.5**
No	555 (98.9)	81,337 (99.3)	**6.8**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Figure 16: Alcohol Use by Race/Ethnicity - Comparative Infant Mortality Rates in Tarrant County, 2002-2004



Data Source: Texas Department of State Health Services

Table 31: Alcohol Use by Race/Ethnicity -
Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004

Race/ Ethnicity	Maternal Alcohol Use	
	Yes	No
Whites		
Infant Deaths (n)	1	205
Live Births (n)	403	35,816
IMR	**2.5**	**5.7**
Blacks		
Infant Deaths (n)	2	165
Live Births (n)	63	11,747
IMR	**31.7**	**14.0**
Hispanics		
Infant Deaths (n)	3	171
Live Births (n)	88	29,644
IMR	**34.1**	**5.8**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

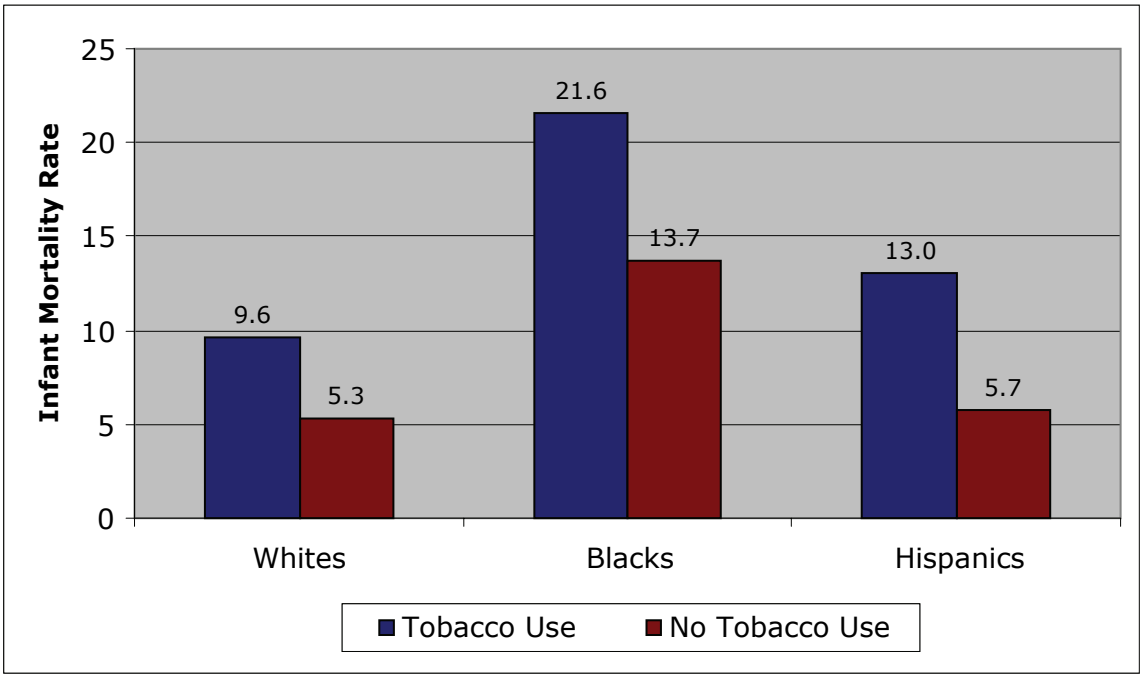
Tobacco Use

Table 32: Tobacco Use, Infant Deaths,
and Live Births in Tarrant County, 2002-2004

Maternal Tobacco Use	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
Yes	53 (9.4)	4,471 (5.5)	**11.9**
No	508 (90.6)	77,442 (94.5)	**6.6**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

**Figure 17: Tobacco Use by Race/Ethnicity -
Comparative Infant Mortality Rates in Tarrant County, 2002-2004**



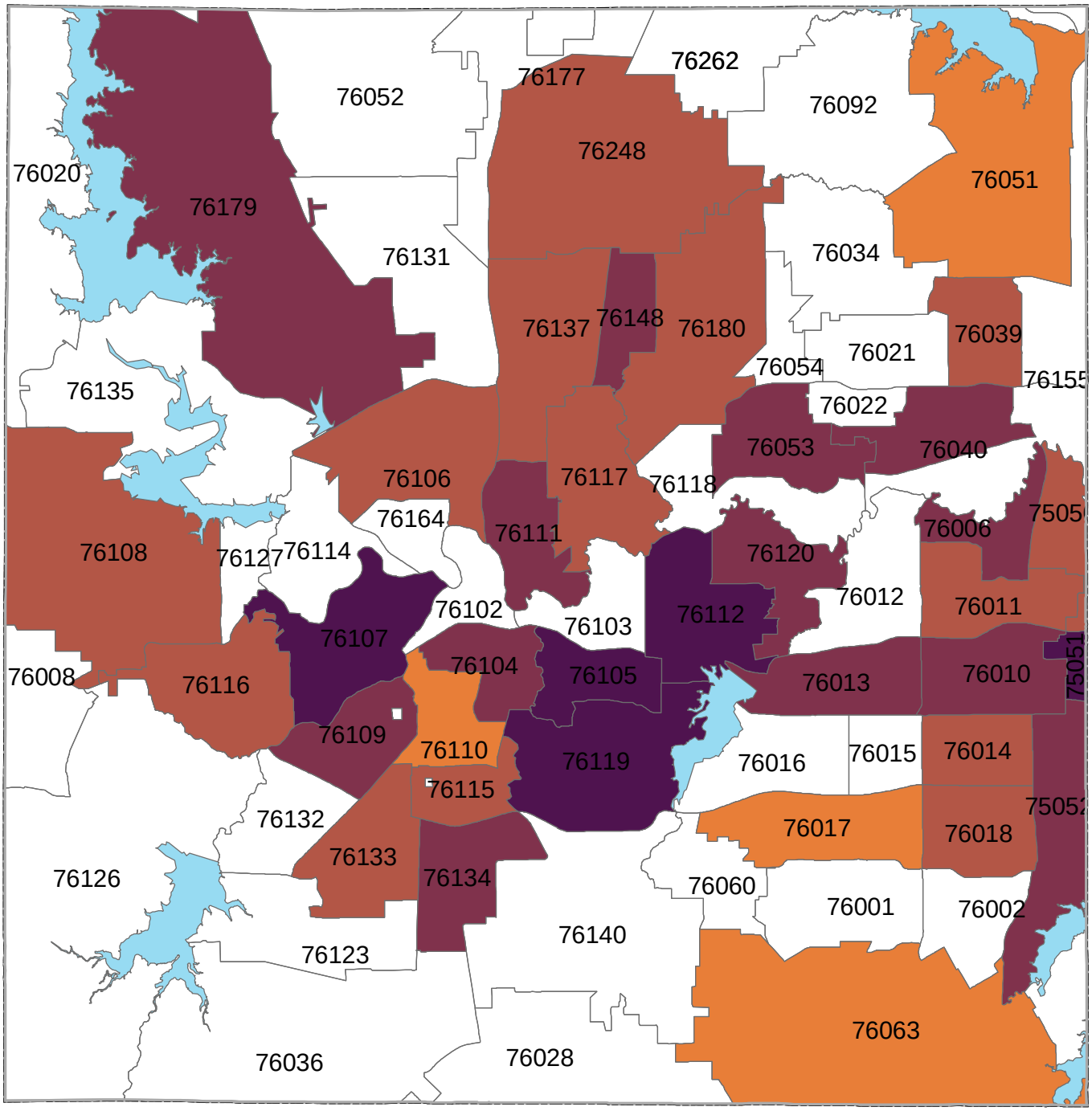
Data Source: Texas Department of State Health Services

**Table 33: Tobacco Use by Race/Ethnicity -
Comparative Infant Mortality Rates (IMR) in Tarrant County, 2002-2004**

Race/ Ethnicity	Maternal Tobacco Use	
	Yes	No
Whites		
Infant Deaths (n)	32	174
Live Births (n)	3,330	32,892
IMR	**9.6**	**5.3**
Blacks		
Infant Deaths (n)	13	154
Live Births (n)	601	11,211
IMR	**21.6**	**13.7**
Hispanics		
Infant Deaths (n)	6	168
Live Births (n)	462	29,271
IMR	**13.0**	**5.7**

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n=number
Data Source: Texas Department of State Health Services

Figure 18: Tarrant County Infant Mortality Rates by ZIP Code Distribution, 2002 - 2004



Rate per 1,000 live births

3.61 - 4.50
the lowest rate of the dataset up to the Healthy People 2010 goal (4.5)

4.51 - 6.90
the national infant mortality rate (6.9)

6.91 - 10.57
between the national rate and the Healthy Start Community qualifying rate

10.58 - 14.29
the Healthy Start Community Qualifying Rate (1.5 times the national rate 1999 - 2001) 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

09/09/2008

Source: Mortality Data from TDSHS

VI. MAPPING INFANT MORTALITY

Figure 18 represents the county infant mortality broken down by ZIP Codes for the combined years 2002, 2003, and 2004. The highest rates are clustered in central Tarrant County – ZIP Codes 76107, 76104, 76119 & 76112 and range from 10.58 to 14.29 infant deaths per 1,000 live births.

VII. CONCLUSIONS

Notable findings from 2002-2004 include:

- A decrease in the Texas infant mortality rate from 6.4 infant deaths per 1,000 live births to 6.3 between 2002 and 2004.

- A decrease in the Tarrant County infant mortality rate among Blacks from 14.6 to 12.5 infant deaths per 1,000 live births between 2002 and 2004.

- Congenital malformations were the primary cause of infant death in Tarrant County followed by early gestational age and sudden infant death syndrome (SIDS).

- The infant mortality rate for teenage mothers (age 17 years and younger) was the highest among age groups (11.4 infant deaths per 1,000 live births), followed by mothers 18 to 39 years old (6.8 per 1,000 live births) and mothers 40 years and older (3.1 per 1,000 live births).

- Tobacco use and alcohol use had high rates of infant mortality, especially among minority populations.

VIII. LIMITATIONS

Although the data in this report provide greater insight into the possible contributing factors for infant mortality in Tarrant County, there are limitations. Foremost, the IMRs provided in this report are crude estimates, hence caution must be exercised while interpreting the results and comparing the rates among sub-groups. Additional useful information could conceivably be gleaned from examining and adjusting for income level, insurance status, maternal occupation, and hospital; however, these data are either missing or not collected on a majority of Texas

birth certificates. Such information could be collected in a Fetal Infant Mortality Review (FIMR) and aggregated with the data to provide useful detail on socioeconomic factors influencing infant death.

Secondly, the medical risk factors such as tobacco use and alcohol use are self-reported, hence the results might be subjected to a recall bias. It should also be noted that because of incompleteness of some linked birth and death files at the state level, local data does not match Texas Department of State Health Services information. Unfortunately, there is no way to reconcile the differences as some births and deaths have taken place out of state and are often incomplete. When linking records at the county level instead of using state linked data, care must also be taken not to bias results by births and deaths that have taken place outside of the county. Completion of birth certificates is assumed to be uniform across hospitals and counties, and states. Hence the possibility of a systematic bias is minimal. The presence of the prenatal care medical record would facilitate accurate documentation on the certificate of a live birth. Conversely, the absence of a prenatal care medical record would result in reliance on maternal recall and/or her partner's knowledge.

IX. DATA SOURCES

- Texas Department of State Health Services, Center for Health Statistics
- National Center for Health Statistics

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