



INFANT MORTALITY
IN
TARRANT COUNTY

September 2004



**TARRANT COUNTY
PUBLIC HEALTH**



Catholic Charities
DIOCESE OF FORT WORTH, INC.



A
REPORT OF THE INFANT MORTALITY
IN
TARRANT COUNTY

A joint effort among
The Tarrant County Public Health
The Catholic Charities of Tarrant County
and
The City of Fort Worth Public Health



**TARRANT COUNTY
PUBLIC HEALTH**

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September 2004

EXECUTIVE SUMMARY

Infant Mortality Rate (IMR) is one of the most important indicators of the general level of health or well being of a given 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, including Tarrant County, have been declining during the past decade, the United States infant mortality rose in 2002 for the first time since 1958. 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, infant mortality rates are further examined by dividing results into neonatal deaths (deaths within the first month of life, < 28 days) and post-neonatal deaths (from one month to less than a year). The rationale of this categorization is that heredity, prenatal development, and the birth process reflect on neonatal deaths. Consequently, environmental factors--nutrition, hygiene, and accidents, among others, reflect on the post-neonatal deaths. Unexpectedly, the data for Tarrant County indicates that neonatal deaths among Blacks were less than those for Hispanics or Whites (65.7% compared to 74.0% and 72.6%, respectively).

Approximately 80% of all neonatal deaths occur within the first week. Infant deaths are further categorized by early neonatal deaths (< 7 days) and late neonatal deaths (between 7 and 28 days). Hispanic had the lowest proportion (15.7%) of late neonatal deaths, compared to Whites (24.1%) and Blacks (20.7%). Examining the early neonatal deaths produced the opposite results: Hispanics had the highest proportion (84.1%) of early neonatal deaths, compared to Whites (75.9%) and Blacks (79.3%).

Generally, traditional comparison of birth characteristics associated with infant mortality were unremarkable and followed historical trends. This included a high correlation between very low birthweight and gestational age and infant deaths. However, unlike expected benchmarks, 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 City MatCH (Maternal and Child Health) was employed in the project to further identify risk factors and suggest specific areas for intervention. The PPOR system examines both fetal and infant deaths, and divides mortalities into four mutually exclusive groups based on factors influencing the death: maternal health/prematurity, maternal care, newborn care, and infant health. For example, using this method of comparing African-American PPOR results to White PPOR results indicated that Maternal Health/Prematurity rates are nearly three times as high; Maternal Care rates are one-and-a-half times as high; Newborn Care rates are equal; and Infant Health rates are over three-and-a-half times as high.

Using the PPOR method, specific groups, risk factors and characteristics can be used to effectively and efficiently focus interventions. The Perinatal Periods of Risk Approach focuses prevention efforts through the following five major steps: 1) engaging community partners, 2) mapping feto-infant mortality, 3) focusing on reducing overall feto-infant mortality rate, 4) examining potential opportunity gaps, and 5) targeting further investigations and prevention efforts.

CONTENTS

Executive Summary.....	ii
Introduction.....	1
Neonatal and Post-Neonatal Deaths.....	4
Causes of Infant Mortality.....	4
Comparison of Birth Characteristic between live births and infant deaths.....	5
Perinatal Periods of Risk (PPOR).....	9
Regional Differences in Feto-Infant Mortality: Fort Worth and Arlington.....	15
Reference Groups and Perinatal Periods of Risk.....	17
Subpopulations Stratification by Race/Ethnicity.....	29
Mapping Infant Mortality.....	21
Limitations.....	21
Tables and Figures	
Table 1: Infant Mortality Rates in Texas By Race 1992 - 2002.....	2
Table 2: Infant Mortality Rates in Tarrant County By Race 1992 - 2002.....	2
Table 3: Early Neonatal and Late Neonatal Deaths in Tarrant County By Race.....	4
Table 4: Three Leading Causes of Infant Mortality By Race.....	5
Table 5: Age of Mother, Live Births and Infant Death in Tarrant County.....	5
Table 6: Birth Weight, Live Births and Infant Deaths, Tarrant County 2000 - 2002.....	6
Table 7: Trimester Prenatal Care Began, Live Births and Infant Deaths, Tarrant County....	7
Table 8: Prenatal Care, Live Births and Infant Deaths, Tarrant County	7
Table 9: Gestational Age, Live Births and Infant Deaths, Tarrant County.....	8
Table 10: Education Level of Mother, Live Births and Infant Deaths, Tarrant County.....	9
Table 11: Frequency of Live Births, Fetal and Infant Deaths for PPOR Inclusion	11
Table 12: Tarrant County Feto-Infant Mortality Rate by Race.....	15

Table 13: Fort Worth Feto-Infant Mortality Rate by Race.....	16
Table 14: Excess Feto-Infant Mortality Rates and Rates for PPOR Components	17
Table 15: Excess Feto-Infant Mortality Rates and Deaths and Rates for PPOR Components	19
Figure 1: Infant Mortality Rates in the United States 1992-2002.....	1
Figure 2: Percentage of Live Births by Race/Ethnicity -Tarrant County, Fort Worth & Arlington	
Figure 3: Infant Mortality Rate by Race/Ethnicity - Tarrant County, Fort Worth & Arlington..	3
Figure 4: Age and Race/Ethnicity – Comparative Infant Mortality Rates, Tarrant County...	6
Figure 5: Birth Weight and Race/Ethnicity, Tarrant County	6
Figure 6: Trimester Prenatal Care Began and Race/Ethnicity – Comparative IMR.....	7
Figure 7: Prenatal Care Status and Race/Ethnicity - Comparative IMR.....	8
Figure 8: Gestational Age and Race/Ethnicity - Comparative IMR.....	8
Figure 9: Maternal Education Level and Race/Ethnicity – Comparative IMR.....	9
Figure 10: Graphic Representation of the Perinatal Periods of Risk Approach.....	10
Figure 11: Tarrant County Feto-Infant Mortality Rates for all Races.....	13
Figure 12: PPOR for Maternal Health/Prematurity.....	13
Figure 13: PPOR for Maternal Care.....	13
Figure 14: PPOR for Newborn Care.....	14
Figure 15: PPOR for Infant Health.....	14
Figure 16: Tarrant County, Fort Worth, Arlington Feto-Infant Mortality Rates.....	15
Figure 17: Fort Worth Feto-Infant Mortality Rate by Race.....	16
Figure 18: Using Reference Groups to Calculate Excess Infant Mortality.....	17
Figure 19: Tarrant County Feto-Infant Mortality Rates – External Reference Group.....	18
Figure 20: Tarrant County Feto-Infant Mortality Rates – Internal Reference Group.....	20
Figure 21: Tarrant County Feto-Infant Mortality Rates – Excess Mortality by Race/Ethnicity	20
Figure 22: Tarrant County IMR by ZIP Code Distributions.....	21

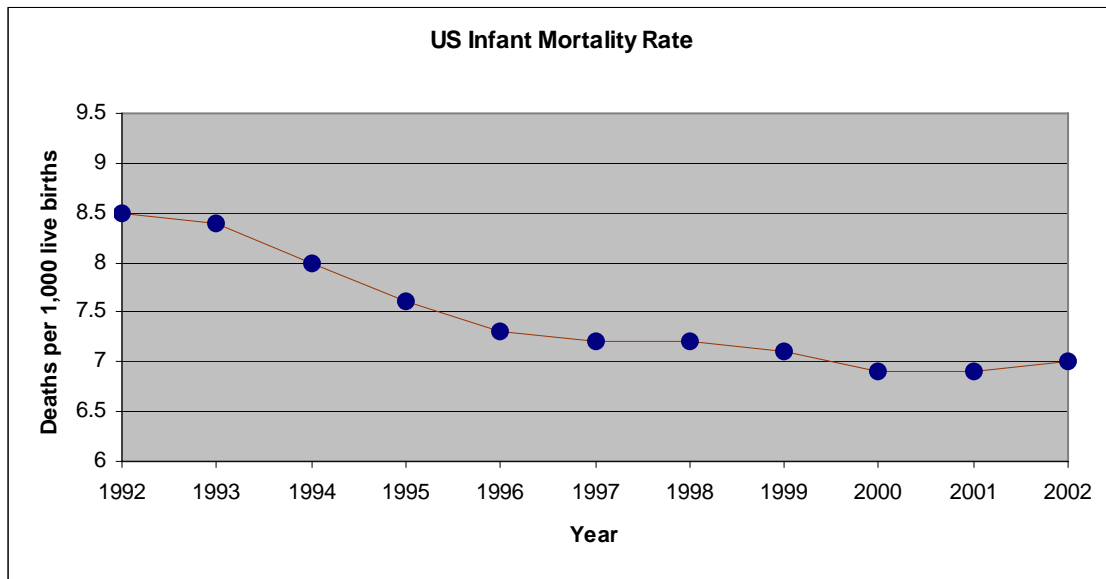
INTRODUCTION

The infant mortality rate (IMR) is one of the most important indicators of the general level of health or well being of a given community. It is a measure of the yearly rate of deaths in children less than one year old. It is 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.

Although overall infant mortality rates in most states and local jurisdictions, including Tarrant County, have been declining during the past decade, United States infant mortality rose in 2002 for the first time since 1958. The magnitude of the infant mortality rate still poses a significant challenge to society and to the public health system. The most recently available infant mortality data for the United States (7.0 deaths per 1000 live births in 2002) is more than one and a half times the Healthy People 2010 objective of 4.5 per 1,000 live births.

Figure 1 highlights the trend in infant mortality rates in the United States from 1992 to 2002.

Figure 1: Infant Mortality Rates in the United States 1992 – 2002



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

Overall, infant mortality rates for the United States declined by 17.6% from 8.5 in 1992 to 7.0 in 2002.

Table 1 highlights the trend in infant mortality rates in the state of Texas from 1992 to 2002.

Table 1: Infant Mortality Rates in Texas by Race, 1992 – 2002

Year	White	Black	Hispanic	All Races
	Rate	Rate	Rate	Rate
1992	7.0	14.2	6.5	7.7
1993	6.3	14.5	6.7	7.5
1994	6.3	12.5	6.6	7.1
1995	5.7	11.6	6.0	6.5
1996	5.7	11.4	5.5	6.3
1997	5.7	10.9	6.0	6.4
1998	5.6	11.6	5.8	6.4
1999	5.1	12.5	5.7	6.2
2000	4.8	11.3	5.2	5.7
2001	5.1	12.0	5.4	6.0
2002	5.7	13.5	5.5	6.4

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

In the past 10 years, the infant mortality rates for Texas have been consistently lower than that of United States and follow the same pattern of continuous decline in trend as seen in the nation. The overall infant mortality rate has declined by 8.5% from 7.0 in 1992 to 6.4 in 2002. In Texas, the IMR for African-Americans is nearly three times as high as the rates for Whites and Hispanics.

Table 2 highlights the trend in infant mortality rates in Tarrant County from 1992 to 2002.

Table 2: Infant Mortality Rates in Tarrant County by Race, 1992 – 2002

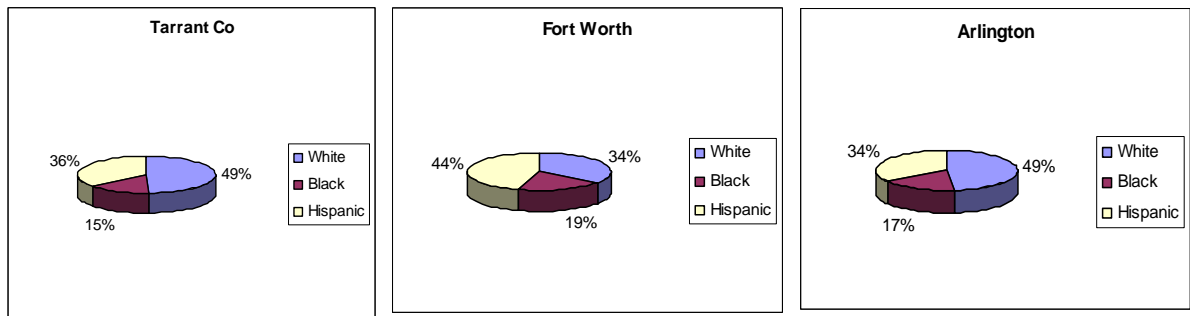
Year	White	Black	Hispanic	All Races
	Rate	Rate	Rate	Rate
1992	6.3	15.3	8.7	7.9
1993	6.5	16.8	8.4	8.1
1994	7.4	12.6	8.3	8.2
1995	5.5	13.2	7.1	6.7
1996	6.9	12.3	3.8	6.6
1997	6.6	11.7	7.1	7.2
1998	5.6	12.9	7.2	6.9
1999	5.6	17.0	8.0	7.9
2000	4.8	14.1	5.5	6.2
2001	6.5	12.5	7.1	7.4
2002	5.4	14.6	5.8	6.8

Infant Mortality Rate=deaths to infants under 1 year, per 1,000 live births

The infant mortality rate in Tarrant County has declined from 1992 to 2002 among all races. The observed fluctuations in the IMR in the time span can be partially attributed to the potential small

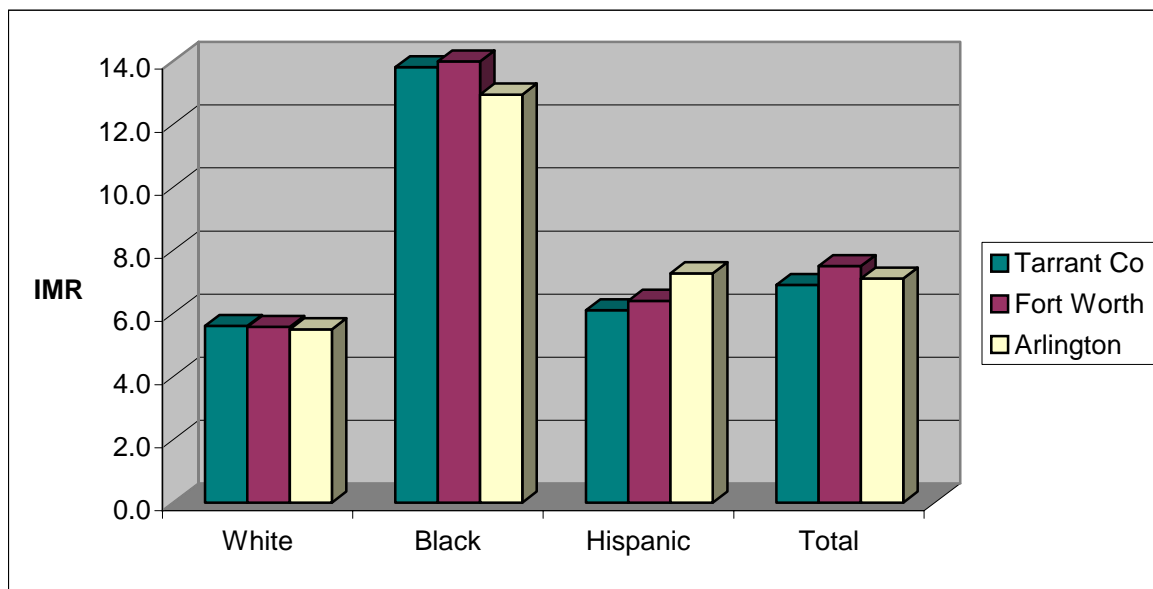
numbers for any particular year and ethnicity. The IMR for all ethnicities decreased by approximately 14% from 7.9 in 1992 to 6.8 in 2002. As in the remainder of this report, the ethnic category “Other” was excluded from the race-specific calculations, but included for all-races computation. Individually, each ethnicity’s infant mortality rates decreased from 1992 to 2002—14%, 5%, and 33% for Whites, African-Americans, and Hispanics respectively. African-Americans have consistently had higher IMRs than both Whites and Hispanics and, notably, this group recorded the smallest rate decrease in the last 10 years (5% versus 33% for Hispanics). The African-American rates in 1992 were twice as high as those for Whites and Hispanics, a pattern that is evident through each year including 2002. Figure 2 depicts the racial/ethnic breakdown of the live births in the regions of Tarrant County from 2000 to 2002.

Figure 2: 2000-2002 Percentage of Live Births by Race/Ethnicity: Tarrant County, Fort Worth, & Arlington



In Tarrant County and Arlington, 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 3: 2000-2002 Infant Mortality Rate by Race/Ethnicity: Tarrant County, Fort Worth, & Arlington



In each of the three areas, infant mortality rates are highest for Blacks, followed by Whites and Hispanics. Infant mortality rates for both Fort Worth and Arlington exceed those of Tarrant

County as a whole for total infant deaths, although slight variations exist when stratified by race/ethnicity.

NEONATAL AND POST-NEONATAL DEATHS IN TARRANT COUNTY

The IMR is broken into two age categories: neonatal and post-neonatal. Neonatal deaths are deaths within the first month of life (< 28 days). Post-neonatal deaths occur from one month to less than a year. The rationale of this categorization is that heredity, prenatal development, and the birth process reflect on the neonatal death. Consequently, environmental factors--nutrition, hygiene, and accidents, among others, reflect on the post-neonatal death. Table 3 presents relationship between age of death and ethnicity in Tarrant County.

Table 3: Early Neonatal, Late Neonatal and Post-Neonatal Deaths in Tarrant County by Race, 2000 – 2002

Age at Death	White	Black	Hispanic	Tarrant County
Early Neonate (less than 7 days)	115 (55.8%)	76 (49.0%)	95 (58.6%)	295 (54.7%)
Late Neonate (between 7 and 28 days)	30 (14.6%)	17 (11.0%)	13 (8.0%)	62 (11.5%)
Post Neonate (between 1 and 12 months)	61 (29.6%)	62 (40.0%)	54 (33.3%)	182 (33.8%)
Total	206 (100.0%)	155 (100.0%)	162 (100.0%)	539 (100.0%)

An unexpected result in Table 3 is that the percent of Black neonatal death (60.0%, combining early and late) is less than that of both Whites (70.4%) and Hispanic (66.7%). This is surprising given that Black infants have been observed to have lower birth weight and/or gestational age than their counterparts.

Exploring this further requires another sub-categorization to be constructed by distinguishing between early and late neo-natal deaths. The definition of early neonatal death is less than a week (< 7 days). The late neonatal death is defined by age at death of at least a week but less than a month (< 27 days). Table 3 explores the stratification of ethnicity and age of death. Approximately 80% of all the neonatal deaths occur within the first week. Hispanics had the lowest proportion (8.0%) of late neonatal deaths compared to Whites (14.6%) and Blacks (11.0%). Examining the early neonatal deaths produced the opposite results: Hispanics had the highest proportion (58.6%) of early neonatal deaths compared to Whites (55.8%) and Blacks (49.0%).

CAUSES OF INFANT MORTALITY IN TARRANT COUNTY

This section examines causes of infant mortality for the period between 2000 and 2002. The three leading causes of death for White and Hispanic infants were 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 African-American infants were diseases related to the length of gestation and fetal nutrition, sudden infant death syndrome (SIDS), and congenital malformations.

Table 4: Three Leading Causes of Infant Mortality by Race, 2000-2002

	White	Black	Hispanic
1	Diseases related to length of gestation and fetal nutrition	Diseases related to length of gestation and fetal nutrition	Diseases related to length of gestation and fetal nutrition
2	Congenital malformations	Sudden infant death syndrome	Congenital malformations
3	Sudden infant death syndrome	Congenital malformations	Sudden infant death syndrome

COMPARISON OF BIRTH CHARACTERISTICS BETWEEN LIVE BIRTHS AND INFANT DEATHS: TARRANT COUNTY (2000-2002)

This section of the report will focus on the birth characteristics of the infants who died in the county from 2000 – 2002 as compared to birth characteristics for total live births. The linked birth and death files and live birth files supplied to Tarrant County Public Health by the Texas Department of Health 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.

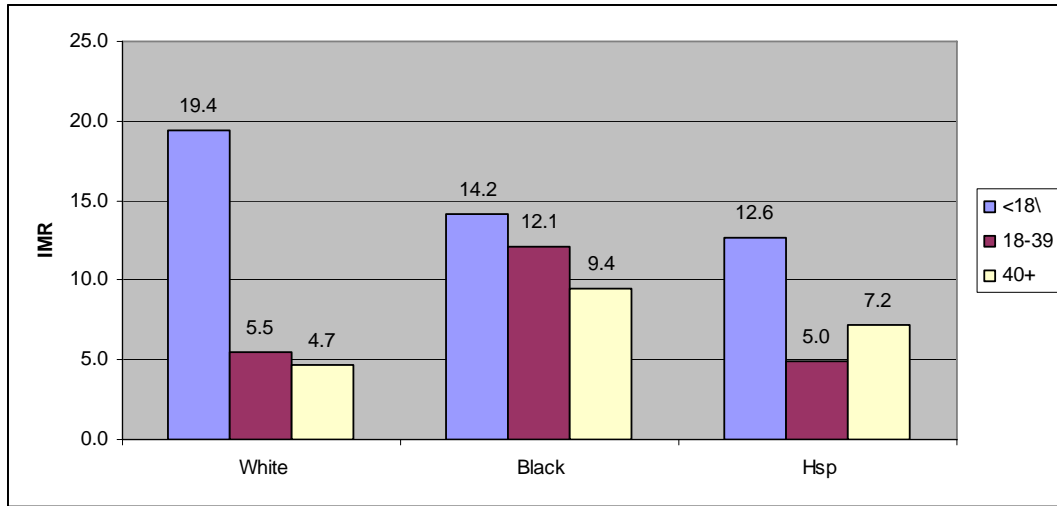
Maternal Age

Table 5: Age of Mother, Live Births and Infant Deaths, Tarrant County 2000-2002

Age of Mother	Infant Deaths % (n)	Live Births % (n)	Rate per 1,000 live births
17 years and under	7.6% (38)	3.4% (2652)	14.3
18 to 39 years	90.2% (451)	94.3% (73621)	6.1
40 years and above	2.0% (10)	2.3% (1829)	5.5

As Table 5 shows, infant mortality rates are highest among the 17 years and under maternal age group in Tarrant County, with no major differences between 18 to 39 years and 40 years and above. When stratified further by race, as in Figure 4, Whites have the largest disparities in IMR among the three age groups, with an IMR among teenagers over three times that of mothers aged 18 to 39, followed by Hispanics and Blacks. Although White mothers have the lowest overall infant mortality rates in Tarrant County, White teenagers have the highest rates in their age group.

Figure 4: Age and Race/Ethnicity – Comparative infant mortality rates, Tarrant County, 2000-2002



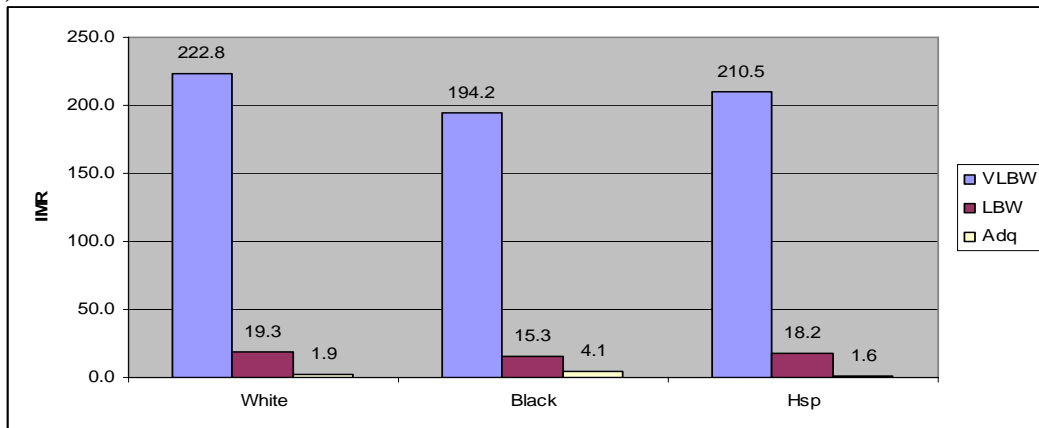
Birthweight

Table 6: Birthweight, Live Births and Infant Deaths, Tarrant County 2000-2002

Birth Weight	Infant Deaths % (n)	Live Births % (n)	Rate per 1,000 live births
Very low birthweight	42.8% (214)	1.3% (1027)	208.4
Low birthweight	17.6% (88)	6.4% (4994)	17.6
Adequate birthweight	29.8% (149)	92.3% (72,521)	2.1

A baby’s weight at birth is directly related to gestational age, and is one of the stronger predictors of infant death. Infant mortality rates have an inverse relationship with birthweight among all races/ethnicities in Tarrant County. Rates differ relatively little when stratified by ethnicity, with IMR in the very low birthweight group over ten times that of low birthweight babies.

Figure 5: Birthweight and Race/Ethnicity – Comparative infant mortality rates, Tarrant County, 2000-2002



Prenatal Care

Table 7: Prenatal Care Status, Live Births and Infant Deaths, Tarrant County 2000-2002

Trimester PNC Began	Infant Deaths % (n)	Live Births % (n)	Rate per 1,000 live births
1 st trimester	78.2% (391)	78.4% (61,214)	6.4
2 nd trimester	9.8% (49)	14.5% (11,321)	4.4
3 rd trimester	9.2% (46)	6.1% (4734)	9.7

Table 7 shows differing IMR based on the trimester that prenatal care began for the mother. In Figure 6, the rates are stratified by race/ethnicity, and the pattern shown for Tarrant County as a whole is also evident in each individual race/ethnicity. As this measure of prenatal care does not take into account number of prenatal visits received, a further measure is also useful in examining effect of prenatal care on infant mortality.

Figure 6: Trimester Prenatal Care Began and Race/Ethnicity – Comparative Infant Mortality Rates, Tarrant County, 2000-2002

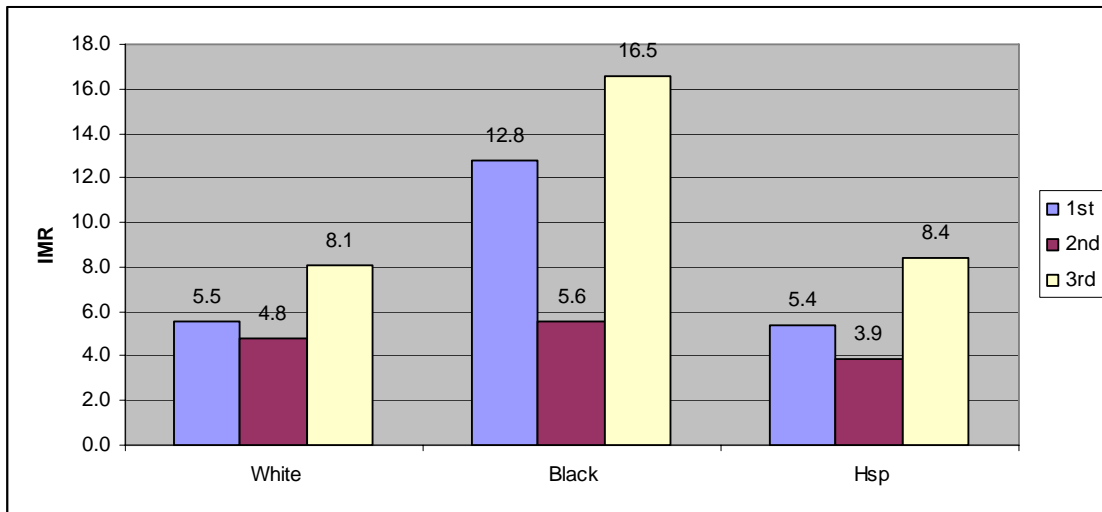


Table 8: Adequacy of Received Prenatal Care, Live Births and Infant Deaths, Tarrant County 2000-2002

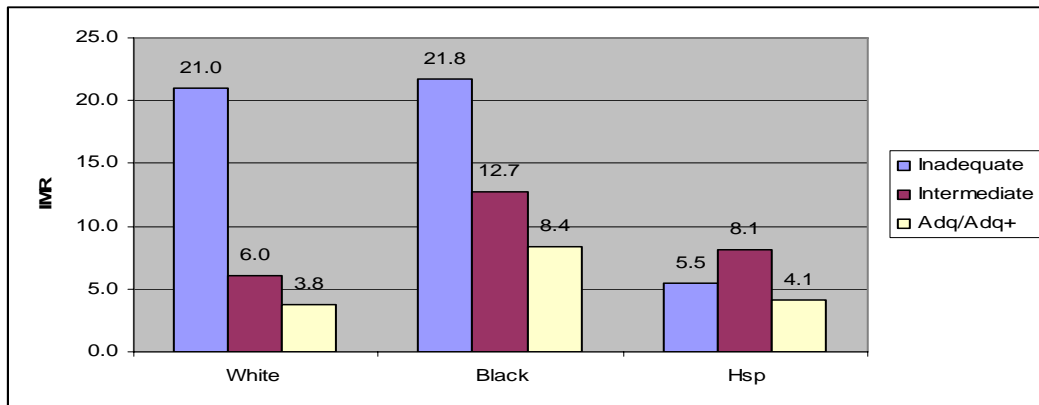
APNCU Index	Infant Deaths % (n)	Live Births % (n)	Rate per 1,000 live births
Inadequate	27.4% (137)	13.7% (10,724)	12.8
Intermediate	13.2% (66)	10.9% (8,540)	7.7
Adequate/Adq Plus	47.2% (236)	67.8% (52,976)	4.5

The Adequacy of Prenatal Care Utilization (APNCU) Index takes into account the number of prenatal care visits and the month prenatal care began to categorize care into inadequate, intermediate, adequate, and adequate plus levels¹. It is useful in that it not only considers at what point care began, but also the gestational age at birth and the number of visits received to

¹ Kotelchuck, M. (1994). An evaluation of the Kessner Adequacy of Prenatal Care Index and a proposed Adequacy of Prenatal Care Utilization Index. *American Journal of Public Health*, 84(9): 1414-1420.

determine a mother’s level of prenatal care. Table 8 shows a direct relationship between level of prenatal care received and subsequent infant mortality rate, with rates lowest in the group that received adequate or adequate-plus care. When stratified by race/ethnicity, this pattern is also evident in the White and Black groups, but not among Hispanics, where mothers with intermediate prenatal care have the highest infant mortality rates.

Figure 7: Trimester Prenatal Care Began and Race/Ethnicity – Comparative infant mortality rates, Tarrant County, 2000-2002



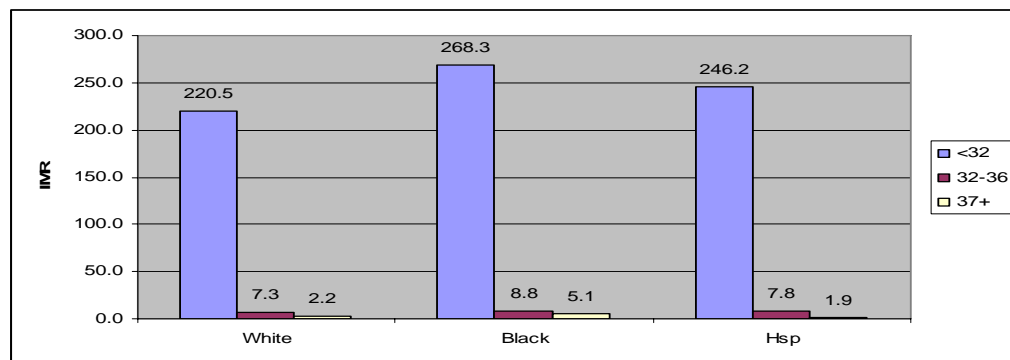
Gestational Age

Table 9: Gestational Age, Live Births and Infant Deaths, Tarrant County 2000-200

Gestational Age	Infant Deaths % (n)	Live Births % (n)	Rate per 1,000 live births
Less than 32 weeks	56.5% (279)	1.6% (1181)	236.2
32 to 36 weeks	10.3% (51)	8.7% (6495)	7.9
37 weeks plus	33.2% (164)	89.8% (67,239)	2.4

Due in part to its relationship with birthweight, gestational age is also 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 (37 weeks plus). 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 8: Gestational Age and Race/Ethnicity – Comparative infant mortality rates, Tarrant County, 2000-2002



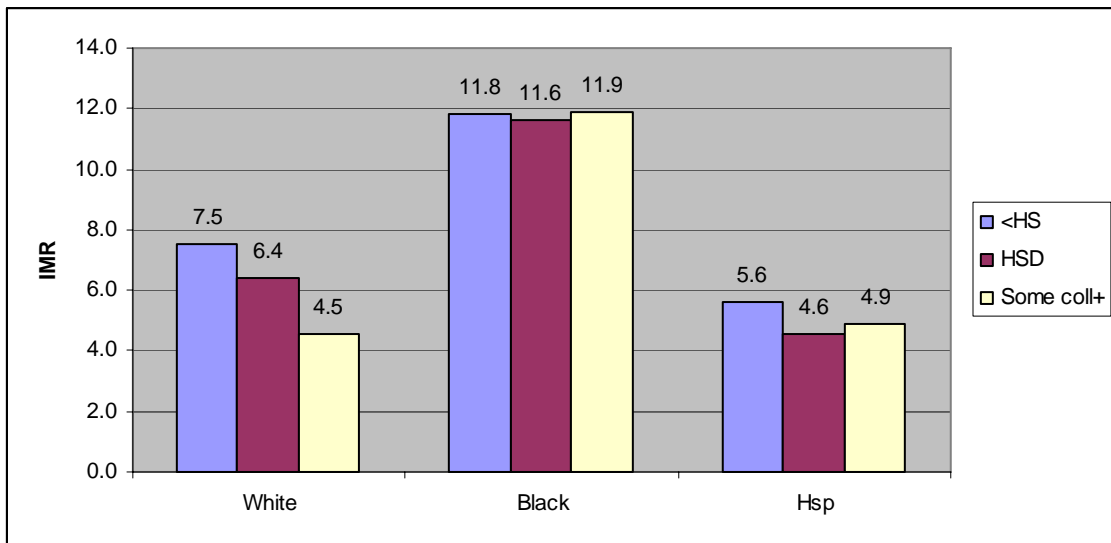
Maternal Education

Table 10: Education Level of Mother, Live Births and Infant Deaths, Tarrant County 2000-2002

Education Level	Infant Deaths % (n)	Live Births % (n)	Rate per 1,000 live births
Less than HS diploma	30.8% (154)	29.9% (23,365)	6.6
HS diploma	32.2% (161)	30.5% (23,843)	6.8
Some college/degree	32.8% (164)	38.4% (29,959)	5.5

Major differences in IMR are not apparent when stratified by maternal education level, although mothers with some college, a college degree, or graduate work do tend to have lower infant mortality. When further stratified by race/ethnicity, however, this trend only holds for White mothers, with Black and Hispanic mothers having approximately equal infant mortality rates across education levels.

Figure 9: Maternal Education Level and Race/Ethnicity – Comparative infant mortality rates, Tarrant County, 2000-2002



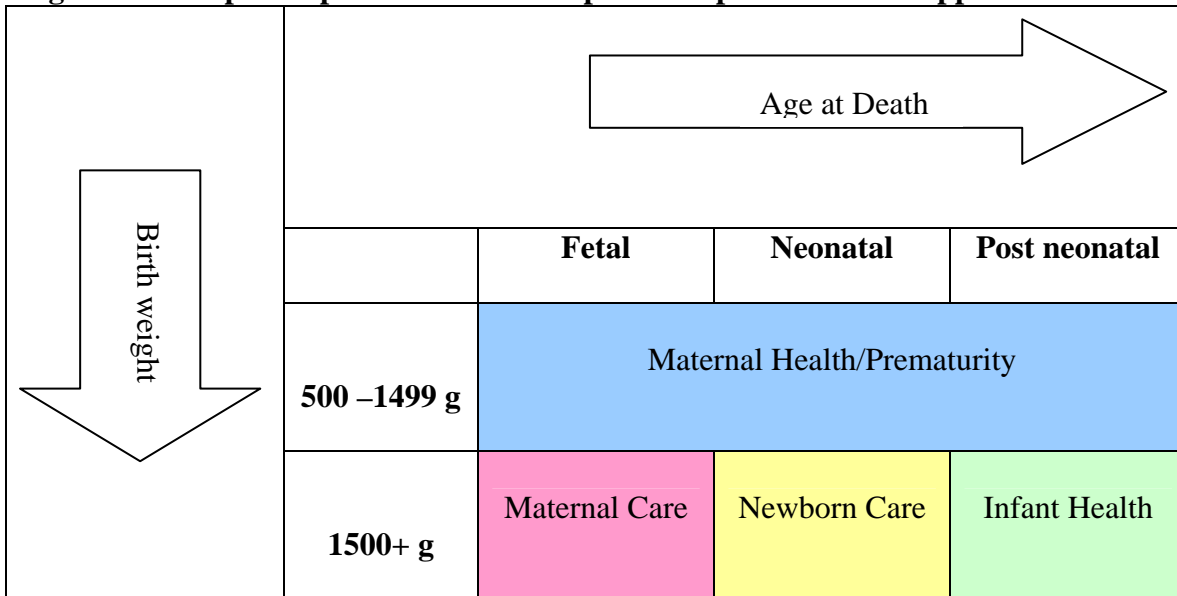
PERINATAL PERIODS OF RISK (PPOR)

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 don't readily identify potential gaps in the community for further reductions.
- Current approaches don't 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, and the graphical representation of this model can be found in Figure 10.

Figure 10: Graphic representation of the perinatal periods of risk approach



The feto-infant 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 birthweight—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.

Using the PPOR model required merging and condensing the original databases of live births and infant deaths generally used by the 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. The number of births and deaths used for the Tarrant County PPOR analysis, 2000-2002, are illustrated in Table 11.

Table 11: 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

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. Figure 11 displays the PPOR results for Tarrant County.

Figure 11: Tarrant County Feto-Infant Mortality Rates for All Races/Ethnicities, 2000 – 2002

Maternal Health/Prematurity		
4.0		
Maternal Care	Newborn Care	Infant Health
1.9	0.9	1.0

*Fetal-infant mortality per 1,000 live births/fetal deaths

Table 12 displays the feto-infant mortality rates for race/ethnicity in Tarrant County between 2000 - 2002.

Table 12: Tarrant County Feto-Infant Mortality Rate by Race, 2000 – 2002

	Maternal Health/Prematurity	Maternal Care	Newborn Care	Infant Health
Tarrant County	4.0	1.9	0.9	1.0
White	2.9	1.7	1.0	0.7
Black	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

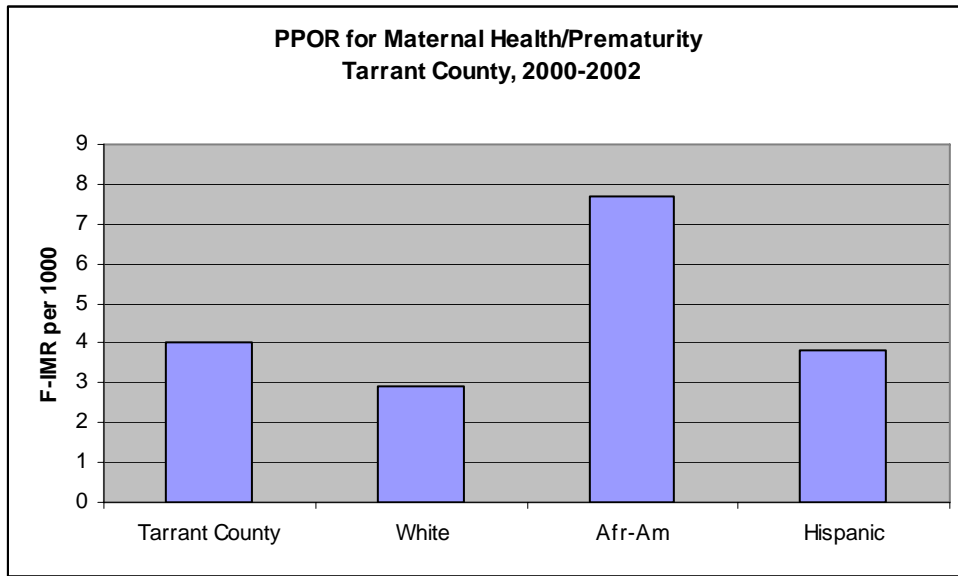
Comparing Black PPOR results to White PPOR results:

- 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:

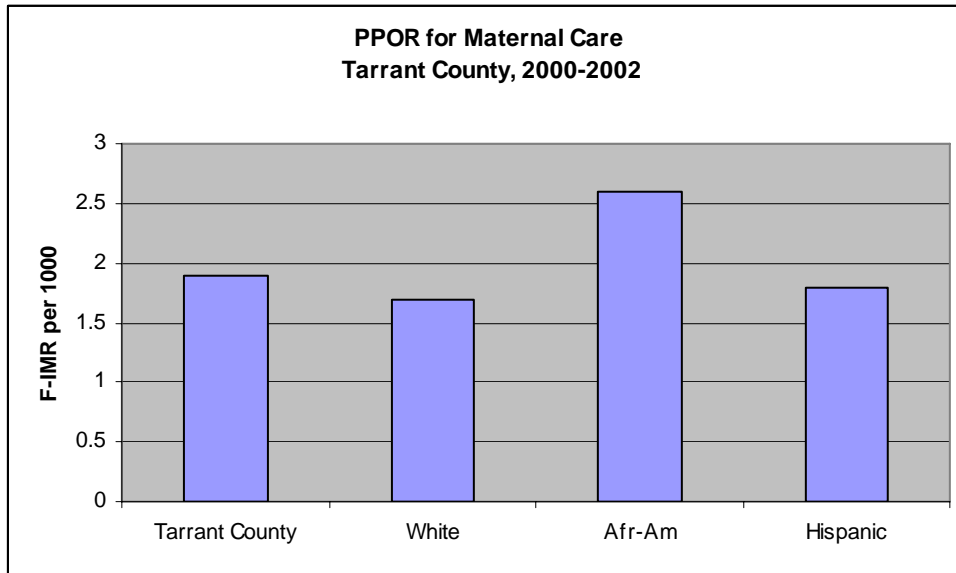
- Maternal Health/Prematurity rates are slightly higher (1.3x)
- Maternal Care rates are approximately equal
- Newborn Care rates are approximately equal
- Infant Health rates are approximately equal

Figure 12: PPOR for Maternal Health/Prematurity



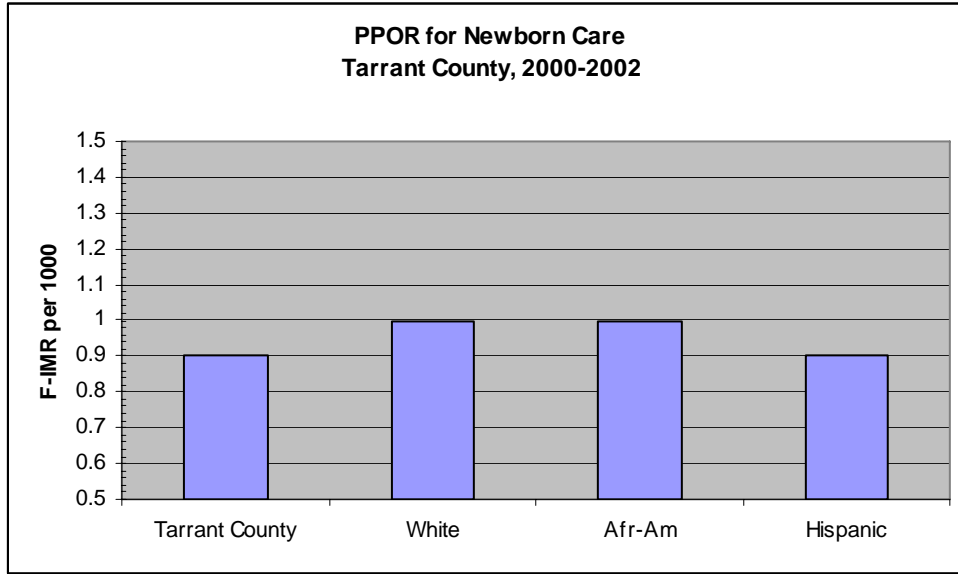
It is observed that the Black PPOR fetio-infant mortality rates of maternal health/prematurity in Figure 12 are more than twice the rates for both Whites and Hispanics and are well above the overall rate for Tarrant County.

Figure 13: PPOR for Maternal Care



Examining the PPOR rates for maternal care in Figure 13 again reveals higher fetio-infant mortality in the Black group, although the differences are not as dramatic as seen in Figure 12.

Figure 14: PPOR for Newborn Care



PPOR feto-infant mortality rates for newborn care in Tarrant County are approximately equal across all ethnicities, as seen in Figure 14.

Figure 15: PPOR for Infant Health.

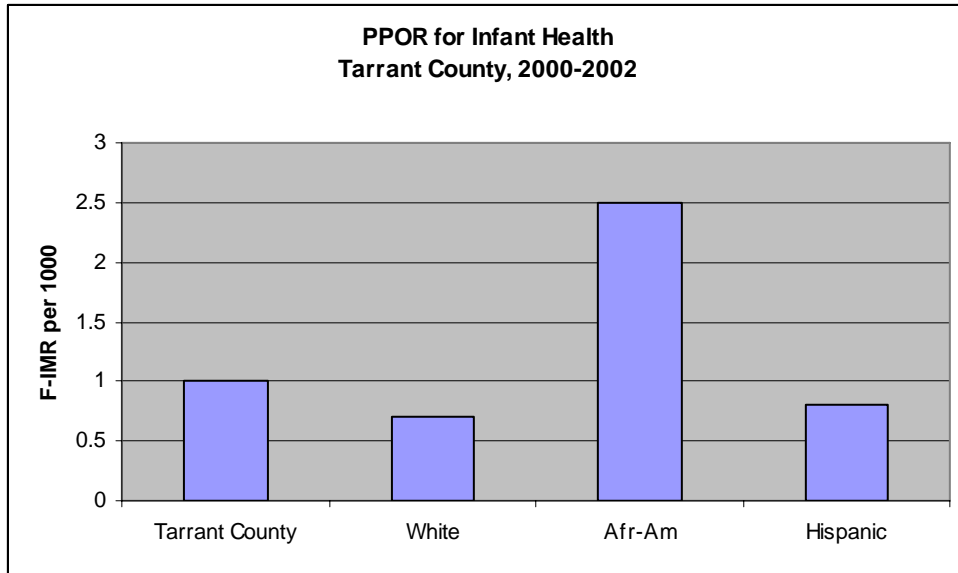


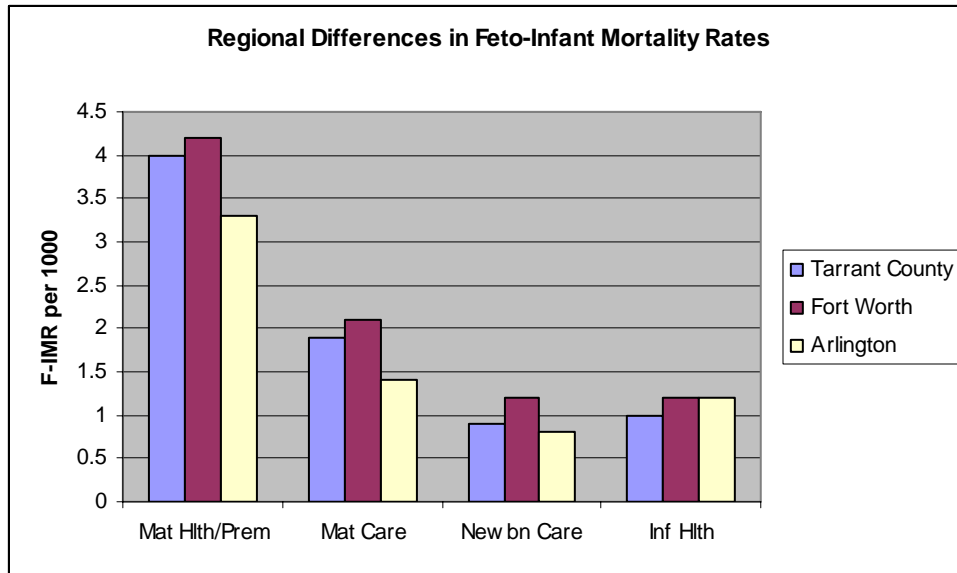
Figure 15 examines the infant health component of the PPOR. The Black feto-infant mortality rate is over three times the rate for both Whites and Hispanics. Whites have a rate of 0.7 deaths per 1,000 live births and fetal deaths, followed by Hispanics with a rate of 0.8 and Black with a rate of 2.5.

REGIONAL DIFFERENCES IN FETO-INFANT MORTALITY: Tarrant County, Fort Worth and Arlington

Table 12: Tarrant County, Fort Worth & Arlington Feto-Infant Mortality Rates, 2000-2002

	Maternal Health/Prematurity	Maternal Care	Newborn Care	Infant Health
Tarrant County	4.0	1.9	0.9	1.0
Fort Worth	4.2	2.1	1.2	1.2
Arlington	3.3	1.4	0.8	1.2

Figure 16: Tarrant County, Fort Worth & Arlington Feto-Infant Mortality Rates, 2000-2002

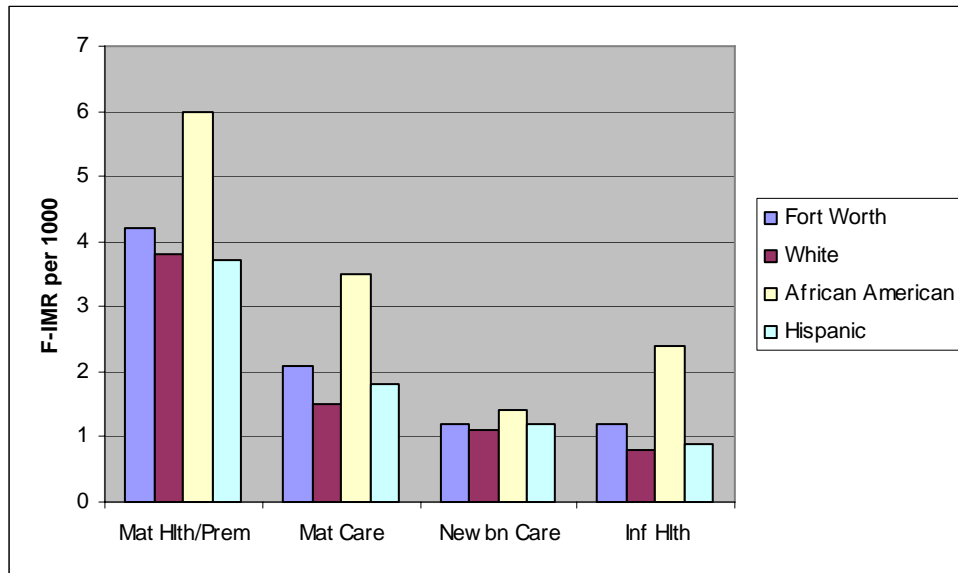


Comparing Fort Worth PPOR results to Tarrant County PPOR results, feto-infant mortality rates in each of the four categories slightly exceed Tarrant County rates. In Arlington, rates in maternal health/prematurity, maternal care, and newborn care are slightly lower than those in Tarrant County as a whole; however, infant health feto-infant mortality rates are slightly higher.

Table 13: Fort Worth Feto-Infant Mortality Rate by Race, 2000-2002

	Maternal Health/Prematurity	Maternal Care	Newborn Care	Infant Health
Fort Worth	4.2	2.1	1.2	1.2
White	3.8	1.5	1.1	0.8
Black	6.0	3.5	1.4	2.4
Hispanic	3.7	1.8	1.2	0.9

Figure 17: Fort Worth Feto-Infant Mortality Rate by Race, 2000-2002



Comparing Black PPOR results to White PPOR results:

- Maternal Health/Prematurity rates are one-and-a-half times as high (1.6x)
- Maternal Care rates are over twice as high (2.3x)
- Newborn Care rates are slightly higher (1.3x)
- Infant Health rates are three times as high

Comparing Hispanic PPOR results to White PPOR results:

- Maternal Health/Prematurity rates are approximately equal
- Maternal Care rates are slightly higher (1.2x)
- Newborn Care rates are approximately equal
- Infant Health rates are approximately equal

The pattern seen in both Black and Hispanic feto-infant mortality rates in Fort Worth is very similar to that found in Tarrant County as a whole: i.e. large disparities between Blacks and both Whites and Hispanics.

REFERENCE GROUPS AND PERINATAL PERIODS OF RISK

The use of a reference group in the perinatal periods of risk approach to analysis of feto-infant mortality data allows a community to further examine infant deaths with the goal of targeting resources to areas in which they can have the most impact. Reference groups are generally chosen to include mothers with the best infant health outcomes; usually White, non-Hispanic mothers over twenty years of age and with thirteen or more years of education. Both internal and external reference groups can be used; internal groups compare a county/city's mortality rates to the group with the optimal outcomes in the county, and external groups compare to the United States as a whole. CityMatCH currently has national reference data available for the period 1998 through 2000. By examining excess infant mortality when compared to reference groups—the mortality above and beyond that which would be expected given rates in the reference group (Figure 18)—communities can begin to determine where the most preventable infant deaths are currently occurring.

Figure 18.: Using Reference Groups to Calculate Excess Infant Mortality

$$\boxed{\text{Excess Feto-Infant Mortality}} = \boxed{\text{F-IMR in Analysis Group}} - \boxed{\text{F-IMR in Reference Group}}$$

In Table 14, the feto-infant mortality rates calculated for Tarrant County (see page 13) are compared to both an internal and an external reference group. The advantage of comparing to both groups is that information is then available on how Tarrant County's rates can be lowered among different races/ethnicities, as well as among the county residents as a whole. In this analysis, the internal reference group chosen was White mothers with thirteen or more years of education and at least 20 years old residing in Tarrant County. The external group used the same selection criteria applied nationally. Both reference groups currently shown are for years 1998-2000; updated reference data is under request from CityMatCH.

Table 14: Excess Feto-Infant Mortality Rates and Rates for PPOR Components, Tarrant County 2002-2002

Group	Maternal Health/ Prematurity	Maternal Care	Newborn Care	Infant Health	Feto-Infant Mortality
Tarrant County	4.0	1.9	0.9	1.0	7.8
Internal Reference— White, 20+, 13+ yrs educ in Tarrant Co.	2.8	1.8	1.2	1.0	6.7
External Reference— White, 20+, 13+ yrs educ in USA	2.2	1.5	1.1	1.0	5.9
Excess Rates (Internal)	1.2	0.1	(0.3)	0.0	1.1
Excess Rates (External)	1.8	0.4	(0.2)	0.0	1.9

*Reference group years 1998-2000.

Table 14 and Figures 19 and 20, below, suggest that the greatest excess fetoinfant mortality in Tarrant County is in the maternal health/prematurity PPOR component, followed by maternal care. None of the excess fetoinfant mortality in the county is attributable to the newborn care or infant health components. In Figure 19, the total fetoinfant mortality rate in Tarrant County is shown with the portion attributable to the internal reference group and the excess mortality. Figure 20 shows the same stratification using the external, or national, reference group.

Figure 19: Tarrant County Feto-Infant Mortality Rates: Internal Reference Group and Excess Mortality

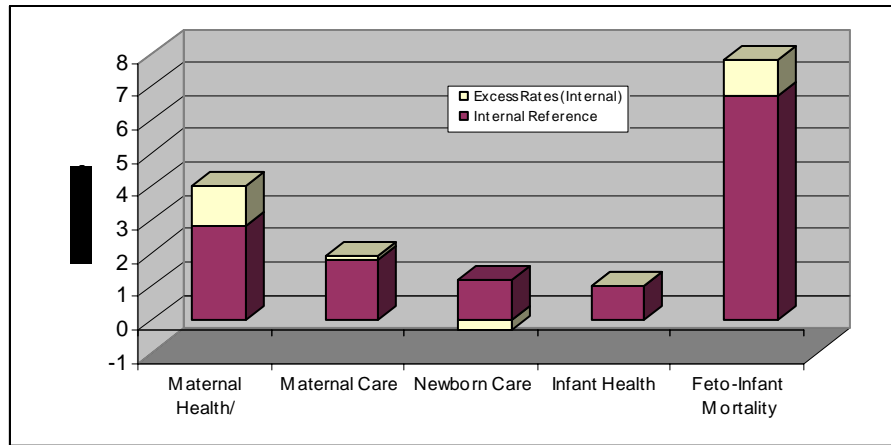
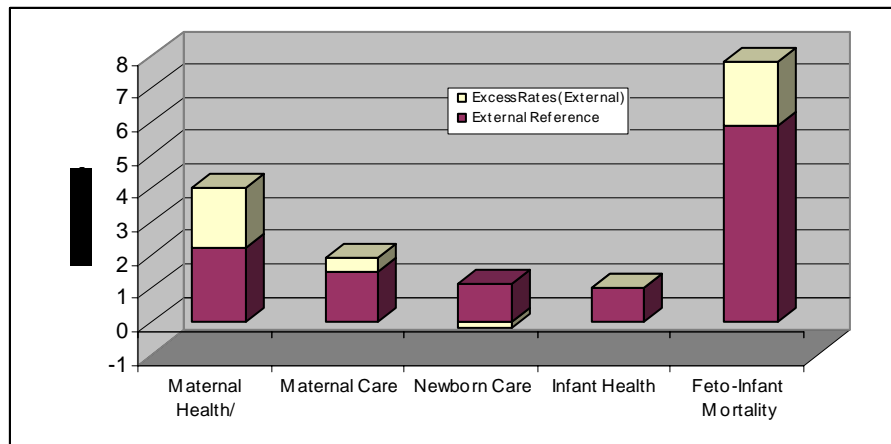


Figure 20: Tarrant County Feto-Infant Mortality Rates: External Reference Group and Excess Mortality



Comparison of results using the internal and external reference groups shows a fairly consistent pattern, with the largest excess rates in the maternal health/prematurity category, followed by maternal care. The main difference between the two analyses is that excess rates are higher overall when compared to the external reference group, suggesting that overall Tarrant County fetoinfant mortality rates may be slightly elevated, even among those with the best outcomes (White women at least 20 years of age with thirteen or more years of education).

SUBPOPULATION---STATIFICATION BY RACE/ETHNICITY

Using the external reference group discussed above, Tarrant County's PPOR components stratified by race/ethnicity are compared and excess mortality computed in Table 15.

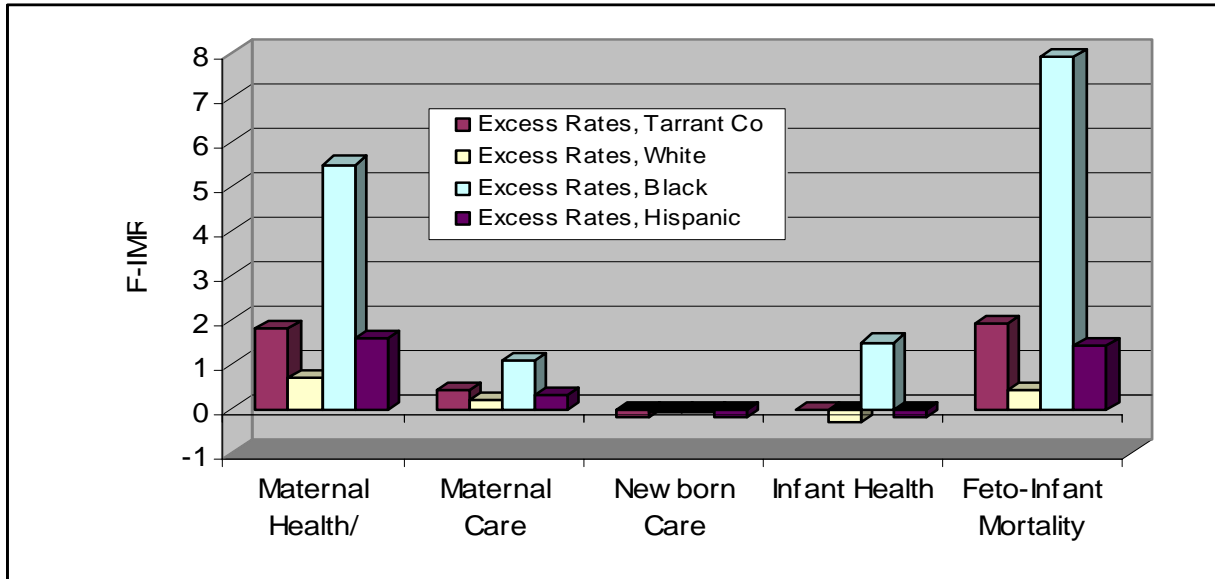
Table 15: Excess Feto-Infant Mortality Rates and Deaths and Rates for PPOR Components, Tarrant County 2002-2002 (External Reference Group)

Group	Maternal Health/ Prematurity	Maternal Care	Newborn Care	Infant Health	Feto-Infant Mortality
Tarrant County	4.0	1.9	0.9	1.0	7.8
White	2.9	1.7	1.0	0.7	6.3
Black	7.7	2.6	1.0	2.5	13.8
Hispanic	3.8	1.8	0.9	0.8	7.3
External Reference— White, 20+, 13+ yrs educ in USA	2.2	1.5	1.1	1.0	5.9
Excess Rates, Tarrant County	1.8	0.4	(0.2)	0.0	1.9
Excess Rates, White	0.7	0.2	(0.1)	(0.3)	0.4
Excess Rates, Black	5.5	1.1	(0.1)	1.5	7.9
Excess Rates, Hispanic	1.6	0.3	(0.2)	(0.2)	1.4
Excess death, Tarrant County	142	32	-16	0	150
Excess death, White	26	7	-4	-11	15
Excess death, Black	62	12	-1	17	89
Excess death, Hispanic	42	8	-5	-5	37

*Reference group years 1998-2000.

The pattern evident in PPOR components by race/ethnicity discussed previously, higher rates among Blacks, is present when compared to a reference group as well. Hispanic feto-infant mortality excess rates are also greater than those for Whites, although the differences are much smaller than those seen among Blacks. Figure 21 illustrates excess rates among the PPOR components for each of the three races/ethnicities included in the analysis. Translating the excess rates to excess deaths (multiply the rate by the number of live births plus the number of fetal deaths and then divide by 1000) indicates that there are 150 excess deaths in Tarrant County for the time period 2000-2002. Of those excess deaths, 90% plus are due to maternal health/prematurity.

Figure 21: Tarrant County Feto-Infant Mortality Rates: Excess Mortality by Race/Ethnicity



Analyses of Tarrant County PPOR feto-infant mortality components using reference groups provides consistent results in that maternal health/prematurity and maternal care rates are contributing the greatest amount of excess mortality in all races/ethnicities and in both internal and external comparisons. These data strongly suggest that interventions to reduce infant mortality in the community should be directed at these two subcomponents to achieve the greatest effect and improve desired outcomes.

Table 16 illustrates the number of excess deaths in Tarrant County (150). This is based on the national comparison group of non-Hispanic white women with at least 13 years of education and 20 years of age or older. It is also observed that African-Americans have a disproportionate share of excess deaths, at 89 compared to 15 and 37 among Caucasians and Hispanics

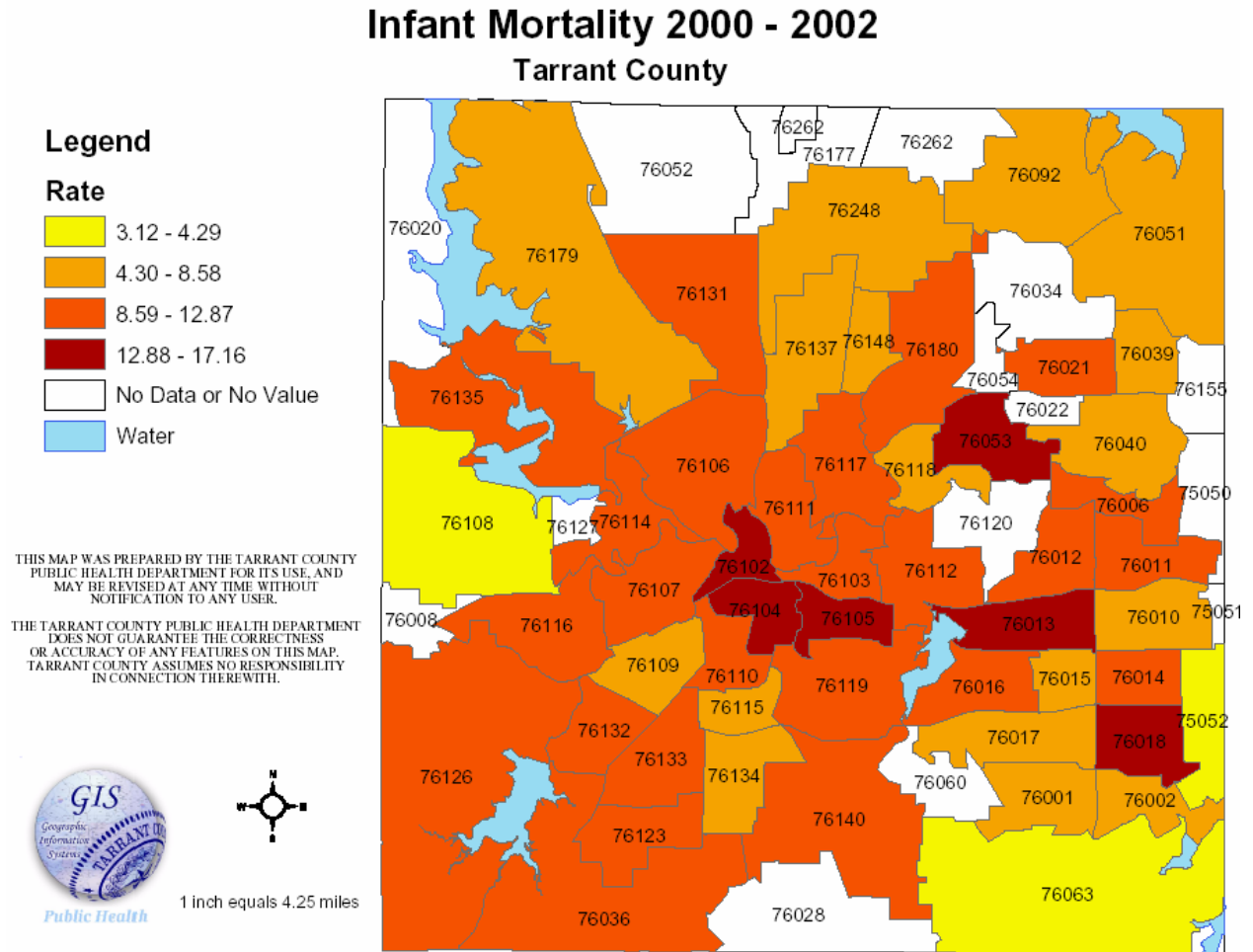
Table 16: Excess deaths in Tarrant County by Race and Risk category

Group	Maternal Health/ Prematurity	Maternal Care	Newborn Care	Infant Health	Feto-Infant Mortality
Excess death, Tarrant County	142	32	-16	0	150
Excess death, Caucasian	26	7	-4	-11	15
Excess death, Blacks	62	12	-1	17	89
Excess death, Hispanic	42	8	-5	-5	37

MAPPING INFANT MORTALITY

Figure 22 represents the county infant mortality broken down by zip code. The highest rates are in central Fort Worth and Arlington – ZIP codes 76014, 76105, 76102, 76013 & 76018.

Figure 22: Tarrant County Infant Mortality Rates by ZIP Code



LIMITATIONS

Although the PPOR perspective provides greater insight into the possible contributing causes for perinatal death, there are some limitations to the reliability of the data. Although not the case with using Tarrant County data for a reference group, as incidence of death decreases, the sample size may limit ensuing reliability of the data, since sample size in each cell needs to be at least 60. Although CityMatCH is still updating state reference group data, some local data does not match Texas Department of Health information since 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. However, when linking records at the county level instead of using state linked data, care must also be taken to keep from biasing results by births and deaths that have taken place outside of the county. Lastly, there are different requirements between states for the type of information

collected, resulting in a large percentage of unknowns for fetal deaths. The information provided on the birth/death certificate is also lacking. Additional useful information could conceivably be gleaned from examining income level, insurance status, maternal occupation, and hospital; however, this data is either missing or not collected on a majority of Texas birth certificates and thus was not available to incorporate in this report. Such information could be collected in a Fetal Infant Mortality Review (FIMR) and aggregated with the data to provide more detail on socioeconomic factors influencing infant death.

Data Sources

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

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