

**A**  
**REPORT OF INFANT MORTALITY**  
**IN**  
**TARRANT COUNTY**

**September 2005**

A collaboration of

**Tarrant County Public Health**

**Tarrant County Infant Mortality Task Force**

and the

**City of Fort Worth Public Health Department**



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## 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 has shown a gradual increase since 2000 and that for Tarrant County has been fluctuating. 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 Blacks (65.7%) was less than the proportions for Whites (74.2%) and Hispanics (71.1%).

The primary cause of infant mortality in Tarrant County is prematurity and low birthweight. Approximately 80% 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 (10.4%) of late neonatal deaths, compared to Whites (13.8%) and Blacks (13.9%). Conversely, Hispanics (60.7%) and Whites (60.4%) had the highest proportions of early neonatal deaths compared to Blacks (51.9%). Infant mortality and morbidity due to prematurity and low birthweight result in emotional suffering and significant direct and indirect costs.

Generally, traditional comparisons of birth characteristics associated with infant mortality were unremarkable and followed historical trends. This included a high correlation between very low birth weight and gestational age and infant deaths. Unlike expected benchmarks however, births to local White teens indicated a substantially higher rate of infant deaths.

The Perinatal Period of Risk (PPOR) system of analysis, originally developed by the World Health Organization and modified for use in the United States by [CityMatCH](#) (Maternal and Child Health), was first employed in the project in 2004 to further identify risk factors and effectively and efficiently focus interventions for specific groups, risk factors and maternal and infant characteristics. These findings are included in this report, although data was not available to update for the year 2003.

The data in this report indicates the need for community programs targeted towards the reduction of premature and low birth-weight births, as well as improving women's health before conception and during pregnancy, particularly among Blacks. This will help reduce the overall infant mortality rate in Tarrant County. Expanding and targeting programs such as Women, Infant and Children's nutrition program (WIC) to Black communities may help decrease one of the risk factors associated with poor maternal health by increasing pregnant women's access to nutritious food.

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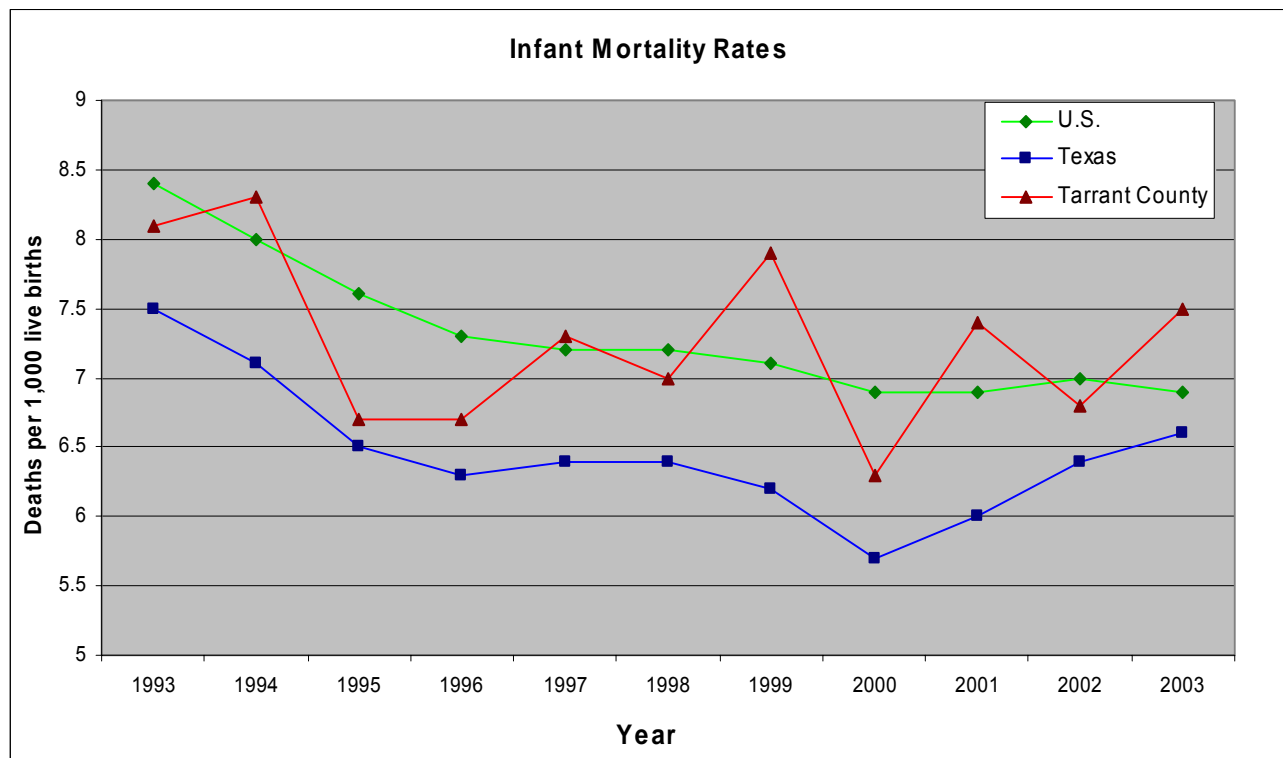
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**INTRODUCTION**

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. More than 4 million infants were born in the US in 2003 and the cost of hospital care for those newborns was more than \$10 million. More than half of that sum was spent on the 12.3% of infants who were preterm.<sup>1</sup> Researchers have also found that the costs of care for extremely low birth weight infants ( $\leq 1,000\text{g}$  at birth) in the first two years of life was 25 times greater than care for a normal birth weight infant.<sup>2</sup> 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.<sup>3</sup>

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 1993-2003**



Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births

<sup>1</sup> Cuevas KD, Silver DR, Broton, D, et al. The cost of prematurity. *Am J of Nursing*, 105(7):56-65.

<sup>2</sup> 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.

<sup>3</sup> Lewitt EM, Baker LS, Corman H, et al. The direct cost 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 may be contributing 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 require that some cases formerly classified as fetal deaths are now reported as infant deaths. The most recently available infant mortality data for the United States, at 6.9 deaths per 1,000 live births in 2003, is higher than the Healthy People 2010 objective of 4.5 per 1,000 live births. The rate for Tarrant County at 7.5 deaths per 1,000 during 2003, is higher than the average for the nation, Texas which is 6.6, and the Healthy People 2010 objective. 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 1993 to 2003. 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, 1993-2003**

Race/ Ethnicity	Year										
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Whites</b>											
Infant Deaths (n)	892	868	796	803	797	787	720	690	718	784	809
Live Births (n)	141,092	139,392	138,061	139,081	137,796	140,325	140,374	142,553	139,351	138,118	138,464
<b>IMR</b>	<b>6.3</b>	<b>6.2</b>	<b>5.8</b>	<b>5.8</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>Blacks</b>											
Infant Deaths (n)	606	505	449	446	430	466	502	468	489	561	576
Live Births (n)	41,648	40,214	38,683	38,803	39,406	40,123	40,005	41,180	40,602	41,520	41,700
<b>IMR</b>	<b>14.6</b>	<b>12.6</b>	<b>11.6</b>	<b>11.5</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>Hispanics</b>											
Infant Deaths (n)	884	879	833	789	883	885	902	876	927	986	1032
Live Births (n)	130,966	132,800	136,831	142,412	146,147	151,116	157,329	166,440	171,790	178,474	182,528
<b>IMR</b>	<b>6.7</b>	<b>6.6</b>	<b>6.1</b>	<b>5.5</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>All Races</b>											
Infant Deaths (n)	2,417	2,290	2,108	2,080	2,148	2,180	2,160	2,064	2,181	2,369	2,483
Live Births (n)	321,961	321,088	322,669	330,238	333,829	342,199	349,157	363,325	365,092	372,369	377,374
<b>IMR</b>	<b>7.5</b>	<b>7.1</b>	<b>6.5</b>	<b>6.3</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>

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births  
n=number

Overall, the infant mortality rate for the United States declined by 16.6% from 8.4 in 1993 to 7.0 in 2002. Even though the infant mortality rate in Texas was consistently lower than that of the United States over those years, it has shown a gradual increase from 2000 to 2003. From 1993 to 2003, there was an overall reduction of 9.0%, but an increase of 16.0% from 2000 to 2003.

Table 1 highlights the trend in infant mortality rates in the state of Texas from 1993 to 2003. 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 1993 to 2003. As in the remainder of this report, the ethnic category “Other” was excluded from the race-specific

**Table 2: Infant Mortality Rates (IMR) by Race/Ethnicity in Tarrant County, 1993-2003**

Race/ Ethnicity	Year										
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
<b>Whites</b>											
Infant Deaths (n)	87	95	70	88	81	69	71	60	81	65	85
Live Births (n)	13,221	12,774	12,509	12,651	12,331	12,378	12,584	12,504	12,458	12,054	12,206
<b>IMR</b>	<b>6.6</b>	<b>7.4</b>	<b>5.6</b>	<b>7.0</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>Blacks</b>											
Infant Deaths	51	37	39	37	37	43	59	51	47	57	63
Live Births (n)	3,007	2,923	2,989	3,022	3,169	3,333	3,478	3,626	3,738	3,892	3,920
<b>IMR</b>	<b>17.0</b>	<b>12.7</b>	<b>13.0</b>	<b>12.2</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>Hispanics</b>											
Infant Deaths (n)	38	40	36	21	43	47	58	44	63	55	55
Live Births (n)	4,714	4,849	5,257	5,680	6,023	6,569	7,222	7,973	8,835	9,545	10,053
<b>IMR</b>	<b>8.1</b>	<b>8.2</b>	<b>6.8</b>	<b>3.7</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>All Races</b>											
Infant Deaths	177	177	146	149	165	163	193	160	196	183	208
Live Births (n)	21,772	21,423	21,685	22,329	22,605	23,353	24,427	25,428	26,367	26,819	27,574
<b>IMR</b>	<b>8.1</b>	<b>8.3</b>	<b>6.7</b>	<b>6.7</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>

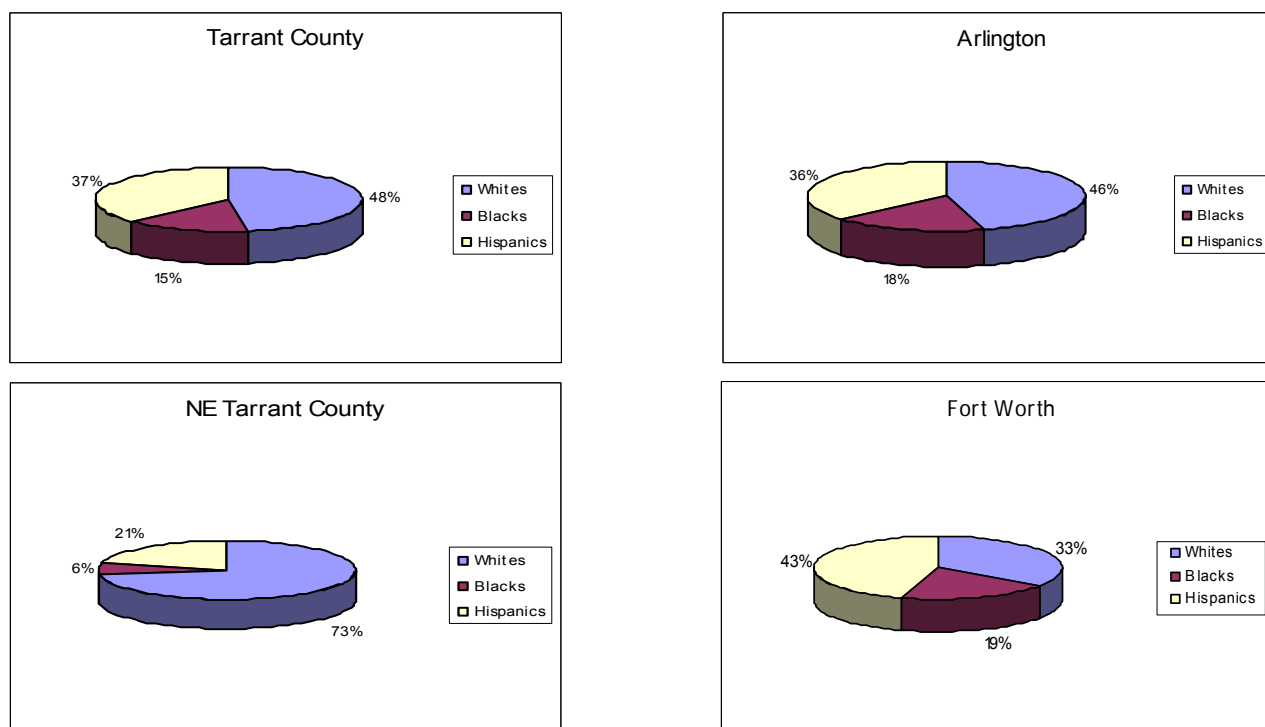
Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births and n = number

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 7.4% from 8.1 in 1993 to 7.5 in 2003. 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 1993 and 2003, IMR increased by 6% for Whites, decreased by 5% for Blacks and decreased by 30% for Hispanics. Blacks have consistently had higher IMRs than both Whites and Hispanics for each of the years 1993 through 2003. As is the case in Texas as a whole, the Tarrant County rates for Blacks each year were twice as high as those for Whites and Hispanics.

The remainder of this report examines infant mortality within specific sub-groups in Tarrant County, such as specific geographic sub-areas, race/ethnicity, age of mother and infant birthweights. Due to annual fluctuations and small sample sizes for individual years, data for the three year period 2001-2003 is combined and averaged. These combined data provide a larger, more robust sample size, especially for considering sub-population differences.

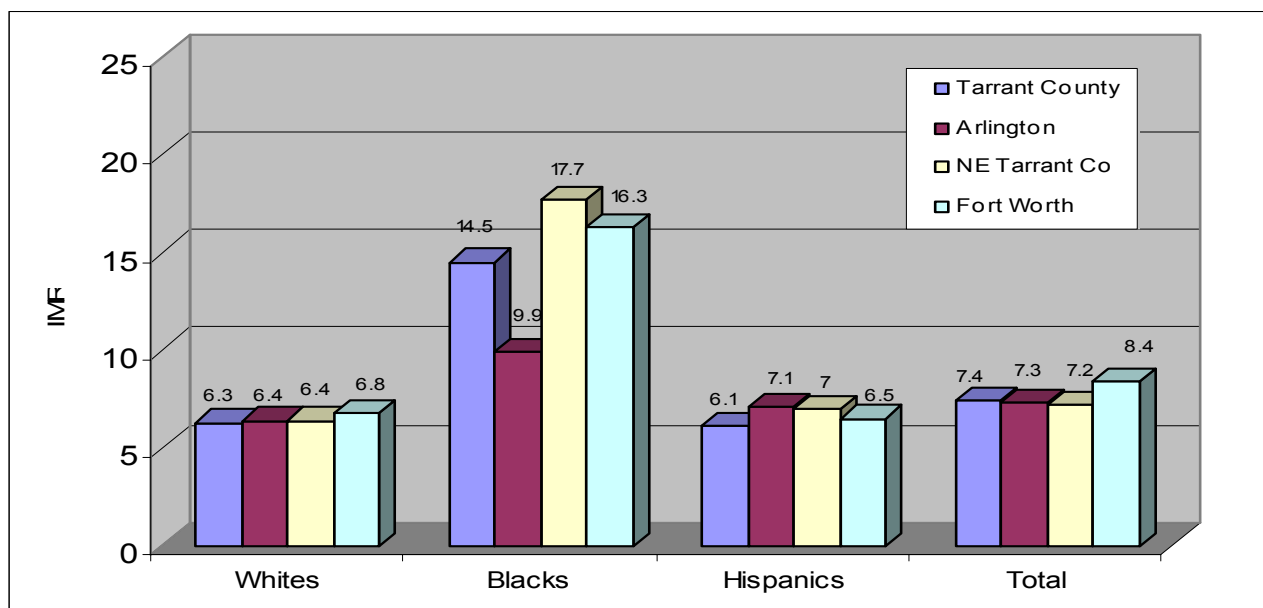
Figure 2 below depicts the racial/ethnic breakdown of the live births in Tarrant County, Arlington, Fort Worth and North East Tarrant County from 2001 to 2003. North East Tarrant County includes the cities of Bedford, Colleyville, Euless, Grapevine, Haltom City, Hurst, Keller, North Richland Hills, Richland Hills, Southlake, Watauga and Westlake. In Tarrant County, Arlington, and North East Tarrant County the majority of the live births are to White mothers, followed by Hispanics and Blacks. In Fort Worth, however Hispanic mothers have the greatest number of births.

**Figure 2: Percentage of Live Births by Race/Ethnicity in Tarrant County, Arlington, North East Tarrant County & Fort Worth, 2001-2003\***



\*Calculations based on averages for combined data for years 2001, 2002 and 2003

**Figure 3: Infant Mortality Rates (IMR) by Race/Ethnicity in Tarrant County, Arlington, North East Tarrant County & Fort Worth, 2001-2003\***



\*Calculations based on averages for combined data for years 2001, 2002 and 2003

Figure 3 above shows average rates of IMR for the three largest racial/ethnic groups in Arlington, North East Tarrant County, Fort Worth, and for all ethnicities combined for all of Tarrant County. In each of the three areas, infant mortality rates were highest for Blacks, followed by Hispanics, and Whites. Infant mortality rates for Fort Worth exceed those of Tarrant County as a whole. Interestingly, IMR in Blacks was lowest in Arlington, but highest in North East Tarrant County.

## NEONATAL DEATHS AND POST-NEONATAL DEATHS IN TARRANT COUNTY

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 3 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 Blacks (65.8%) than for Whites (74.2%) and Hispanics (70.7%) as shown in Table 3 below. This can be explored further by distinguishing between early and late neonatal deaths. The definition of early neonatal death is less than a week (<7 days). Late neonatal death is defined as age at death of at least one week but less than a month (<28 days). Table 3 shows the stratification of age of death by ethnicity. Of all the neonatal deaths, over 80% occur within the first week. Hispanics had the lowest proportion (10.4%) of late neonatal deaths compared to Whites (13.8%) and Blacks (13.9%). Early neonatal deaths show an

opposite pattern: Hispanics (60.7%) and Whites (60.4%) had higher proportions of early neonatal deaths compared to Blacks (51.9%).

**Table 3: Early Neonatal, Late Neonatal and Post-Neonatal Deaths by Race/Ethnicity in Tarrant County, 2001-2003\***

Age at Death	Whites n (%)	Blacks n (%)	Hispanics n (%)	Tarrant County n (%)
<b>Early Neonate ( less than 7 days)</b>	136 (60.4%)	82 (51.9%)	99 (60.7%)	326 (57.8%)
<b>Late Neonate (between 7 and 27 days)</b>	31 (13.8%)	22 (13.9%)	17 (10.4%)	73 (12.9%)
<b>Post Neonate (between 28 days and 1 year)</b>	58 (25.8%)	54 (34.2%)	47 (28.8%)	165 (29.3%)
<b>Total</b>	225 (100.0%)	158 (100.0%)	163 (100.0%)	564 (100.0%)

\*Calculations based on averages for combined data for years 2001, 2002 and 2003  
n=number

### CAUSES OF INFANT MORTALITY AND MEDICAL RISK IN TARRANT COUNTY

This section examines causes of infant mortality for the period between 2001 and 2003. The three leading causes of death for White and Hispanic infants in Tarrant County were, in order, diseases related to the length of gestation and fetal nutrition, congenital malformations, and sudden infant death syndrome (SIDS). The three leading causes of death for Blacks infants in Tarrant County were, in order, diseases related to the length of gestation and fetal nutrition, sudden infant death syndrome (SIDS), and congenital malformations. (Table 4)

**Table 4: Three Leading Causes of Infant Mortality by Race/Ethnicity in Tarrant County, 2001-2003\***

Rank	Whites n (%)	Blacks n (%)	Hispanics n (%)
<b>1</b>	Diseases related to length of gestation and fetal nutrition 115 (49.8%)	Diseases related to length of gestation and fetal nutrition 93 (55.7%)	Diseases related to length of gestation and fetal nutrition 91 (52.6%)
<b>2</b>	Congenital malformations 56 (24.2%)	Sudden infant death syndrome 29 (17.4%)	Congenital malformations 39 (22.5%)
<b>3</b>	Sudden infant death syndrome 20 (11.7%)	Congenital malformations 18 (10.8%)	Sudden infant death syndrome 20 (11.6%)

\*Calculations based on averages for combined data for years 2001, 2002 and 2003  
n=number

Table 5 below shows the five leading medical risk factors reported by mothers of infants that died in Tarrant County. The most common medical risk factor is preterm labor, which occurred in approximately one fifth of the mothers, followed by preterm membrane rupture, hydramnios, anemia and sexually transmitted diseases. Hydramnios is a condition during pregnancy characterized by excessive amniotic fluid in the amniotic sac.

**Table 5: Five Leading Medical Risks Linked to Infant Deaths in Tarrant County, 2001-2003\***

Rank	Medical Risk	Infant Deaths	
		n	(%)
1	Preterm Labor	112	(19.9%)
2	Preterm Membrane Rupture	47	(8.3%)
3	Hydramnios	21	(3.7%)
4	Anemia	19	(3.4%)
5	Sexually Transmitted Disease	16	(2.8%)

\*Calculations based on averages for combined data for years 2001, 2002 and 2003  
n=number

### COMPARISON OF BIRTH CHARACTERISTICS BETWEEN LIVE BIRTHS AND INFANT DEATHS IN TARRANT COUNTY, 2001-2003

This section focuses on the birth characteristics of the infants who died in Tarrant County from 2001 - 2003 as compared to birth characteristics for total live births. The linked birth and death files and live birth files provided to Tarrant County Public Health by the Department of State Health Services were used in this analysis. Examining maternal differences between live births and infant deaths can suggest possible causes of infant mortality and areas for intervention. Where possible, analysis by race/ethnicity is also conducted.

#### Maternal Age

As Table 6 shows, in Tarrant County, IMRs are highest among infants born to mothers aged 17 and under, followed by those aged 18 to 39 and those 40 and above. A similar pattern is observed when stratified further by race/ethnicity, as in Figure 4 and Table 7. In Table 7, the raw data is used to generate the bar graph in Figure 4. Whites, Blacks and Hispanics all have notable disparities in IMR among the three maternal age groups with teenage mothers having the highest IMR, followed by mothers aged 18 to 39 and mothers who are 40 years and older respectively. Whites and Hispanics have similar trends in IMR in all three age groups. Among Blacks, however the highest IMRs are seen in mothers aged 18-39 followed by teenage mothers. There were no deaths recorded for Black mothers aged 40 years and older.

**Table 6: Age of Mother, Infant Deaths and Live Births in Tarrant County, 2001-2003\***

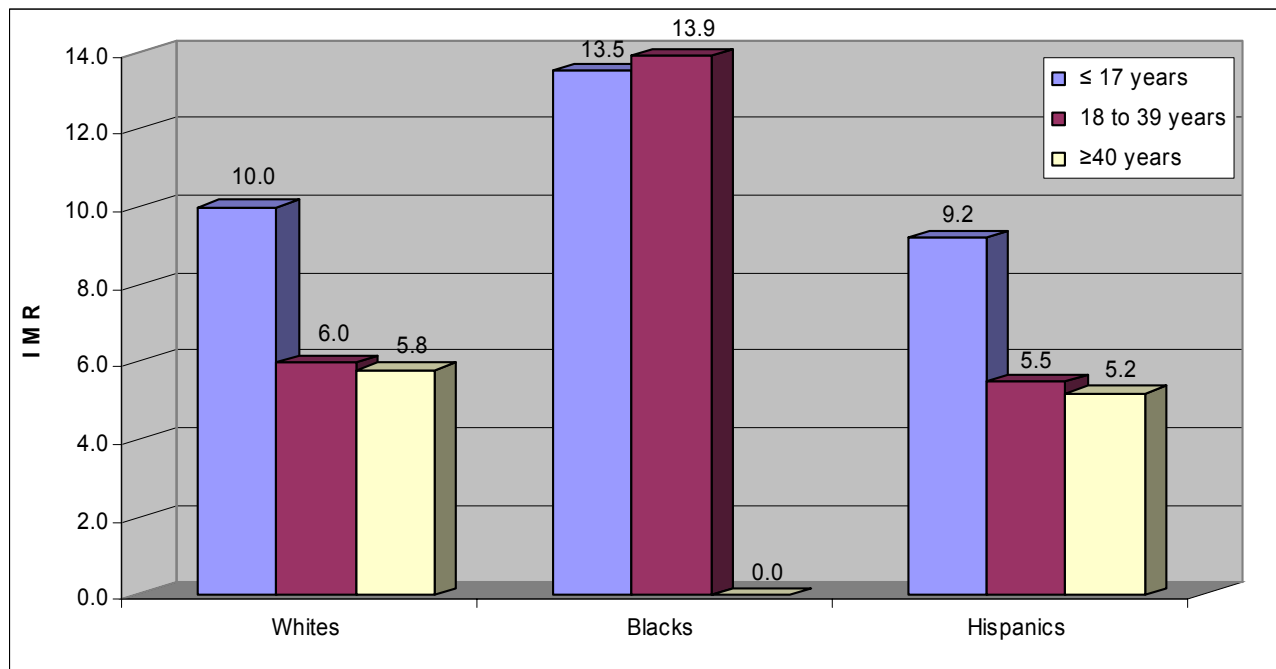
Age of Mother	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
<b>17 years and under</b>	37 (6.6%)	3,611 (4.5%)	<b>10.2</b>
<b>18 to 39 years</b>	520 (92.2%)	75,610 (93.6%)	<b>6.9</b>
<b>40 years and above</b>	7 (1.2%)	1,534 (1.9%)	<b>4.6</b>

\*Calculations based on averages for combined data for years 2001, 2002 and 2003

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births

n=number

**Figure 4: Age of Mother by Race/Ethnicity – Comparative Infant Mortality Rates in Tarrant County, 2001-2003\***



**Table 7: Age of Mother by Race/Ethnicity – Comparative Infant Mortality Rates (IMR) in Tarrant County, 2001-2003\***

Race/Ethnicity	Age of Mother		
	17 years and under	18 to 39 years	40 years and above
<b>Whites</b>			
Infant Deaths (n)	9	211	5
Live Births (n)	904	34,955	857
<b>IMR</b>	<b>10.0</b>	<b>6.0</b>	<b>5.8</b>
<b>Blacks</b>			
Infant Deaths (n)	11	147	0
Live Births (n)	814	10,546	189
<b>IMR</b>	<b>13.5</b>	<b>13.9</b>	<b>0</b>
<b>Hispanics</b>			
Infant Deaths (n)	17	144	2
Live Births (n)	1,846	26,207	381
<b>IMR</b>	<b>9.2</b>	<b>5.5</b>	<b>5.2</b>

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

\*Calculations based on averages for combined data for years 2001, 2002 and 2003

### Birth Weight

A baby's weight at birth is directly related to gestational age, and is one of the strongest predictors of infant death. Low birth weight (LBW) is defined as less than 2500 grams and very low birth weight (VLWB) is less than 1500 grams at birth. Infant mortality rates have an inverse relationship with birth weight among all races/ethnicities in Tarrant County (Table 8). Rates differ relatively little when stratified by ethnicity, with IMR in the very low birth weight group over ten times that of low birth weight babies. Among babies with adequate birth weight (ABW), however the infant mortality rate was highest in Blacks (Figure 5 and Table 9). Table 9 includes the raw data used to generate the bar graphs in Figure 5.

**Table 8: Birth Weight, Infant Deaths and Live Births in Tarrant County, 2001-2003\***

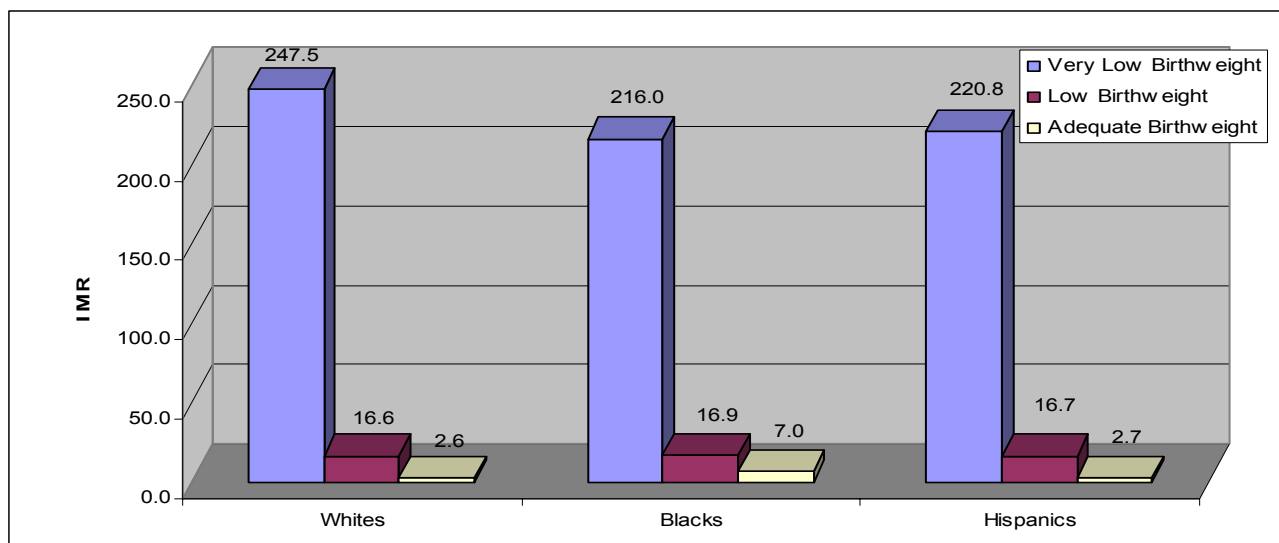
Birthweight	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
<b>Very Low (&lt;1500 gm)</b>	243 (43.1%)	1,075 (1.3%)	<b>226.0</b>
<b>Low (&lt;2500 gm)</b>	84 (14.9%)	5,250 (6.5%)	<b>16.0</b>
<b>Adequate (≥2500 gm)</b>	237 (42.0%)	74,435 (92.2%)	<b>3.2</b>

\*Calculations based on averages for combined data for years 2001, 2002 and 2003

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

The extraordinarily high death rate for infants with very low birthweight (226.0 per 1000 live births) is indicative of the correlation between this indicator and infant mortality. Conversely, those infants born at or above adequate birthweight experienced a death rate of 3.2 per 1000 births thereby already exceeding the Healthy People 2010 objective of 3.2 deaths per 1000 live births. These data suggest that interventions that ultimately impact adequate birthweight may help secure infant well-being.

**Figure 5: Birth Weight by Race/Ethnicity – Comparative Infant Mortality Rates (IMR) In Tarrant County, 2001-2003\***



\*Calculations based on averages for combined data for years 2001, 2002 and 2003

Infant mortality rates for very low birthweight infants remain consistently elevated for all race/ethnicities. However, survival among very low birthweight Black infants is approximately 3% better than Whites and only slightly better than Hispanics. According to the National Center for Health Statistics, approximately 24% of all infants weighing less than 1500 grams die by age one. Very low birthweight infants who survive are at a significantly increased risk of severe problems, including physical and visual difficulties, developmental delays and cognitive impairment requiring increased levels of medical, educational and parental care.

**Table 9: Birth Weight by Race/Ethnicity – Comparative Infant Mortality Rates (IMR) in Tarrant County, 2001-2003\***

Race/Ethnicity	Birth Weight		
	Very Low	Low	Adequate
<b>Whites</b>			
Infant Deaths (n)	98	35	89
Live Births (n)	396	2,109	34,213
<b>IMR</b>	<b>247.5</b>	<b>16.6</b>	<b>2.6</b>
<b>Blacks</b>			
Infant Deaths (n)	70	21	70
Live Births (n)	324	1,239	9,987
<b>IMR</b>	<b>216.0</b>	<b>16.9</b>	<b>7.0</b>
<b>Hispanics</b>			
Infant Deaths (n)	70	25	71
Live Births (n)	317	1,496	26,620
<b>IMR</b>	<b>220.8</b>	<b>16.7</b>	<b>2.7</b>

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births

\*Calculations based on averages for combined data for years 2001, 2002 and 2003

n=number

## Prenatal Care

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 10 infers an inverse correlation between the trimester prenatal care was initiated and infant mortality. A lack of prenatal care altogether is correlated with a substantially greater risk of infant mortality (25.3 deaths per 1000 live births). In fact, those who did not receive any prenatal care had IMRs more than 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.

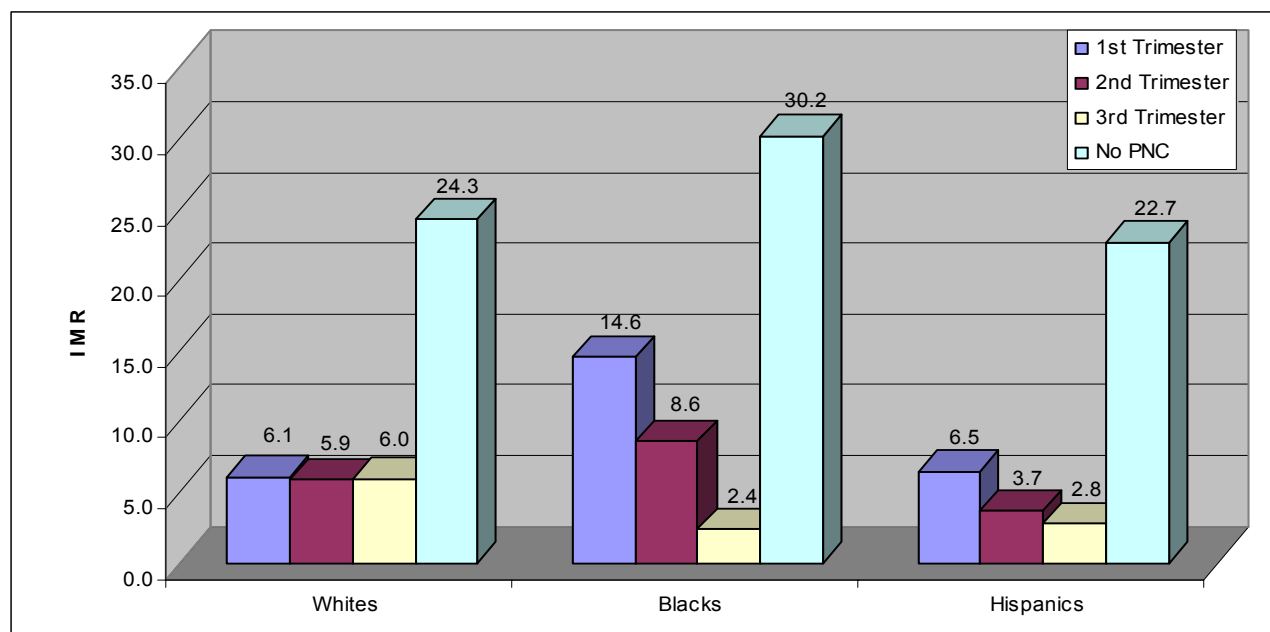
In Figure 6 and Table 11, the rates are stratified by race/ethnicity, and the pattern shown for Tarrant County as a whole is evident among Blacks and Hispanics. Among Whites, however the IMR does not vary markedly by the trimester prenatal care began.

**Table 10: Prenatal Care Status, Infant Deaths and Live Births in Tarrant County, 2001-2003\***

Trimester PNC Began	Infant Deaths n (%)	Live Births n (%)	Infant Mortality Rate
1 <sup>st</sup> Trimester	474 (19.8%)	64,981 (79.5%)	7.3
2 <sup>nd</sup> Trimester	63 (2.6%)	12,260 (15.0%)	5.1
3 <sup>rd</sup> Trimester	9 (0.4%)	2,652 (3.2%)	3.4
No Prenatal Care	47 (2.0%)	1,848 (2.3%)	25.3

\*Calculations based on averages for combined data for years 2001, 2002 and 2003  
 Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births  
 n=number

**Figure 6: Trimester Prenatal Care Began by Race/Ethnicity – Comparative Infant Mortality Rates (IMR) in Tarrant County, 2001-2003\***



\*Calculations based on averages for combined data for years 2001, 2002 and 2003  
 PNC = Prenatal Care

**Table 11: Trimester Prenatal Care Began by Race/Ethnicity – Comparative Infant Mortality Rates (IMR) in Tarrant County, 2001-2003\***

<b>Trimester Prenatal Care Began</b>				
<b>Race/ Ethnicity</b>	<b>1<sup>st</sup> Trimester</b>	<b>2<sup>nd</sup> Trimester</b>	<b>3<sup>rd</sup> Trimester</b>	<b>No Prenatal Care</b>
<b>Whites</b>				
Infant Deaths (n)	196	20	4	10
Live Births (n)	32,327	3,366	672	412
<b>IMR</b>	<b>6.1</b>	<b>5.9</b>	<b>6.0</b>	<b>24.3</b>
<b>Blacks</b>				
Infant Deaths (n)	133	16	1	12
Live Births (n)	9,145	1,859	417	398
<b>IMR</b>	<b>14.6</b>	<b>8.6</b>	<b>2.4</b>	<b>30.2</b>
<b>Hispanics</b>				
Infant Deaths (n)	131	24	4	22
Live Births (n)	20,169	6,536	1,440	971
<b>IMR</b>	<b>6.5</b>	<b>3.7</b>	<b>2.8</b>	<b>22.7</b>

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births

\*Calculations based on averages for combined data for years 2001, 2002 and 2003

n=number

### Gestational Age

Gestational age is an extremely strong predictor of infant mortality, with rates for gestations of less than 32 weeks nearly 100 times that of rates for full term babies over 37 weeks (Table 12). Over half of all infant deaths in Tarrant County were among babies born at less than 32 weeks gestation. No major differences are evident when gestational IMR are stratified by race/ethnicity (Figure 7 and Table 13).

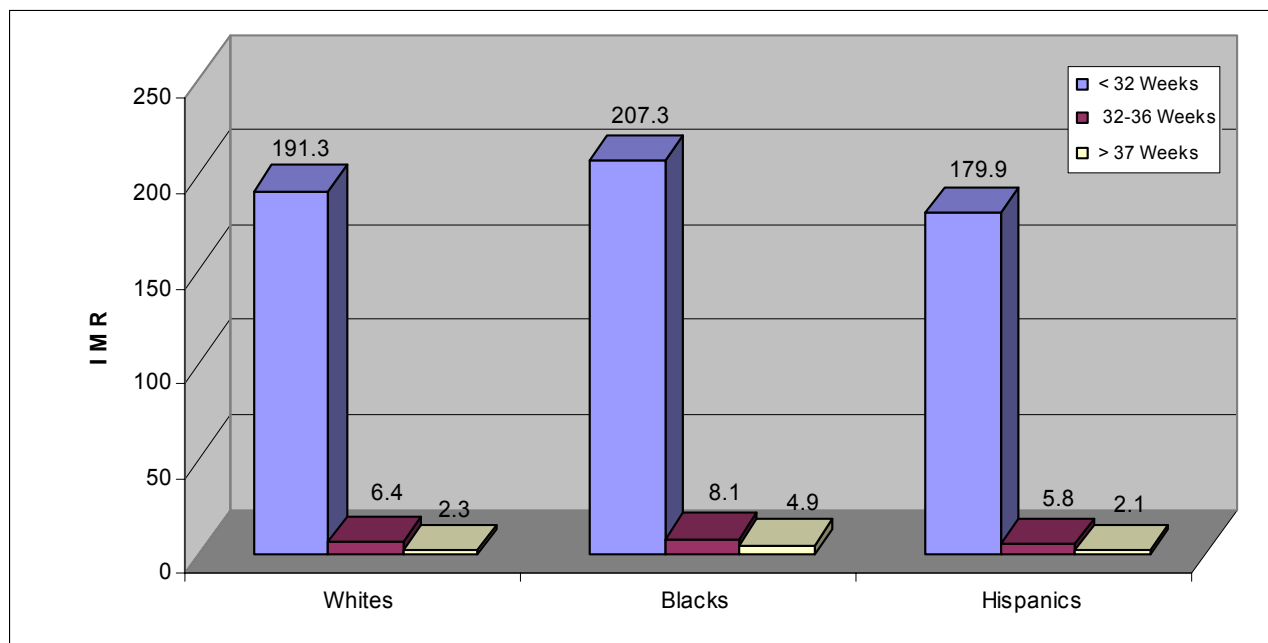
**Table 12: Gestational Age, Infant Deaths and Live Births in Tarrant County 2001-2003**

<b>Gestational Age</b>	<b>Infant Deaths n (%)</b>	<b>Live Births n (%)</b>	<b>Infant Mortality Rate</b>
<b>Less than 32 weeks</b>	327 (58.8%)	1,722 (2.1%)	<b>189.9</b>
<b>32-36 weeks</b>	45 (8.1%)	6,587 (8.2%)	<b>6.8</b>
<b>37 weeks plus</b>	184 (33.1%)	72,037 (89.7%)	<b>2.6</b>

Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births

n=number

**Figure 7: Gestational Age by Race/Ethnicity – Comparative Infant Mortality Rates (IMR) in Tarrant County, 2001-2003**



**Table 13: Gestational Age and Race/Ethnicity – Comparative Infant Mortality Rates (IMR) in Tarrant County, 2001-2003\***

Race/Ethnicity	Gestational Age		
	Less than 32 Weeks	32-36 Weeks	37 Weeks Plus
<b>Whites</b>			
Infant Deaths (n)	128	19	76
Live Births (n)	669	2,988	32,916
<b>IMR</b>	<b>191.3</b>	<b>6.4</b>	<b>2.3</b>
<b>Blacks</b>			
Infant Deaths (n)	97	10	48
Live Births (n)	468	1,241	9,767
<b>IMR</b>	<b>207.3</b>	<b>8.1</b>	<b>4.9</b>
<b>Hispanics</b>			
Infant Deaths (n)	95	12	54
Live Births (n)	528	2,077	25,672
<b>IMR</b>	<b>179.9</b>	<b>5.8</b>	<b>2.1</b>

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

\*Calculations based on averages for combined data for years 2001, 2002 and 2003

**Maternal Education**

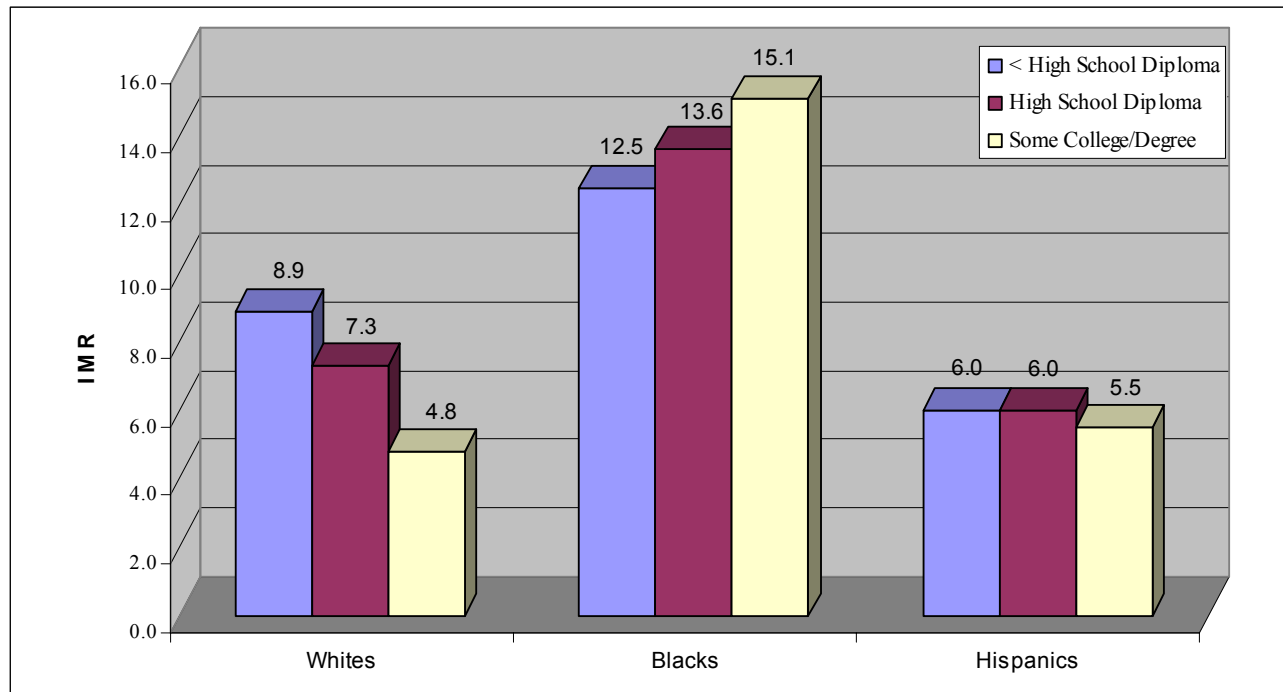
Major differences in IMR are not apparent when stratified by maternal education level, although mothers with some college, a college degree, or graduate work tend to have lower infant mortality (Table 14). When further stratified by race/ethnicity, however, this trend only holds for White and Hispanic mothers. Surprisingly, Blacks with college or some college education have a higher IMR than mothers with high school or less than a high school education (Figure 8 and Table 15).

**Table 14: Maternal Education Level, Infant Deaths and Live Births in Tarrant County, 2001-2003\***

Education Level	Infant Deaths		Live Births		Infant Mortality Rate
	n	%	n	%	
<b>Less than HS Diploma</b>	173	30.7%	24,429	30.2%	<b>7.1</b>
<b>High School Diploma</b>	197	34.9%	24,502	30.3%	<b>8.0</b>
<b>Some College/Degree</b>	194	34.4%	31,829	39.4%	<b>6.1</b>

\*Calculations based on averages for combined data for years 2001, 2002 and 2003  
 Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births  
 n=number

**Figure 8: Maternal Education Level by Race/Ethnicity – Comparative Infant Mortality Rates (IMR) in Tarrant County, 2001-2003\***



\*Calculations based on averages for combined data for years 2001, 2002 and 2003

**Table 15: Maternal Education Level by Race/Ethnicity – Comparative Infant Mortality Rates (IMR) in Tarrant County, 2001-2003\***

Race/Ethnicity	Educational Level of Mother		
	Less than HS Diploma	HS Diploma	Some College/Degree
<b>Whites</b>			
Infant Deaths (n)	41	79	102
Live Births (n)	4,621	10,810	21,287
<b>IMR</b>	<b>8.9</b>	<b>7.3</b>	<b>4.8</b>
<b>Blacks</b>			
Infant Deaths (n)	31	68	62
Live Births (n)	2,487	4,995	4,108
<b>IMR</b>	<b>12.5</b>	<b>13.6</b>	<b>15.1</b>
<b>Hispanics</b>			
Infant Deaths (n)	100	43	23
Live Births (n)	16,802	7,180	4,181
<b>IMR</b>	<b>6.0</b>	<b>6.0</b>	<b>5.5</b>

\*Calculations based on averages for combined data for years 2001, 2002 and 2003  
 Infant Mortality Rate=Deaths in infants under 1 year per 1,000 live births  
 n=number

## PERINATAL PERIODS OF RISK (PPOR)

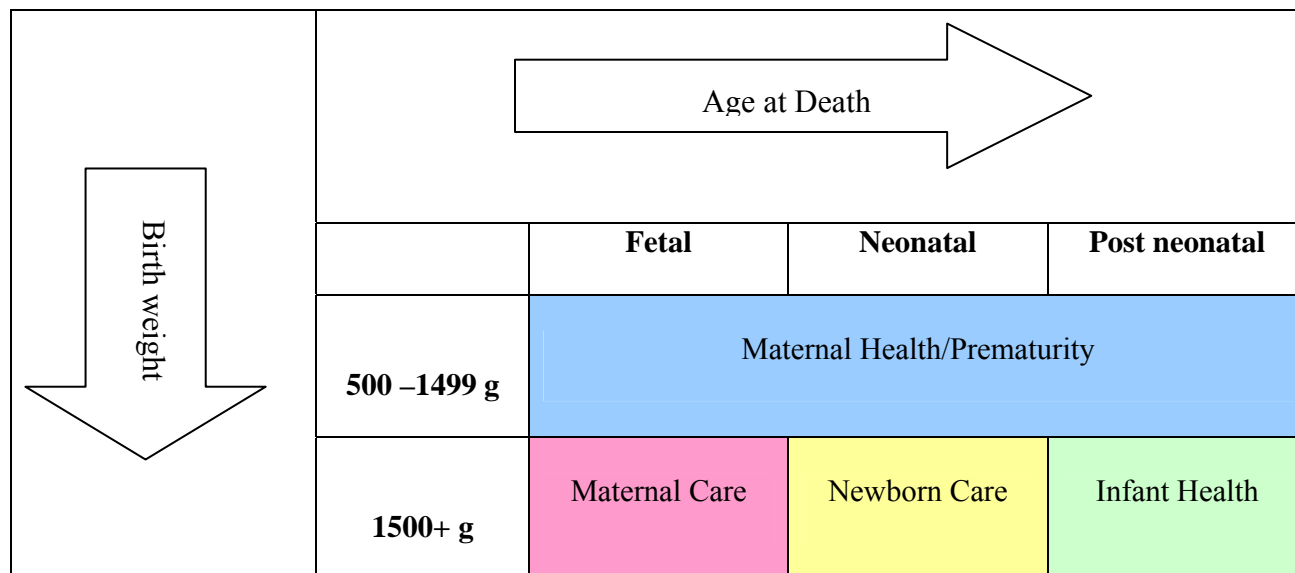
For over a decade, the Perinatal Periods of Risk approach has been used in developing and developed countries by Dr. Brian McCarthy from the Centers for Disease Control and Prevention (CDC) and other World Health Organization collaborators to monitor and investigate fetal-infant mortality. Since 1997, in partnership with CDC and the March of Dimes and several major cities, [CityMatCH](#) has led national efforts to validate, enhance and adapt this approach for greater use in U.S. cities. Four key factors spurred a more in-depth look at this new approach:

- No simple, standardized, widely accepted approach for communities to examine infant mortality.
- Current approaches do not readily identify potential gaps in the community for further reductions.

- Current approaches do not directly lead to action to targeted studies, investigations or prevention activities.
- Current approaches are not simply and easily communicated to community partners, which can inhibit mobilization.

The reference for this analysis plan is at the website [www.citymatch.org](http://www.citymatch.org), and the graphical representation of this model can be found in Figure 9.

**Figure 9: Graphic Representation of the Perinatal Periods of Risk Approach**



The fetoinfant mortality map provides a simple framework upon which to build greater prevention efforts. The map’s framework includes two dimensions: age at death and birthweight. Traditionally, infant mortality has been examined by the first dimension of the map, age at death. Different problems occur at different developmental stages due to differing risk factors. Specific interventions have been developed to specifically address these differing windows of opportunity. Therefore, high mortality during a specific time period may reflect an opportunity for intervention. The second mapping component is birthweight, the strongest predictor at birth of a child’s survival.

Combining age at death and birthweight yields a two-dimensional map of the fetoinfant mortality. The three categories for age at death start with fetal deaths, continue with neonatal deaths (first month of life), and end with post-neonatal deaths (remainder of the first year). Birthweight can be divided into two major birthweight categories: those less than 1,500 grams (defined as very low birth weight - VLBW - in this model) and those 1,500 grams or more (higher birthweight - HBW).

The PPOR approach clusters these six cells into four primary groups. First, the VLBW (500-1499g) fetal, neonatal, and post-neonatal deaths become one group. The higher birthweight (1500+ g) cells form the three remaining groups. These four groups are given labels that suggest the primary preventive direction for deaths for that group. VLBW-related deaths can best be prevented by addressing maternal health issues and by preventing and treating prematurity. For HBW-related deaths, fetal deaths can best

be prevented by providing maternal care; neonatal deaths, by providing newborn care; and post-neonatal deaths, by improving infant health.

In 2004, PPOR analysis was completed with 2000 - 2002 data. This analysis was included in this report because it allows for greater insight into the community’s infant mortality. Using the PPOR model required merging and condensing the original databases of live births and infant deaths generally used by the Texas Department of State Health Services (formerly known as Texas Department of Health). A new measure of infant mortality must be computed: the fetal infant mortality rate (FIMR). The inclusion criteria for PPOR analysis are a gestational age at birth of greater than 24 weeks and birth weight greater than 500 grams. This new measure requires that fetal deaths, neonatal, and post-neonatal deaths be combined to generate the numerator. The denominator is the number of live births plus the number of fetal deaths in the given county over a specified range of time. Using the linked birth and death records and filtering based on the inclusion criteria for the 2000-2002 in Tarrant County the denominator used for the overall FIMR computation is 78,858 as shown in Table 16. Figure 10 displays the PPOR results for Tarrant County in 2000-2002.

**Table 16: Frequency of Live Births, Fetal and Infant Deaths in Tarrant County for PPOR Inclusion, 2000 -2002**

Group	Frequency
Fetal Deaths	245
Infant Deaths	366
Live Births	78,613

**Figure 10: Tarrant County Feto-Infant Mortality Rates for All Races/Ethnicities, 2000-2002**

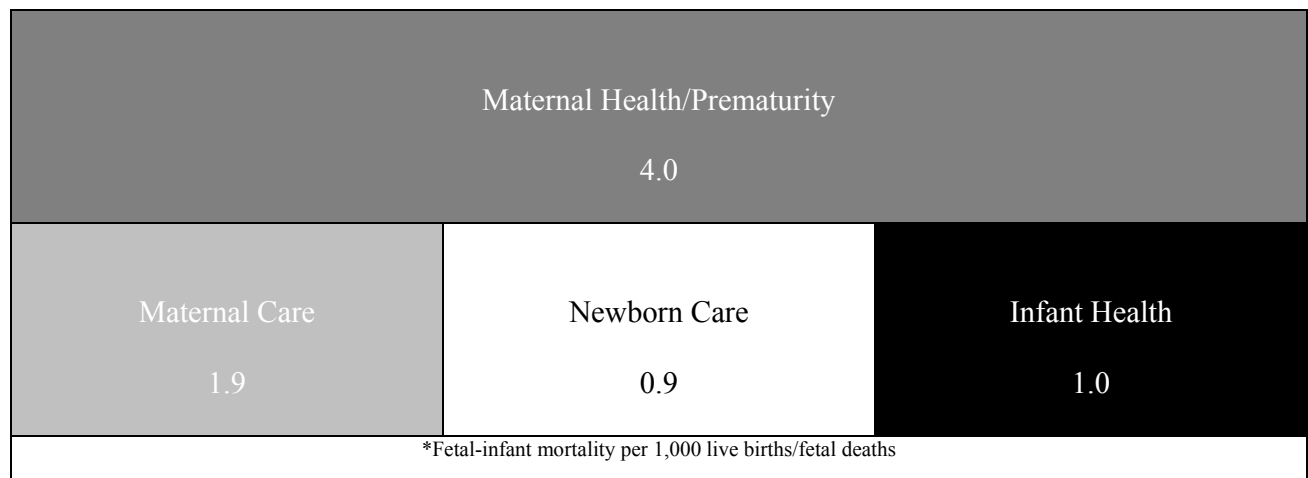


Table 17 displays the feto-infant mortality rates for race/ethnicity in Tarrant County between 2000 and 2002.

**Table 17: Tarrant County Feto-Infant Mortality Rate by Race, 2000-2002**

	<b>*Maternal Health/Prematurity</b>	<b>*Maternal Care</b>	<b>*Newborn Care</b>	<b>*Infant Health</b>
Tarrant County	4.0	1.9	0.9	1.0
White	2.9	1.7	1.0	0.7
African-American	7.7	2.6	1.0	2.5
Hispanic	3.8	1.8	0.9	0.8

\*Feto-infant mortality per 1,000 live births

Comparing African-American PPOR results to White PPOR results:

- Maternal health/prematurity rates are nearly three times as high (2.7x)
- Maternal care rates are one-and-a-half times as high (1.5x)
- Newborn care rates are equal
- Infant health rates are over three-and-a-half times as high (3.6x)

Comparing Hispanic PPOR results to White PPOR results:

- Maternal health/prematurity rates are slightly higher (1.3x)
- Maternal care rates are approximately equal
- Newborn care rates are approximately equal
- Infant health rates are approximately equal

**MAPPING INFANT MORTALITY**

Figure 11 represents the county infant mortality broken down by ZIP Codes. The highest rates are clustered in central Tarrant County with some ZIP Codes to the east and west– ZIP Codes 76126, 76109, 76116, 76105, 76104, 76112, 76013, 76053 & 76135.



## CONCLUSIONS

Notable findings from 2001-2003 include:

- An increase in the Texas infant mortality rate from 5.7 deaths per 1000 live births to 6.6 between 2000 and 2003.
- An increase in the Tarrant County infant mortality rate among Blacks from 12.6 to 16.1 between 2001 and 2003.
- Early gestational age and low birthweight are the primary cause of infant death in Tarrant County for all races.
- Blacks have a greater proportion of infant deaths (17.4%) due to Sudden Infant Death Syndrome than do Whites (11.7%) or Hispanics (11.6%).
- Women who reported having no prenatal care had an infant mortality rate of 25.3.
- Black women with college or some college education have a higher infant mortality rate than Black women with less education.
- The 2000 – 2002 PPOR analysis indicates maternal health and prematurity are primary indicators of infant mortality in Tarrant County, suggesting the critical role of preconceptual health and family planning in reducing infant mortality.

## LIMITATIONS

Although the data in this report provides greater insight into the possible contributing causes for perinatal death, there are some limitations. As incidence of death decreases, the sample size may limit reliability of the data, which is why the analysis maintains a sample size of at least 60. Some local data does not match Texas Department of State Health Services information because some linked birth and death files at the state level are not complete. Unfortunately, there is no way to reconcile the differences as some births and deaths have taken place out of state and fetal death records 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. There are different requirements among states for the type of information collected, resulting in a large percentage of unknowns for fetal deaths. Completion of birth certificates is assumed to be uniform across hospitals and counties, and states. Systematic bias may occur if institutions had different policies regarding the completion of birth certificate information. Such policies may have affected the quality of the data reported for specific subgroups. 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. Additional useful information could conceivably be gleaned from examining 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.

Data Sources

- Texas Department of State Health Services, Center for Health Statistics
- U.S. Census Bureau, Census 2000
- U.S. Census Bureau, Population Projection 2002

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