

Health Consultation

Evaluation of Health Outcome Data

as part of the

MIDLOTHIAN AREA AIR QUALITY PETITION RESPONSE

MIDLOTHIAN, ELLIS COUNTY, TEXAS

JUNE 23, 2016

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This health consultation is one of a series of six health consultations being prepared by ATSDR for this site. Completion of all six health consultations concludes the health consultation process for this site and unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Prepared By:

Office of the Director
Division of Community Health Investigations
Agency for Toxic Substances and Disease Registry

Contents

List of Tables	iii
List of Figures	x
Acronyms and Abbreviations	xii
Summary	xiv
1.0 Purpose and Statement of Issues	1
2.0 Background	2
2.1 Location and Site Description	2
2.2 Demographics	2
2.3 Chemicals of Concern	5
3.0 General Approach and Methods in this Health Outcome Data Review	7
3.1 General Approach in this Health Consultation	7
3.2 Epidemiological and Statistical Methods Used in this Health Consultation	9
4.0 Health Outcome Data Review	15
4.1 Birth-Related Health Outcomes	15
Birth Defects	15
Adverse Birth Outcomes	35
4.2 Cancer	40
Previous Cancer Cluster Investigations in Midlothian	41
Update on Cancer Incidence in Midlothian	43
Update on Cancer Mortality in Midlothian	46
Leukemia	47
Childhood Cancer	49
4.3 Mortality	51
4.4 Childhood Lead Exposure	56
4.5 Chronic Diseases	61
Databases for chronic diseases	61
Asthma	64
Other Respiratory Illnesses	69
Cardiovascular diseases	74
Diabetes	80
4.6 Other Health Concerns	84
Acute Symptoms	84
Immune-related Chronic Diseases	85
Amyotrophic Lateral Sclerosis (ALS)	88
Special Education	89
5.0 Child Health Considerations	92
6.0 Community Concerns Evaluation	93
7.0 Conclusions and Recommendations	97

8.0 Public Health Action Plan.....105
 Primary Author and Technical Advisors106
 Data Contributors:.....106
 References.....107
 Glossary113
 Appendices.....116
 Appendix A – Tables A-1
 Appendix B – FiguresB-1
 Appendix C – ATSDR Response to Public Comments.....C-1
 Appendix D – ATSDR Response to Peer Review Comments..... D-1

List of Tables

Number	Title	Page
S.1	Midlothian population, comparison population, primary database, and years of data used for epidemiological evaluation of the major categories of health outcomes.	xvi
2.1	Population by Race and Hispanic Origin for Midlothian, Ellis County, Public Health Region 3 and Texas, 2010	3
2.2	Population of Midlothian, ZIP code 76065, Ellis County, Public Health Region 3 and Texas for 2000, 2010, and percent increase	4
2.3	Population comparison for ZIP code 76065, 2000 and 2010, for age categories 0-14 years, 15-44 years, and 45 or over, male and female with percent increase	4
2.4	Change in residence by type, Ellis County, Texas, 1985 to 1990 and 1995 to 2000.	5
3.1	Number and percentage of birth defect, live birth, infant death, and fetal death records not geocoded for residents of the four counties in which the Midlothian potential area of impact lies, tabulated by county of residence, 1999-2008.	14
4.1.1	Number of birth defects categories with number of cases, total number of birth defects and total cases, and average (mean) number of birth defects per case for the potential area of impact, Midlothian, Ellis County, Public Health Region 3, and Texas, 1999-2008.	20
4.1.2	Total cases (infants and fetuses with any monitored congenital anomaly), total live births, crude prevalence and maternal age and race adjusted prevalence of birth defects per 10,000 live births with 95% confidence intervals for Midlothian potential area of impact, city of Midlothian, Ellis County, Public Health Region 3, and Texas, 1999-2008.	22
4.1.3	Total birth defects cases (infants and fetuses with any monitored congenital anomaly), total live births, crude prevalence of birth defects per 10,000 live births and crude prevalence ratios with 95% confidence intervals and p-values for Midlothian potential area of impact, Midlothian, Ellis County, Public Health Region 3, and Texas, as compared to each other, 1999-2008.	23
4.1.4	Birth defects with significantly lower adjusted prevalence in potential area of impact or Midlothian as compared to Texas with total cases, crude and maternal age and race adjusted prevalence per 10,000 live births for potential area of impact, Midlothian, Ellis County, and Public Health Region 3 with 95% confidence intervals and crude prevalence for Texas, 1999-2008.	24
4.1.5	Birth defects with significantly higher crude prevalence in the potential area of impact or Midlothian as compared to Texas with total cases, crude and maternal age and race adjusted prevalence per 10,000 live births for potential area of impact, Midlothian, Ellis County, and Public Health Region 3 with 95% confidence intervals and crude prevalence for Texas, 1999-2008.	26

4.1.6	Number of cases, crude and adjusted prevalence ratios with 95% confidence intervals and p-values for Midlothian potential area of impact, city of Midlothian, and Ellis County, as compared to the remainder of Public Health Region 3, for BPA4 Code 744.2 (other specified anomalies of the ear) and 750.5 (congenital hypertrophic pyloric stenosis), 1999-2008.	27
4.1.7	Number of crude prevalence ratios not significant or significantly higher or lower at $\alpha=0.05$ for birth defect codes with any cases by instances of 1 to 4 cases or 5 or more cases for the Midlothian potential area of impact, city of Midlothian and Ellis County as compared to the respective remainder of Public Health Region 3, Texas, 1999-2008.	28
4.1.8	Total number of cases, crude prevalence and maternal age and race adjusted prevalence of birth defects per 10,000 live births with 95% confidence intervals for Midlothian potential area of impact, city of Midlothian, Ellis County, Public Health Region 3, and Texas for BPA4 752.6 (Hypospadias, epispadias, and congenital chordee), 1999-2008.	29
4.1.9	Number of cases, total live births, crude prevalence of birth defects per 10,000 live births and crude prevalence ratios with 95% confidence intervals and p-values for potential area of impact, city of Midlothian, Ellis County, Public Health Region 3, and Texas, as compared to each other for BPA4 code 752.6 (hypospadias, epispadias and congenital chordee), 1999-2008.	30
4.1.10	Number of cases, crude and adjusted prevalence ratios with 95% confidence intervals and p-values for Midlothian potential area of impact, city of Midlothian, and Ellis County, as compared to the remainder of Public Health Region 3, for BPA4 Code 752.6 (hypospadias, epispadias, and congenital chordee), 1999-2008.	31
4.1.11	Total number of cases, crude prevalence and maternal age and race adjusted prevalence of birth defects per 10,000 live births with 95% confidence intervals for Midlothian potential area of impact, city of Midlothian, Ellis County, Public Health Region 3, and Texas, for BPA4 758.0 (Down syndrome), 1999-2008.	32
4.1.12	Number of cases, total live births, crude prevalence of birth defects per 10,000 live births and crude prevalence ratios with 95% confidence intervals and p-values for Midlothian potential area of impact, city of Midlothian, Ellis County, Public Health Region 3, and Texas, as compared to each other for BPA4 code 758.0 (Down syndrome), 1999-2008.	32
4.1.13	Number of cases, crude and adjusted prevalence ratios with 95% confidence intervals and p-values for Midlothian potential area of impact, city of Midlothian, and Ellis County, as compared to the remainder of Public Health Region 3, for BPA4 Code 758.0 (Down syndrome), 1999-2008.	33
4.1.14	Number and crude rate (%) of live births with preterm birth, low birth weight and very low birth weight by geographic area with 95% confidence intervals, 1999-2008.	36
4.1.15	Number and crude rates of fetal death and infant mortality for communities of interest as compared to Texas with 95% confidence intervals, 1999-2008.	37
4.1.16	Adjusted rate ratios of preterm birth, low birth weight, very low birth weight, and fetal death and unadjusted rate ratio of infant mortality for the potential area of impact as compared to the remainder of Ellis County with 95% confidence intervals and p-values, 1999-2008.	38
4.1.17	Crude 10-year average general fertility and birth rates per 1,000 for communities of interest with 95% confidence intervals, 1999-2008.	39
4.2.1	Summary of four cancer mortality studies for Midlothian, Texas (ZIP code 76065)	42
4.2.2	Standardized Incidence Ratios (SIR), Males, Total, total childhood (age 0-19), and top 5 cancers, 1999-2008 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3. SIR based on race-, sex-, and age-adjusted cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	43
4.2.3	Standardized Incidence Ratios (SIR), Females, Total, total childhood (ages 0-19), and top 5 cancers, 1999-2008 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3. SIR based on race-, sex-, and age-adjusted cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	44
4.2.4	Standardized Incidence Ratios (SIR), Selected Cancers with significantly higher or lower SIRs, 1999-2008 for Midlothian ZIP code 76065. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals, using census year 2000, census year 2010, or the average of the two census years data for population rates.	45

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

4.2.5	Observed number of newly diagnosed cancer cases , Total, total childhood (age 0-19), and top 8 cancers, in the potential area of impact, ZIP code 76065, and Ellis County, male and female combined, 1999-2008.	46
4.2.6	Standardized Mortality Ratios (SMR), Males, Total, total childhood (age 0-19), and top 3 cancers (ranked by number of observed deaths), 2000-2009 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3. SMR based on race-, sex-, and age-adjusted cancer mortality rates for Texas during the period 2000–2009 rounded to the first decimal place with 99% confidence intervals.	47
4.2.7	Standardized Mortality Ratios (SMR), Females, Total, total childhood (ages 0-19), and top 3 cancers, (ranked by number of observed deaths), 2000-2009 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3. SMR based on race-, sex-, and age-adjusted cancer mortality rates for Texas during the period 2000–2009 rounded to the first decimal place with 99% confidence intervals.	47
4.2.8	Observed and expected number of cases and Standardized Incidence Ratios (SIR), Males and Females, Total leukemia, total childhood leukemia (ages 0-19), and 5 leukemia subtypes, 1999-2008 for Midlothian ZIP code 76065 and Ellis County, TX. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	48
4.2.9	Observed and expected number of deaths and Standardized Mortality Ratios (SMR), Males and Females, Total leukemia, total childhood leukemia (ages 0-19), and 5 leukemia subtypes, 2000-2009 for Midlothian ZIP code 76065 and Ellis County, TX. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals.	49
4.2.10	Observed and expected number of cases and Standardized Incidence Ratios (SIR), Males and Females, Total childhood cancer (ages 0-19) and total childhood leukemia (ages 0-19), 1999-2008 for Midlothian ZIP code 76065, Ellis County, TX and Public Health Region 3. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	50
4.2.11	Observed and expected number of deaths and Standardized Mortality Ratios (SMR), Males and Females, Total childhood cancer (ages 0-19) and total childhood leukemia (ages 0-19), 2000-2009 for Midlothian ZIP code 76065, Ellis County, TX and Public Health Region 3. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals.	50
4.3.1	Crude mortality rates per 100,000 for males, females, and combined males and females for all causes of death for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3), and Texas, 1999-2010.	53
4.3.2	Standardized Mortality Ratios (SMR) for combined males and females for the top 5 leading causes of death for Midlothian ZIP code 76065 using comparison populations for Ellis County, Public Health Region 3, and Texas with 95% Confidence Intervals, 1999-2010.	54
4.3.3	Standardized Mortality Ratios (SMR) for males, females, and combined males and females for the statistically significant leading causes of death for Ellis County using comparison populations for Texas with 95% confidence intervals, 1999-2010.	55
4.4.1	Summary TXCLPPP Blood lead level (BLL) testing data (1997-2009) for Children 0-14 years of age residing in Midlothian, Texas and the entire state of Texas.	58
4.5.1	Percentage of current and ever diagnosed adults and children with asthma with 95% confidence intervals based on Behavioral Risk Factor Surveillance System (BRFSS) survey questions for combined ZIP codes 76065 and 75104, Ellis County, Public Health Region 3 and Texas, 2001-2010.	65
4.5.2	Primary Hospital Discharge Data for Asthma (ICD-9-CM Code 493) including number of asthma discharges, total number of hospital discharges, and percent of primary discharges for asthma for Midlothian ZIP code 76065, Ellis County, Public Health Region 3 and Texas, 2000-2009.	66
4.5.3	Total number of schools and students for Midlothian ISD, ESC Region 10, and Texas for academic years 1994-95, 1999-2000, 2004-05 and 2009-10.	68

4.5.4	Primary Hospital Discharge Data for Chronic Obstructive Pulmonary Diseases and Allied Conditions (COPD-AC) (ICD-9-CM Codes 490, 491, 492, and 496) including number of COPD-AC ICD-9 Code discharges, total number of hospital discharges, and percent of primary discharges for COPD-AC ICD-9 Codes for Midlothian ZIP code 76065, Ellis County, Public Health Region 3 and Texas, 2000-2009.	70
4.5.5	Behavioral Risk Factor Surveillance System (BRFSS) Prevalence percent responses with 95% confidence intervals for risk factor, “Smoked in their lifetime” and “Current Smoker” for combined ZIP codes 76065 and 75104 (2004-2010), and Ellis County, Public Health Region 3 and Texas (2001-2010).	72
4.5.6	Standardized Mortality Ratios (SMR) for males, females, and combined males and females for COPD/asthma, respiratory disease, and flu/pneumonia for Midlothian ZIP code 76065 using comparison populations for Ellis County, Public Health Region 3, and Texas with 95% Confidence Intervals (CI), 1999-2010.	73
4.5.7	Percentage of selected ever diagnosed cardiovascular diseases (high blood pressure, angina or coronary heart disease, heart attack, and stroke) in adults with 95% confidence intervals based on Behavioral Risk Factor Surveillance System (BRFSS) survey questions for combined ZIP codes 76065 and 75104, Ellis County, Public Health Region 3 and Texas, 2001-2010.	75
4.5.8	Primary Hospital Discharge Data for selected cardiovascular disease ICD-9-CM Codes including number and percent of discharges for each ICD-9-CM code and total number of hospital discharges for Midlothian ZIP code 76065, Ellis County, Public Health Region 3 and Texas, 2000-2009.	77
4.5.9	Odds Ratio with 95% Confidence Intervals for Primary Hospital Discharge Data for Acute Myocardial Infarction (ICD-9-CM Code 410) and other Ischemic Disease (ICD-9-CM Codes 411-414) for Midlothian ZIP code 76065 and Ellis County with respect to Public Health Region 3 and Texas for the combined ten year period 2000-2009.	78
4.5.10	Standardized Mortality Ratios (SMR) for males, females, and combined males and females for heart disease, hypertension, vascular disease, and stroke for Midlothian ZIP code 76065 using comparison populations for Ellis County, Public Health Region 3, and Texas with 95% Confidence Intervals, 1999-2010	79
4.5.11	Behavioral Risk Factor Surveillance System (BRFSS) prevalence percent responses with 95% confidence intervals for survey question, “Have you ever been told by a doctor that you have diabetes?” for combined ZIP codes 76065 and 75104, Ellis County, Public Health Region 3 and Texas, 2001-2010.	81
4.5.12	Primary Hospital Discharge Data for Diabetes Mellitus (ICD-9-CM Code 250), including number of ICD-9-CM Code 250 discharges, total number of hospital discharges, and percent of primary discharges for ICD-9-CM Code 250 for Midlothian ZIP code 76065, Ellis County, Public Health Region 3 and Texas, 2000-2009.	82
4.5.13	Table 4.5.13 Death frequency and crude mortality rates per 100,000 for males, females, and combined males and females for diabetes for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3), and Texas, 1999-2010.	83
4.6.1	Behavioral Risk Factor Surveillance System (BRFSS) prevalence percent responses with 95% confidence intervals for survey question, “Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?” for combined ZIP codes 76065 and 75104 (2004-2010), and Ellis County, Public Health Region 3 and Texas (2001-2010)	87
4.6.2	Death frequency and crude mortality rates per 100,000 for males, females, and combined males and females for autoimmune diseases for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3), and Texas, 1999-2010	88
4.6.3	Standardized mortality rates (SMR) with lower and upper 95% confidence intervals for males, females, and combined males and females for ALS and other motor neuron diseases for Midlothian ZIP code 76065 with respect to Ellis County, and Public Health Region 3 (PHR 3), and Texas, 1999-2010.	89
4.6.4	Death frequency and crude mortality rates per 100,000 for males, females, and combined males and females for neurologic diseases for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3), and Texas, 1999-2010.	89

6.1	Health concerns raised by Midlothian residents with corresponding reference to section, subsection, tables, and figures in this Health Outcome Data Health Consultation.	95
A.4.1.a	Birth defects cases by BPA4 code and crude prevalence of birth defects per 10,000 live births with 95% confidence intervals for Midlothian potential area of impact, Texas, 1999-2008	A-2
A.4.1.b	Birth defects cases by BPA4 code and crude prevalence of birth defects per 10,000 live births with 95% confidence intervals for Midlothian, Texas, 1999-2008.	A-5
A.4.1.c	Birth defects cases by BPA4 code and crude prevalence of birth defects per 10,000 live births with 95% confidence intervals for Ellis County, Texas, 1999-2008.	A-8
A.4.1.d	Birth defects cases by BPA4 code and crude prevalence of birth defects per 10,000 live births with 95% confidence intervals for Public Health Region 3, Texas, 1999-2008.	A-11
A.4.1.e	Birth defects cases by BPA4 code and crude prevalence of birth defects per 10,000 live births with 95% confidence intervals for Texas, 1999-2008.	A-14
A.4.1.f	Crude prevalence of birth defects per 10,000 live births with 95% confidence intervals for birth defects with 5 or greater cases in the Potential area of impact for Midlothian Potential area of impact, city of Midlothian, Ellis County, Public Health Region 3, and Texas, 1999-2008	A-18
A.4.1.g	Adjusted prevalence of birth defects for the Midlothian Potential area of impact, city of Midlothian, Ellis County, and Public Health Region 3, and Texas prevalence for birth defects with 5 or greater cases in the Midlothian Potential area of impact, 1999-2008.	A-19
A.4.1.h	Crude and adjusted prevalence of birth defects for the Midlothian Potential area of impact and Texas prevalence for birth defects with 5 or greater cases in the Midlothian Potential area of impact, 1999-2008.	A-20
A.4.1.i	Crude and adjusted prevalence of birth defects for the city of Midlothian, TX and Texas prevalence for birth defects with 5 or greater cases in the Midlothian Potential area of impact, 1999-2008.	A-21
A.4.1.j	Crude and adjusted prevalence of birth defects for Ellis County, TX and Texas prevalence for birth defects with 5 or greater cases in the Midlothian Potential area of impact, 1999-2008.	A-22
A.4.1.k	Crude and adjusted prevalence of birth defects for Public Health Region 3, TX and Texas prevalence for birth defects with 5 or greater cases in the Midlothian Potential area of impact, 1999-2008.	A-23
A.4.1.l	Number of cases, crude prevalence per 10,000 live births, and crude prevalence ratio with 95% confidence interval and p-value for birth defects with 1 or greater cases in the Midlothian potential area of impact compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008.	A-24
A.4.1.m	Number of cases, crude prevalence per 10,000 live births, and crude prevalence ratio with 95% confidence interval and p-value for birth defects with 1 or greater cases in the city of Midlothian compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008.	A-27
A.4.1.n	Number of cases, crude prevalence per 10,000 live births, and crude prevalence ratio with 95% confidence interval and p-value for birth defects with 1 or greater cases in Ellis County compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008.	A-30
A.4.1.o	Crude and adjusted prevalence ratios with 95% confidence intervals and p-values for birth defects with 1 or greater cases in the Midlothian potential area of impact compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008.	A-36
A.4.1.p	Crude and adjusted prevalence ratios with 95% confidence intervals and p-values for birth defects with 1 or greater cases in the city of Midlothian compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008.	A-39
A.4.1.q	Crude and adjusted prevalence ratios with 95% confidence intervals and p-values for birth defects with 1 or greater cases in Ellis County compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008.	A-42
A.4.1.r	Number of cases, crude prevalence per 10,000 live births, and crude prevalence ratio with 95% confidence intervals and p-values for birth defects with 1 or greater cases with statistically significant findings in the Midlothian potential area of impact compared to the remainder of Ellis County, Texas, 1999-2008	A-48
A.4.1.s	Number of cases, crude prevalence per 10,000 live births, and crude prevalence ratio with 95% confidence intervals and p-values for birth defects with 1 or greater cases with statistically	A-49

	significant findings in the city of Midlothian compared to the remainder of Ellis County, Texas, 1999-2008.	
A.4.1.t	Crude and adjusted prevalence ratios with 95% confidence intervals and p-values for birth defects with 1 or greater cases in the Midlothian potential area of impact compared to the remainder of Ellis County, Texas, 1999-2008.	A-49
A.4.1.u	Crude and adjusted prevalence ratios with 95% confidence intervals and p-values for birth defects with 1 or greater cases in the city of Midlothian compared to the remainder of Ellis County, Texas, 1999-2008.	A-50
A.4.2.a	Standardized Incidence Ratios (SIR), Males, Selected Cancers, 1999-2008 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3). SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	A-51
A.4.2.b	Standardized Incidence Ratios (SIR), Females, Selected Cancers, 1999-2008 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3). SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	A-52
A.4.2.c	Number of Observed and Expected Male Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Midlothian Zip Code 76065, 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	A-53
A.4.2.d	Number of Observed and Expected Female Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Midlothian Zip Code 76065, 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	A-54
A.4.2.e	Number of Observed and Expected Male Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Ellis County, TX, 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	A-55
A.4.2.f	Number of Observed and Expected Female Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Ellis County, TX, 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	A-56
A.4.2.g	Number of Observed and Expected Male Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Public Health Region 3, TX, 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	A-57
A.4.2.h	Number of Observed and Expected Female Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Public Health Region 3, TX, 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals.	A-58
A.4.2.i	Number of Observed and Expected Male Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Midlothian Zip Code 76065 [#] , 2000–2009. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 2000–2009 rounded to the first decimal place with 99% confidence intervals.	A-59
A.4.2.j	Number of Observed and Expected Female Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Midlothian Zip Code 76065 [#] , 2000-2009. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 2000–2009 rounded to the first decimal place with 99% confidence intervals.	A-60
A.4.2.k	Observed number of cancer cases in the potential area of impact, Midlothian ZIP code 76065, and Ellis County, TX, Select cancers, male and female combined, 1999-2008.	A-61
A.4.2.l	Standardized Mortality Ratios (SMR), Males, Selected Cancers, 2000-2009 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3). SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000–2009 rounded to the first decimal place with 99% confidence intervals.	A-62

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

A.4.2.m	Standardized Mortality Ratios (SMR), Females, Selected Cancers, 2000-2009 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3). SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals.	A-63
A.4.2.n	Number of Observed and Expected Male Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Midlothian Zip Code 76065#, 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals	A-64
A.4.2.o	Number of Observed and Expected Female Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Midlothian Zip Code 76065#, 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals	A-65
A.4.2.p	Number of Observed and Expected Male Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Ellis County, Texas, 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals.	A-66
A.4.2.q	Number of Observed and Expected Female Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Ellis County, Texas, 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals.	A-67
A.4.2.r	Number of Observed and Expected Male Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Public Health Region 3, Texas, 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals	A-68
A.4.2.s	Number of Observed and Expected Female Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Public Health Region 3, Texas, 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals.	A-69
A.4.2.t	Number of Observed Cancer Deaths (ranked by number of observed deaths in Midlothian ZIP code 76065), in Midlothian ZIP code 76065, Ellis County, and Public Health Region 3, Texas, Select cancers, male and female combined, 2000-2009.	A-70
A.4.3.a	Cause of Death with description and underlying ICD-10 codes for the 33 leading causes of death in Texas.	A-71
A.4.3.b	Number of deaths, percentage of total deaths, and crude mortality rates per 100,000 population for all causes and the 33 leading causes of death, for males, females and combined, in ZIP code 76065, Texas, 1999-2010	A-72
A.4.3.c	Number of deaths, percentage of total deaths, and crude mortality rates per 100,000 population for all causes and the 33 leading causes of death, for males, females and combined, in Ellis County, Texas, 1999-2010.	A-73
A.4.3.d	Number of deaths, percentage of total deaths, and crude mortality rates per 100,000 population for all causes and the 33 leading causes of death, for males, females and combined, in Public Health Region 3, Texas, 1999-2010.	A-74
A.4.3.e	Number of deaths, percentage of total deaths, and crude mortality rates per 100,000 population for all causes and the 33 leading causes of death, for males, females and combined, in Texas, 1999-2010	A-75
A.4.3.f	Crude mortality rates per 100,000 population for all causes and the 33 leading causes of death, for males, females and combined, in ZIP code 76065, Ellis County, Public Health Region 3, and Texas, 1999-2010.	A-76
A.4.3.g	Standardized Mortality Ratios (SMR), for 33 Leading Causes of Death in Males, Females and combined for ZIP code 76065 with respect to Ellis County, Texas, with 95% confidence intervals, 1999-2010.	A-78
A.4.3.h	Standardized Mortality Ratios (SMR), for 33 Leading Causes of Death in Males, Females and combined for ZIP code 76065 with respect to Public Health Region 3, Texas, with 95% confidence intervals, 1999-2010.	A-79

A.4.3.i	Standardized Mortality Ratios (SMR), for 33 Leading Causes of Death in Males, Females and combined for ZIP code 76065 with respect to Texas, with 95% confidence intervals, 1999-2010.	A-80
A.4.3.j	Standardized Mortality Ratios (SMR), for 33 Leading Causes of Death in Males, Females and combined for Ellis County with respect to Public Health Region 3, Texas, with 95% confidence intervals, 1999-2010.	A-81
A.4.3.k	Standardized Mortality Ratios (SMR) and 95% confidence intervals for 33 Leading Causes of Death in Males, Females and combined, for Ellis County compared to number of expected deaths in Texas, 1999-2010.	A-82
A.4.3.l	Standardized Mortality Ratios (SMR) and 95% confidence intervals for 33 Leading Causes of Death in Males, Females and combined, for Public Health Region 3 with respect to Texas, with 95% confidence intervals, 1999-2010.	A-83
A.4.3.m	Standardized Mortality Ratios (SMR) and 95% confidence intervals for 33 Leading Causes of Death (Males and Females combined), for Midlothian ZIP code 76065, Ellis County, or Public Health Region 3 with relative to Ellis County, Public Health Region, or Texas, 1999-2010.	A-84
A.4.5.a	Behavioral Risk Factor Surveillance System (BRFSS) questions selected for data evaluation with corresponding labels, variable names, available years, and respondent options.	A-87
A.4.5.b	International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) Codes selected for data evaluation in this health consultation.	A-89
A.4.5.c	Odds Ratio (OR) with lower and upper 95% Confidence Intervals (CI) and p values for Primary Hospital Discharge Data for various ICD-9-CM Codes for combined years 2000-2009 for Midlothian ZIP code 76065, Ellis County, or Public Health Region 3 compared to Ellis County, Public Health Region 3 (PHR 3), or Texas.	A-90
	A.4.5.c.1 Diabetes mellitus	A-90
	A.4.5.c.2 Cardiovascular diseases	A-90
	A.4.5.c.3 Respiratory diseases	A-92

List of Figures

Number	Title	Page
2.1	Midlothian ZIP code 76065 population 2000 and 2010 by 5 year age category	4
4.1	Crude birth rates per 1,000 mid-year population for Midlothian, Ellis County and Texas, 1999-2008.	39
4.3.1	Number of deaths for the ten leading causes of death in males and females in ZIP code 76065, Texas, 1999-2010.	52
4.3.2	Crude mortality rates per 100,000 for males and females for the 5 leading causes of death for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR3), and Texas, 1999-2010	53
4.3.3	Standardized Mortality Ratios (SMR) for combined males and females for the top 15 leading causes of death for Midlothian ZIP code 76065 using Texas as the comparison population with 95% Confidence Intervals, 1999-2010.	55
4.4.1	Mean Blood Lead Levels (BLL) ($\mu\text{g/dL}$) for Children tested 0-14 years of age residing in Midlothian, Texas compared to the entire State (1997-2009).	59
4.4.2	Number of children tested 1-5 years of age residing in Midlothian, Texas with Blood Lead Levels (BLL) above and below 10 $\mu\text{g/dL}$ by year (1997-2009).	60
4.5.1	Odds Ratio with 95% Confidence Intervals by Year for Primary Hospital Discharge Data for Asthma (ICD-9-CM Code 493) for Midlothian ZIP code 76065 with respect to Ellis County, 2000-2009.	67
4.5.2	Yearly percent school attendance for Midlothian ISD, ESC Region 10, and Texas, for academic years 1994-95 through 2009-10.	68
4.5.3	Odds Ratio with 95% Confidence Intervals by Year for Primary Hospital Discharge Data for Chronic Obstructive Pulmonary Diseases and Allied Conditions (ICD-9-CM Codes 490, 491, 492, and 496) for Midlothian ZIP code 76065 with respect to Ellis County, 2000-2009.	71

4.5.4	Odds Ratio with 95% Confidence Intervals by Year for Primary Hospital Discharge Data for Acute Myocardial Infarction (ICD-9-CM Code 410) for Midlothian ZIP code 76065 with respect to Texas, 2000-2009.	78
4.5.5	Odds Ratio with 95% Confidence Intervals by Year for Primary Hospital Discharge Data for Diabetes Mellitus (ICD-9-CM Code 250) for Midlothian ZIP code 76065 with respect to Ellis County, 2000-2009.	83
4.6.1	Students participating in special education programs expressed as a percent of total students for Midlothian ISD, ESC Region 10, and Texas, for academic years 1994-95 through 2009-10.	91
B.2.1	Midlothian, TX Site Location	B-2
B.2.2	Existing Land Use, Midlothian, TX	B-3
B.2.3	Facilities of Interest in the Midlothian, TX and Extraterritorial Jurisdiction	B-4
B.2.4	Midlothian Wind Roses	B-5
B.2.5	Demographics within three miles of facilities, Midlothian, TX	B-6
B.3.1	Potential area of Impact with surrounding ZIP codes	B-7
B.3.2	Potential area of Impact with surrounding counties	B-8

Acronyms and Abbreviations

ADDM	Autism and Developmental Disease Monitoring (Network)
ADHD	attention deficit hyperactivity disorder
AIDS	acquired immune deficiency syndrome
ALS	amyotrophic lateral sclerosis
AOI	(potential) area of impact
APR	adjusted prevalence ratio
ASD	atrial septal defect
ASD	autism spectrum disorders
ATSDR	Agency for Toxic Substances and Disease Registry
BLL	blood lead level
BMI	body mass index
BPA	British Pediatrics Association
BPA4	British Pediatrics Association, 4 digit code
BRFSS	Behavior Risk Factor Surveillance System
CCHAPS	(Cook) Community-wide Children’s Health Assessment & Planning Survey
CDC	Centers for Disease Control and Prevention
CEDM	Corporation for the Economic Development of Midlothian
CHS	Center for Health Statistics
CI	confidence interval
CLPPP	Childhood Lead Poisoning Prevention Program
CNS	central nervous system
COPD	chronic obstructive pulmonary disease
COPD-AC	chronic obstructive pulmonary disease and allied conditions
CPR	crude prevalence ratio
DDT	dichloro-diphenyl-trichloroethane (organochlorine pesticide)
DHHS	(U.S.) Department of Health and Human Services
D/O	disorder
DSHS	(Texas) Department of State Health Services
DVT	deep vein thrombosis
EBV	Epstein-Barr virus
EIET	Environmental and Injury Epidemiology and Toxicology (Branch)
EPA	(U.S.) Environmental Protection Agency
ESC	Education Service Center
F	females
HAT	Health Assessment and Toxicology (Program)
HOD	health outcome data
H ₂ S	hydrogen sulfide
ICD-9-CM	International Classification of Diseases 9 th Edition, Clinical Modification
ICD-10	International Classification of Diseases 10 th Revision
IDEA	Individuals with Disabilities Education Act
IEUBK	Integrated Exposure Uptake Biokinetic Model
ISD	Independent School District
LCL	lower confidence limit
LD	learning disorder

M	males
MMWR	Morbidity and Mortality Weekly Report
µg/dL	micrograms/deciliter
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NAMCS	National Ambulatory Medical Care Survey
NBDPN	National Birth Defects Prevention Network
NC	not calculated
NCHS	National Center for Health Statistics
NHAMCS	National Hospital Ambulatory Medical Care Survey
NHANES	National Health and Nutrition Examination Survey
NHIS	National Health Interview Survey
NIH	National Institutes of Health
NOS	not otherwise specified
NS	not shown
OR	odds ratio
PCBs	polychlorinated biphenyls
PDA	Patent ductus arteriosus
PHR 3	Public Health Region 3
PM _{2.5}	particulate matter up to 2.5 microns in size
PR	prevalence ratio
PUDF	Public Use Data File
SHPPS	School Health Policy and Practices Study
SIR	standardized incidence ratio
SLE	systemic lupus erythematosus
SMR	standardized mortality ratio
SO ₂	sulfur dioxide
SPSS	Statistical Package for the Social Sciences
TBDES	Texas Birth Defects Epidemiology and Surveillance
TCEQ	Texas Commission on Environmental Quality
TCR	Texas Cancer Registry
TEA	Texas Education Agency
THCIC	Texas Health Care Information Council
TRI	Toxic Release Inventory
TXCLPPP	Texas Childhood Lead Poisoning Prevention Program
TXI	Texas Industries, Inc.
UCL	upper confidence limit
USDOE	U.S. Department of Education
ZIP	zone improvement plan (code)

Summary

INTRODUCTION/ OVERVIEW

The Agency for Toxic Substances and Disease Registry (ATSDR) and the Texas Department of State Health Services (DSHS) are conducting an extensive review of environmental health concerns related to air quality in Midlothian, Texas based on a petition request by several community members. The community is located in an area that includes three large cement manufacturers and a steel manufacturer. This health consultation, which examines health outcome data in the Midlothian area, is one of a series of six health consultations being prepared by ATSDR for this site. Air sampling data and other media data are addressed in the other health consultations.

The goal of this health consultation is to evaluate the available health outcome data for the Midlothian area to address the community concerns regarding possible health impacts from the site. DSHS provided data on numerous health outcomes. The health outcomes were selected based on community concerns (e.g. birth defects, cancer, and respiratory problems) and the relationship of some health outcomes to air pollutants (e.g., mortality and cardiovascular diseases). When possible, data were provided for the city of Midlothian, the Midlothian ZIP code 76065, and/or the potential area of impact around the industries as modeled from air sampling data and presented in the first health consultation for this site [ATSDR 2015a] in order to more closely correspond to the population around the industrial facilities of interest.

To evaluate possible impacts from air pollutants, this health consultation includes evaluation of health outcome data on chronic diseases such as asthma, chronic obstructive pulmonary disease (COPD), and cardiovascular diseases (Section 4.5). Some acute effects from exposure to air pollutants are discussed in section 4.6. Birth outcomes, which can be impacted by some air pollutants, are discussed and data are presented in Section 4.1. Mortality (death rate) data for cardiovascular and respiratory diseases are included in Section 4.3. Children's blood lead data are evaluated in Section 4.4.

This health outcome data review does not provide a cause and effect evaluation related to the chemicals of concern identified at the site. No research was conducted and the databases do not provide specific information on individual exposures and additional risk factors associated with the diseases. This health consultation provides a comprehensive overview of the health status of the community based on available data, and provides information that public health agencies could use to focus prevention efforts.

METHODS

Standard, accepted statistical and epidemiologic methods were used to examine rates of various diseases and conditions occurring in the Midlothian population. Many of the epidemiological concepts may be less familiar to community members, therefore, Section 3.0 provides an explanation of epidemiologic terminology, including incidence, prevalence, rate ratios, crude and adjusted estimates, and statistical significance. Because a statistical test is performed to evaluate each of these hundreds of individual health outcomes, some statistically significant findings would be expected based on chance alone. Given the exploratory nature of this health consultation, no statistical correction was made to control for the evaluation of numerous health outcomes.

The databases used in this health consultation are validated, well-maintained and conform to national standards. These data sources were established for the more general public health goals of tracking regional trends and identifying regional intervention needs. Therefore, while these data sources can be queried for specific diseases, time trends and affected geographic areas, they were not specifically designed for on-site research studies. They will not show cause and effect. A limitation of these databases is that they may not include information on other risk factors which may be related to the disease or causally associated with the exposure. Not being able to evaluate the presence of risk factors impacts our ability to interpret any findings. Another limitation for less common diseases is that the small sample size may result in an estimate that is more influenced by chance.

In this health consultation, the comparison population selected for each category of disease was determined in part by the database used and also based on disease characteristics. Depending upon the database, the Midlothian population refers to people residing in the city of Midlothian or in ZIP code 76065 (or combined with ZIP 75104). For some conditions, geocoded data for people in the modeled potential area of impact (AOI) around the industries of concern was available as well. Health outcome rates from these groups were compared to rates found in people from Ellis County, Public Health Region 3, or the state of Texas. Table S1 explains the Midlothian population, comparison population, database, and years of data used to examine the different health outcomes.

Table S1. Midlothian population, comparison population, primary database, and years of data used for epidemiological evaluation of the major categories of health outcomes.

Health Outcome				
Birth defects	City of Midlothian Potential AOI	Ellis County Public Health Region 3 Texas	DSHS Texas Birth Defects Registry	1999-2008
Adverse birth outcomes*	City of Midlothian Potential AOI	Ellis County Public Health Region 3 Texas	DSHS CHS, Vital Statistics	1999-2008
Fertility and birth rates	City of Midlothian	Ellis County Public Health Region 3 Texas	DSHS CHS, Vital Statistics	1999-2008
Cancer incidence [§]	ZIP code 76065	Ellis County Public Health Region 3 Texas	DSHS Texas Cancer Registry	1999-2009 2000-2009
Cancer mortality [§]	ZIP code 76065	Ellis County Public Health Region 3 Texas	DSHS CHS, Vital Statistics	2000-2009
Mortality	ZIP code 76065	Ellis County Public Health Region 3 Texas	DSHS CHS, Vital Statistics	1999-2010
Blood lead levels	City of Midlothian	Texas	TXCLPPP	1997-2009
Chronic Disease Prevalence [¶]	ZIP codes 76065/75104	Ellis County Public Health Region 3 Texas	DSHS CHS, BRFSS	2001-2010 2004-2010 ^{¶¶}
Chronic Disease Hospitalization [†]	ZIP code 76065	Ellis County Public Health Region 3 Texas	DSHS CHS, PUDF—hospital discharge data	2000-2009
Chronic Disease Mortality ^{††}	ZIP code 76065	Ellis County Public Health Region 3 Texas	DSHS CHS, Vital Statistics	1999-2010
Special Education [‡]	Midlothian ISD	ESC Region 10 Texas United States	TEA	1994-95 to 2009-10 ^{‡‡}

Abbreviations: CHS (Center for Health Statistics); TXCLPP (Texas Childhood Lead Poisoning Prevention Program); BRFSS (Behavioral Risk Factor Surveillance System); PUDF (Public Use Data File); ISD (Independent School District); ESC (Education Service Center); TEA (Texas Education Agency)

* Adverse birth outcomes include live births, preterm births, low birth weight births, very low birth weight births, fetal death, and infant mortality

[§] Cancer types and groupings included all cancer sites combined, total childhood cancers (age 0-19), total childhood leukemia (age 0-19), total leukemia, 5 leukemia sub-types, and 25 additional cancers grouped by site.

[¶] BRFSS data included asthma, cardiovascular diseases, diabetes, joint disease, and chronic disease risk factors.

^{¶¶} BRFSS Data at the ZIP code level was only available for the period 2004-2010.

[†] Primary hospital discharge data included asthma, chronic obstructive pulmonary disease, cardiovascular diseases, and diabetes.

^{††} Chronic disease mortality for asthma, respiratory disease, cardiovascular diseases, diabetes, autoimmune diseases, and neurological diseases.

[‡] Special education combines all children participating in special education classes including those with autism and attention deficit disorder.

^{‡‡} Years are grouped by academic school year.

CONCLUSIONS

Overall, there were few statistically significant findings that suggested the burden of disease was different in Midlothian as compared to other populations in Texas evaluated. Those few statistically significant findings were not considered to be practically or medically significant. ATSDR reached ten conclusions in this health consultation

corresponding to specific health outcome data evaluated in this document.

**CONCLUSION 1—
Birth Defects**

With a few exceptions, birth defects in the Midlothian potential area of impact and the city of Midlothian were comparable to the rates in Ellis County (Texas), Public Health Region 3, and the state of Texas. Although the crude prevalence of hypospadias (a birth defect in which the urinary opening is on the underside of the penis) for the potential area of impact, the city of Midlothian, Ellis County, and Public Health Region 3 were all significantly higher than the state of Texas, after adjusting for maternal age and race/ethnicity there was no statistically significant difference in hypospadias prevalence for the potential area of impact and Midlothian as compared to the state of Texas. There were no differences in the crude and adjusted prevalence for Down syndrome for the potential area of impact, the city of Midlothian, and Ellis County compared to the state of Texas. However, when compared to the remainder of Public Health Region 3, the adjusted prevalence ratios for Down syndrome were statistically significantly higher for the potential area of impact and Ellis County.

**BASIS FOR
DECISION**

- The vast majority of the 185 birth defects categories examined have either zero individual cases reported or had prevalence rates that were not statistically significantly different in the potential area of impact and city of Midlothian as compared to Ellis County, Public Health Region 3, or state of Texas.
 - Crude prevalence rates for the total number of individual cases reported with any monitored birth defect were approximately 30% higher for the potential area of impact, city of Midlothian, Ellis County, and Public Health Region 3 compared to the state of Texas. However, no difference was seen for the potential area of impact and the city of Midlothian compared to the state of Texas when the rates were adjusted for maternal age and race/ethnicity.
 - Only 17 of 185 birth defect categories had 5 or more individual cases reported in the Midlothian potential area of impact over the ten year period. These 17 birth defect categories were examined more closely.
 - Two of the 17 birth defect categories that had 5 or more cases, ostium secundum type septal defect and patent ductus arteriosus (PDA), had maternal age and race/ethnicity adjusted prevalence rates that were statistically significantly lower in Midlothian than in the state of Texas and Public Health Region 3. The adjusted prevalence for PDA was also statistically significantly lower in the potential area of impact than the state of Texas, Public Health Region 3, and Ellis County.
-

- Five of the 17 birth defect categories that had 5 or more cases had crude prevalence rates, but not maternal age and race/ethnicity-adjusted prevalence rates, that were statistically significantly higher in the potential area of impact than in the state of Texas. These five birth defects are: other specified anomalies of the ear; congenital hypertrophic pyloric stenosis; hypospadias, epispadias, and congenital chordee; certain anomalies of the skull, face, and jaw; and other specified anomalies of muscle, tendon, and connective tissue.
- In Midlothian, Ellis County, and Public Health Region 3, crude and adjusted prevalence estimates for other specified anomalies of the ear were statistically significantly higher than the state of Texas prevalence estimates. The crude prevalence ratio, but not adjusted prevalence ratio, for other specified anomalies of the ear, was significantly higher for Midlothian with respect to the remainder of Public Health Region 3.
- Crude and adjusted prevalence ratios for congenital hypertrophic pyloric stenosis were statistically significantly higher for the potential area of impact and Midlothian with respect to the remainder of Public Health Region 3, indicating higher rates in these two areas relative to Public Health Region 3. The crude prevalence ratio was also statistically significantly higher for the potential area of impact with respect to the remainder of Ellis County.
- Hypospadias crude prevalence estimates for the potential area of impact, city of Midlothian, Ellis County, and Public Health Region 3 were all statistically significantly higher than the state of Texas estimates. Adjusted rates were not statistically different in the potential area of impact and Midlothian compared to Texas. Adjusted prevalence ratios for hypospadias for the potential area of impact, Midlothian, and Ellis County as compared to the remainder of Public Health Region 3 were not statistically different, indicating that the prevalence estimates were similar.
- Down syndrome crude and adjusted prevalence rates were not statistically significantly different for the potential area of impact, Midlothian, and Ellis County, as compared to Texas for the ten year period 1999-2008. This was a similar finding to the 2005 TBDES cluster investigation (Number 2005.04) for Midlothian Down syndrome prevalence for 1997-2001 registry data. Adjusted prevalence ratios for the potential area of impact and Ellis County, but not for Midlothian, as compared to the remainder of Public Health Region 3, were statistically significantly higher for Down syndrome.

**CONCLUSION 2—
Adverse Birth
Outcomes**

Rates for preterm births, low birth weight births, very low birth weight births, fetal deaths, and infant mortality were similar in the potential area of impact or the city of Midlothian and the state of Texas. Fertility rates and birth rates were similar or higher in the city of Midlothian than rates found in the state of Texas.

**BASIS FOR
DECISION**

- There were no statistically significant differences found in the unadjusted rates for preterm births, low birth weight births, and very low birth weight births in the potential area of impact and the city of Midlothian compared to Ellis County, Public Health Region 3, or the state of Texas. Maternal age and race/ethnicity-adjusted rate ratios for the Midlothian potential area of impact compared to the remainder of Ellis County were also not statistically different, indicating that the rates of these adverse birth outcomes were similar between the potential area of impact and the rest of Ellis County.
 - Crude fetal death rates were lower in the city of Midlothian as compared to the state of Texas, while there was no statistically significant difference in fetal death rates in the potential area of impact with respect to Texas. There were no significant differences in unadjusted infant mortality rates among the potential area of impact, city of Midlothian, Ellis County, and state of Texas.
 - While the unadjusted fertility rates and birth rates in Midlothian appeared to be statistically significantly higher than the state of Texas unadjusted rates, the results should be interpreted with caution since the underlying populations used for the analysis are not directly comparable. Over the last ten years (1999-2008), the unadjusted birth rate for Midlothian appeared to becoming more similar to the state rate.
-

**CONCLUSION 3—
Cancer**

The occurrence of new cancer cases and the death rate from cancer in the Midlothian ZIP code 76065 was the same as the rates in the state of Texas.

**BASIS FOR
DECISION**

- The standardized incidence ratios (SIR, or observed cases in a population divided by the expected number of cases in a reference population) of cancer for males and females in ZIP code 76065 did not show a statistically significantly higher incidence than expected for any of the cancer groupings or sites, including leukemia and childhood cancers.
 - The standardized mortality ratios (SMR, or observed deaths in a population divided by the expected number of deaths in a reference population) for males and females for ZIP code 76065 did not show a statistically significantly higher mortality than expected for any
-

of the cancer groupings or sites, including leukemia and childhood cancers.

- These data were comparable to previous cancer cluster investigations of cancer incidence and cancer mortality by the Texas Cancer Registry that found the SIRs and SMRs were within expected ranges for men and women in the Midlothian ZIP code.

**CONCLUSION 4—
Mortality**

In general, mortality (death) rates in the Midlothian ZIP code 76065 were similar or lower than the rates in the state of Texas.

**BASIS FOR
DECISION**

- In the Midlothian ZIP code, the crude mortality rate for all deaths was less than the rate in Ellis County, Public Health Region 3, and Texas. Crude mortality rates for the top 5 leading causes of death were similar for these geographic areas, with heart disease deaths and cancer deaths accounting for about half of the mortality.
- Standardized mortality ratios for combined males and females indicated that for the 33 leading causes of death for ZIP code 76065, mortality due to accidents, suicide, liver disease, and ‘all other causes of death’ were statistically significantly lower compared to the state of Texas. However, death rates due to Alzheimer’s disease were statistically significantly higher in ZIP code 76065 compared to the state of Texas.

**CONCLUSION 5—
Childhood Lead
Exposure**

Blood lead data for children tested in the city of Midlothian demonstrate that their results were comparable to Texas statewide data on children’s blood lead levels.

**BASIS FOR
DECISION**

- Not all children receive testing for blood lead. Children’s bloods are tested for lead based on risk factors associated with lead exposure. Approximately 2% of the children who are tested in both the city of Midlothian and statewide have a blood lead result greater than 10 microgram lead/deciliter ($\mu\text{g/dL}$).
- A statistical test was performed on the data to determine whether there was a difference in the mean blood lead levels found in children tested living in the city of Midlothian compared to those tested in the state for each surveillance year. The means for the two groups were statistically similar.
- A subset of the TXCLPPP blood lead data was reviewed for children between the ages of 1 and 5. Children in this age group are particularly susceptible to adverse health effects from lead exposure and potentially have an increased risk for exposure. The average percent of children (age 1-5) tested who had blood lead levels above 10 $\mu\text{g/dL}$ was approximately 3% in both the city of Midlothian and statewide. In the city of Midlothian, only one child

tested in this age group had a venous blood lead level above 10 µg/dL.

- Over this thirteen year time period, the mean blood lead levels for children residing in Midlothian or statewide have followed a similar downward trend. The mean blood lead level in tested children for both groups in 2009 was 2.0 µg/dL.

**CONCLUSION 6—
Asthma and Other
Chronic Respiratory
Diseases**

The occurrence of asthma and other chronic respiratory diseases was comparable in Midlothian ZIP code 76065, Ellis County, Public Health Region 3, and the state of Texas.

**BASIS FOR
DECISION**

- BRFSS data show that the current rate of adult asthma in the Midlothian area was similar to Ellis County, Public Health Region 3, and the state of Texas. Similarly, the current rate of childhood asthma was similar across these populations. These rates were similar to those in the United States.
- Although there was variation by year, the odds ratio of being discharged from a hospital with the primary diagnosis of asthma was not statistically significantly different between ZIP code 76065 and Ellis County. However, odds ratios for both ZIP code 76065 and Ellis County were higher when compared to Public Health Region 3 and the state of Texas. Primary hospital discharge data do not reflect prevalence of asthma but may indicate poorly controlled asthma, access to care, exposures, or other factors that may have contributed to admission to the hospital.
- Primary hospital discharge data for COPD, chronic bronchitis, and emphysema were not statistically significantly different between Midlothian ZIP code 76065 and the remainder of Ellis County. The odds ratio of having a primary hospital discharge for these conditions were significantly lower in ZIP code 76065 and Ellis County than for hospitalizations among people living in the remainder of Public Health Region 3 or Texas for the same time period.
- Standardized mortality ratios for males, females, and combined males and females indicated that the death rates due to COPD and asthma and to other respiratory diseases were not statistically significantly different in the Midlothian ZIP code than in Ellis County, Public Health Region 3, and Texas.

**CONCLUSION 7—
Cardiovascular
Diseases**

The prevalence, odds ratio of hospital discharge, and mortality related to the adult cardiovascular conditions examined in Midlothian ZIP code 76065 were comparable to Ellis County, Public Health Region 3, and the state of Texas.

BASIS FOR DECISION

- BRFSS data available on adult cardiovascular diseases and risk factors showed that the estimated prevalence in the Midlothian area is similar to the comparison populations. The rates of hypertension, coronary heart diseases, and stroke were similar to those in the United States.
- The odds ratio of being discharged from a hospital with the diagnosis of acute myocardial infarction or other ischemic heart disease was statistically significantly higher for ZIP code 76065 or Ellis County than the remainder of Public Health Region 3 and the state of Texas. Being discharged with a diagnosis of acute pulmonary heart disease was statistically significantly higher for hospitalizations to people living in ZIP code 76065 compared to hospitalizations in people living in the remainder of Ellis County or the state of Texas. There were statistically significantly lower differences of primary hospital discharges for hypertension and heart failure for Midlothian ZIP code compared to the remainder of the other three areas.
- Standardized mortality ratios (SMR) for heart disease, hypertension, vascular disease, and stroke for males, females, and total population for ZIP code 76065 in relation to the comparison populations were not found to be statistically significantly higher or lower.

**CONCLUSION 8—
Diabetes**

The prevalence rate of diabetes was similar in Midlothian ZIP code 76065, Ellis County, Public Health Region 3, and the state of Texas.

BASIS FOR DECISION

- Based on BRFSS data, the prevalence of adult diabetes and the prevalence of the risk factors of obesity and physical inactivity in the Midlothian area were similar to Ellis County, Public Health Region 3, the state of Texas, and the United States.
- Primary hospital discharge data for diabetes for the Midlothian ZIP code 76065 generally indicated a lower likelihood of being discharged with a diabetes diagnosis than for individuals residing in the remainder of Ellis County, Public Health Region 3, and the state of Texas.
- The standardized mortality ratios for ZIP code 76065 with respect to the other three geographic areas revealed that there were no statistically significant differences for deaths from diabetes in ZIP code 76065 than in the comparison populations for males, females, and combined population.

**CONCLUSION 9—
Other Health
Concerns**

The information available from public health reporting systems was insufficient to allow for a definitive epidemiological evaluation of the occurrence of acute symptoms, autoimmune diseases, amyotrophic

lateral sclerosis (ALS), and some other community health concerns in the Midlothian area.

**BASIS FOR
DECISION**

- There is no reporting system that captures the prevalence of acute irritant signs and symptoms such as headache, burning eyes and throat, rash, and nosebleeds. Despite the lack of a reporting system, the findings in the previous health consultations on Midlothian air quality of periods of time when irritants such as sulfur oxides and particulates were present suggest that exposed individuals in Midlothian may experience these acute symptoms.
- There are no databases that comprehensively capture respiratory infections. Residents expressed concern that the air pollutants may make them more susceptible to respiratory infections. Standardized mortality ratios for ZIP code 76065 with respect to Ellis County, Public Health Region 3, and Texas found no statistically significant differences for deaths from influenza or pneumonia. Using school attendance available from the Texas Education Association website as a surrogate, the percent yearly school attendance from 1994 to 2010 in the Midlothian ISD fell consistently between 96% and 97%. The Midlothian ISD attendance rate was slightly higher than that of ESC Region 10 and Texas.
- BRFSS prevalence rates for combined ZIP codes 76065 (Midlothian) and 75104 (Cedar Hill), Ellis County, Public Health Region 3, and Texas on adults diagnosed with arthritis, gout, lupus, or fibromyalgia were not statistically significantly different. There were an insufficient number of cases of fibromyalgia, sarcoidosis, lupus, and Graves disease listed as a primary hospital discharge diagnosis in ZIP code 76065 or Ellis County for the combined ten year period to provide statistical analyses. Standardized mortality ratios for males, females, and total population for ZIP code 76065 with respect to all comparison populations found no statistically significant differences for deaths related to autoimmune diseases.
- ATSDR’s National ALS Registry is not considered complete and ATSDR’s funds for Texas ALS surveillance did not include Ellis County. Standardized mortality ratios for males, females, and total population for the Midlothian ZIP code with respect to the three comparison populations found no statistically significant differences for deaths related to ALS and other motor neuron diseases.

**CONCLUSION 10—
Special Education**

The information available from publicly available school reporting systems did not allow for conclusions to be made on attention deficit hyperactivity disorder (ADHD), autism, or special education participation by Midlothian school children.

BASIS FOR DECISION

- The percent of students participating in special education programs in the Midlothian ISD was consistently one to three percent higher than the percent in ESC Region 10 and Texas. The percent participation in the Midlothian ISD was lower than the U.S. Department of Education reported national average percent participation.
- There are more than a dozen major categories of disabilities that fall into the special education category. The TEA website data did not distinguish among percent of students with ADHD, autism, or other disabilities.

NEXT STEPS (All Conclusions)

All Health Outcome Data

- ATSDR and DSHS will provide community health education for residents of Midlothian to better understand the findings and implications of this health outcome data evaluation. ATSDR and DSHS recognize that health outcome databases and epidemiological concepts are less familiar to community members. ATSDR and DSHS will be available to answer technical questions if they arise.
- At this time, ATSDR will not be requesting additional health outcome data from DSHS. DSHS maintains multiple data sources on various health outcomes which are available to the public on websites at the county level of data. For smaller geographic areas, community members can request data from DSHS. Based on the health outcome data presented, at this time, ATSDR and DSHS have no recommendations for additional epidemiologic studies.

Birth Defects Registry specific

- The prevalence of birth defects found in Public Health Region 3, which includes Ellis and 18 other counties, is approximately 30% higher than the remainder of Texas. ATSDR recommends that TBDES: (a) consider evaluating potential reasons behind this difference, and (b) consider including both Public Health Region 3 and Texas as reference populations when providing data to the public on birth defects prevalence estimates in communities within Public Health Region 3.
- In their cluster investigation report 2005.04, TBDES stated that they will continue to monitor the prevalence of the birth defect hypospadias in the Midlothian area. ATSDR recommends that TBDES consider including Ellis County and Public Health Region 3 in their future evaluations of the prevalence of the birth defect hypospadias.

Acute Health Effects specific

- Although there are no reporting systems available to capture the prevalence of acute irritant effects, based on our understanding of the irritant properties of some of the air pollutants, these pollutants are a potential health concern. As explained in the Midlothian health consultation on criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a], ATSDR and DSHS intend to work with the Texas Commission on Environmental Quality (TCEQ), the state environmental agency, to insure levels of air pollutants remain below health levels of concern.

**FOR MORE
INFORMATION**

If you have questions about this document or ATSDR’s ongoing work on the Midlothian facilities, please call ATSDR at 1-800-CDC-INFO and ask for information about the “Midlothian, Texas evaluations.” If you have concerns about your health, please contact your health care provider.

1.0 Purpose and Statement of Issues

In July, 2005, a group of residents of Midlothian, Texas, submitted a petition to the Agency for Toxic Substances and Disease Registry (ATSDR). The petition expressed multiple concerns, but primarily that nearby industrial facilities were emitting air pollutants at levels that were affecting the health of residents. ATSDR accepted this petition, and the Texas Department of State Health Services (DSHS), under a cooperative agreement with ATSDR, prepared a response.

In December 2007, DSHS, with ATSDR concurrence, issued a draft public comment health consultation that responded to many concerns outlined in the original petition. Many comments were received on the draft health consultation.

During the process of evaluating these comments, the ATSDR and National Center for Environmental Health Director requested that the ATSDR and DSHS team take a more comprehensive look at the site. As outlined in its Midlothian Public Health Response Plan [ATSDR 2012a], ATSDR, in coordination with DSHS, will complete this reevaluation in a series of projects.

Purpose of this Document

ATSDR prepared this Health Consultation to review the currently available health outcome data for the Midlothian area. By drawing from numerous health data sources this review will provide a comprehensive look at the health status of the community. The evaluation includes birth defects, cancer incidence, birth and mortality data, asthma and other chronic disease prevalence, and other community health concerns. While this data review will not provide cause and effect evaluation for the chemicals of concern at the site, the document will provide an overview of the health status of the community and recommend health issues where public health agencies may prioritize their prevention efforts.

This document is intended to be used in conjunction with the companion health consultations prepared or in preparation for the site in order to have a more comprehensive understand of the issues addressed.

This ATSDR health consultation on Health Outcome Data is part of the series of ATSDR health consultations prepared or in preparation related to the Midlothian, Texas area air quality. It was developed to address the community concerns regarding various health issues that are believed to be related to the site. This consultation presents a review of numerous data sources in order to provide a comprehensive picture of the health status in the community. Birth defects prevalence, cancer incidence and mortality, the rates of other adverse birth outcomes, asthma prevalence, and chronic disease prevalence are the primary health issues that are evaluated.

2.0 Background

This section presents background information that ATSDR considered when evaluating the health outcome data to address community health concerns related to residing in the Midlothian area. Section 4 of this health consultation provides an analysis of the various health outcome data for the health concerns.

2.1 Location and Site Description

Midlothian is located in Ellis County, Texas, approximately 30 miles south of the Dallas/Fort Worth metropolitan area (Appendix B, Figure B.2.1). The town consists of commercial/retail buildings and residential properties. Much of the surrounding area is agricultural (Appendix B, Figure B.2.2). The facilities of interest for this site with respect to the evaluation of air quality, Gerdau Ameristeel, Ashgrove Cement, Holcim Texas, and Texas Industries¹ (TXI), are all located in Midlothian and its Extra-territorial jurisdiction (Appendix B, Figure B.2.3). The city limits encompass 38 square miles of land. The Midlothian ZIP code 76065 encompasses approximately 100 square miles and is almost entirely contained within Ellis County. The predominant wind direction in Midlothian is from south to north (Appendix B, Figure B.2.4). Both the most frequent and strongest winds come from a southerly direction.

Information from the Texas Education Agency (TEA) (<http://www.tea.state.tx.us/>) shows that there are 6 elementary schools, 2 middle schools, and 1 high school in the Midlothian independent school district (ISD). In the 2010-11 academic year, approximately 7,500 students attended these schools. The Midlothian ISD is part of the Region 10 Education Service Center (ESC). Region 10 ESC is the second largest of the 20 ESCs in Texas. The service region includes 80 public school districts and encompasses Collin, Dallas, Ellis, Fannin, Grayson, Hunt, Kaufman, Rockwall, and a part of Van Zandt Counties (Appendix B, Figure B.2.1).

While there are two outpatient medical centers in Midlothian, hospital inpatient services are provided in the surrounding Dallas/Fort Worth metropolitan area [CEDM 2012]. Midlothian is located within Texas Public Health Region 3 (PHR3). The PHR 3 field office/clinic serves Ellis and Johnson counties and is located in Cleburne, Texas. PHR 3 is one of 11 public health regions and is administered from the combined Health Service Region 2/3. PHR 3 encompasses 19 counties including Collin, Cooke, Dallas, Denton, Ellis, Erath, Fannin, Grayson, Hood, Hunt, Johnson, Kaufman, Navarro, Palo Pinto, Parker, Rockwall, Somervell, and Tarrant counties (Appendix B, Figure B.2.1).

2.2 Demographics

ATSDR examines demographic data to determine the number of people who are potentially exposed to environmental contaminants and to consider the presence of sensitive populations, such as young children (age 6 years and younger), women of childbearing age (between ages 15

¹ Texas Industries, Inc. (TXI) merged with Martin Marietta Materials, Inc. in January 2014. This document refers to this facility as TXI.

and 44 years), and the elderly (age 65 and older). In the evaluation of health outcome data, when possible, demographic characteristics of age, sex, and race are taken into consideration to account for the influence of these factors on the likelihood of occurrence of a disease. Furthermore, health outcomes are expressed as a rate or a ratio of rates, so the underlying population for a given area has to be established. For chronic diseases or diseases with long *latency* (Note: all italicized words are defined in the glossary), such as cancer, movement of people in and out of area are important in trying to understand where the disease may have developed, so migration and population growth patterns are considered.

Overall, within 3 miles of the Midlothian facilities of interest, there are an estimated 42,700 people, where approximately 31 percent of the population are children 18 years of age or younger, 8 percent are considered elderly (over 64 years of age), and 21 percent are women of childbearing age (between 15 and 44 years of age) (Appendix B, Figure B.2.5). As can be observed in the census tract data in that figure, the main population center of Midlothian is located between the facilities of interest, although several residential developments and individual property owners are located throughout the area. The racial and ethnic profile of the city of Midlothian differs from that of the county and state in that non-Hispanic whites (Anglo) make up a greater percentage of the population and the city has a smaller percentage of individuals who describe themselves as Hispanic or black (Table 2.1).

Table 2.1 Population by Race and Hispanic Origin for Midlothian, Ellis County, Public Health Region 3 (PHR 3) and Texas, 2010 (Source, DSHS, Center for Health Statistics—based on 2010 US Census data

	Total	Anglo	%	Hispanic	%	Black	%	Other	%
Midlothian†	18,037	14,220	78.8	2,734	15.2	616	3.4	467	2.6
Ellis County	149,610	98,984	66.2	35,161	23.5	13,724	9.2	1,741	1.2
PHR 3	6,733,179	3,535,326	52.5	1,805,258	26.8	997,188	14.8	395,407	5.9
Texas	25,145,561	11,562,682	46.0	9,460,921	37.6	3,003,149	11.9	1,118,809	4.4

† Data for Midlothian from U.S. Census Bureau; compiled by North Central Texas Council of Governments.

The city of Midlothian and the Midlothian ZIP code (76065) have experienced a substantial increase in population between the 2000 and 2010 census years (Table 2.2). Midlothian experienced a 141% increase in population in the last ten years and ZIP code 76065 experienced about a 75% increase in population in that time period. Demographic data for ZIP code 76065 show that the growth has not been uniform across all age categories, with the largest growth in population experienced in ages beyond child-bearing years (greater than 44 years of age) (Table 2.3, Figure 2.1). In 2010, children less than 15 years of age made up about 25% of the population in the ZIP code area.

Since many of the health outcomes examined in this health consultation have long latency periods, the percent of the population migrating in and out of an area is a consideration for understanding potential factors related to the onset of disease or disease progression such as previous exposures. Data on migration within 5 years were available for Ellis County for the periods 1985 to 1990 and 1995 to 2000 from Texas State Data Center (<http://txsdc.utsa.edu/Index.aspx>) (Table 2.4). Information was not available for the 2010 census year. Between 1995 and 2000, approximately 51% of the Ellis County residents remained in the same house and an additional 21% moved but remained in Ellis County. Migrants from other

Texas counties, other states and other countries constituted the remaining 28% of the population, putting Ellis County in the third highest quartile of the counties in Texas for percent migrants. Between 1995 and 2000, the state average migration was 23.34%.

Table 2.2 Population of Midlothian, ZIP code 76065, Ellis County, Public Health Region 3 (PHR 3) and Texas for 2000, 2010, and percent increase (Source, DSHS, Center for Health Statistics—based on 2010 US Census data).

	2000	2010	% Increase
Midlothian†	7,480	18,037	141.1
ZIP code 76065‡	16,521	28,986	75.4
Ellis County	111,360	149,610	34.3
PHR 3	5,487,477	6,733,179	22.7
Texas	20,851,820	25,145,561	20.6

† Data for Midlothian from U.S. Census Bureau; compiled by North Central Texas Council of Governments.

‡ Data for ZIP code 76065 from US Census Bureau 2010.

Table 2.3 Population comparison for ZIP code 76065, 2000 and 2010, for age categories 0-14 years, 15-44 years, and 45 or over, male and female with percent increase (Source: US Census Bureau 2010).

Age	All			Male			Female		
	2000	2010	%Increase	2000	2010	%Increase	2000	2010	%Increase
0-14	4,194	7,143	70.3	2,142	3,664	71.1	2,052	3,479	69.5
15-44	7,462	11,733	57.4	3,779	5,745	52.0	3,683	5,988	62.6
45 +	4,865	10,110	107.8	2,403	4,958	106.3	2,462	5,152	109.3
Total	16,521	28,986	75.4	8,324	14,367	72.6	8,197	14,619	78.3

Figure 2.1 Midlothian ZIP code 76065 population 2000 and 2010 by 5 year age category (Source: US Census Bureau 2010)

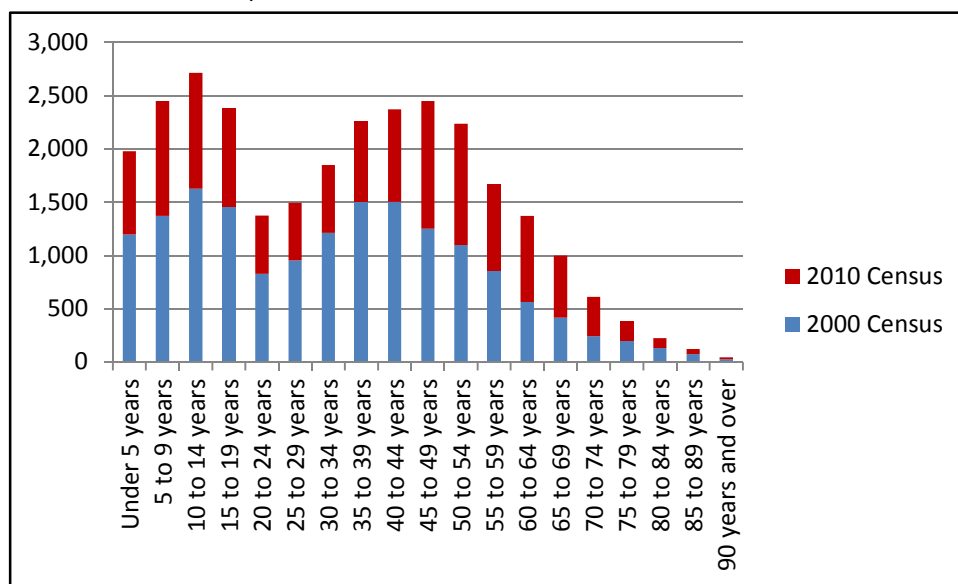


Table 2.4 Change in residence by type, Ellis County, Texas, 1985 to 1990 and 1995 to 2000. (Data Source: Texas State Data Center).

Change in Residence Type	Population		Percent of Population	
	1985-1990	1995-2000	1985-1990	1995-2000
Total population 5 years and over	77,963	102,901	100.0	100.0
Same house	42,068	52,411	54.0	50.9
Different house in United States	35,396	48,426	45.4	47.1
Same county	16,253	21,507	20.8	20.9
Different county	19,143	26,919	24.6	26.2
Same state	14,964	21,467	19.2	20.9
Different state	4,179	5,452	5.4	5.3
Elsewhere	499	2,064	0.6	2.0

2.3 Chemicals of Concern

This health consultation, which examines health outcome data in the Midlothian area, is one of a series of six health consultations being prepared by ATSDR to address health concerns related to air quality in Midlothian. Air sampling data evaluated in the Midlothian health consultation on criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a] identified several air pollutants of concern for sensitive populations. Sensitive populations include those with underlying respiratory diseases, cardiac diseases, children, and the elderly. Sampling data suggested that most exposures would not result in harmful effects to the general public. Based on existing land use and census tract information, some of the areas identified that had higher air pollutant levels were vacant or sparsely populated (Appendix B, Figures B.2.2 and B.2.5, respectively).

Air sampling data from 1997 through late 2008 showed that there were some infrequent periods when sulfur dioxide (SO₂) was present at concentrations that could have harmed the health of sensitive individuals [ATSDR 2016a]. Data since 2008 showed a reduction in SO₂ levels resulting in exposures that would not be expected to be harmful to any individual. Sulfur dioxide can combine with water vapors to form sulfuric acid aerosols that can be acutely irritating to the eyes, nose, and skin. Modeled air data described in the Midlothian health consultation on other air pollutants found slightly higher maximum annual and 5-year averages of sulfuric acid aerosols as compared to EPA's risk based concentrations. [ATSDR 2015b].

Based on available data, breathing air contaminated with fine particulate matter (PM_{2.5}) for a year or more was not determined to be a public health concern [ATSDR 2016a]. However, there have been infrequent but potentially harmful short term levels of PM_{2.5} measured in Midlothian, which could have resulted in cardiopulmonary problems for some people.

Cement kiln dust, which includes particles of many sizes, is highly alkaline and can cause irritation of exposed skin, eyes, and mucous membranes. ATSDR's health consultation on NAAQS stated that it would not be inconsistent with the operations at the three cement plants operating in Midlothian that some releases of cement kiln dust could occur [ATSDR 2016a]. Particulate modeling [ATSDR 2015b; 2016a] and tapelift samples that contained cement dust or limestone [ATSDR 2016b] provide support for airborne deposition of cement kiln dust.

Ozone was another air pollutant identified as a concern in the Midlothian Health Consultation on criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a]. Ellis County is part of the Dallas-Fort Worth ozone non-attainment area. Midlothian is crisscrossed by several major highways (Appendix B, Figure B.2.2) and traffic is a major contributor to ozone levels. Since air monitoring began in 1997, ozone levels have occasionally been detected that would increase the likelihood of a sensitive individual experiencing harmful respiratory effects. There were some rare occasions when ozone concentrations were above 100 parts per billion, which could result in respiratory effects in the general public as well.

While it is unknown how many (but believed to be few, if any) children lived in a localized area north of the Gerdau Ameristeel fence line, during the period 1993 to 1998, airborne lead exposures could have posed a risk to the health of children who resided or frequently played in this area [ATSDR 2016a]. Since 1998, lead air levels in this area have decreased.

To evaluate possible impacts of these air pollutants, this health consultation includes evaluation of health outcome data on chronic diseases such as asthma, chronic obstructive pulmonary disease (COPD), and cardiovascular diseases (Section 4.5). Some acute effects from exposure to air pollutants are discussed in section 4.6. Birth outcomes, which can be impacted by some air pollutants, are discussed and data are presented in Section 4.1. Mortality data for cardiovascular and respiratory diseases are included in Section 4.3. Children's blood lead data are evaluated in Section 4.4.

3.0 General Approach and Methods in this Health Outcome Data Review

3.1 General Approach in this Health Consultation.

This health outcome data (HOD) evaluation uses existing data sources to help address concerns about the potential health impacts of emissions from a number of industrial facilities in the Midlothian area. The Texas Department of State Health Services (DSHS) maintains several health outcome databases that can be used to generate area-specific data. These databases include the birth defects registry, the cancer registry, vital statistics records (birth and death certificates) and hospital discharge information. These databases are validated and well-maintained and conform to national standards. DSHS also participates in several national health surveillance studies such as the Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System (BRFSS) and the Childhood Lead Poisoning Prevention Program (CLPPP). The combined evaluation of these multiple data sources provides information that helps to characterize the health status of a population.

The data sources evaluated in this health consultation were established for the more general public health goals of tracking regional trends and identifying regional intervention needs. Therefore, while these data sources can be queried for specific diseases, time trends, and geographic variability, they were not specifically designed for on-site research studies. Consequently, the information gained from the queries is not sufficient to identify or establish any "cause and effect" relationships between the environment and a particular disease or condition. *Incidence* and *prevalence* rates, such as those presented in this health consultation, should be considered exploratory or hypothesis-generating and should be used to evaluate whether or not further studies would be appropriate.

In evaluating health outcome data, it is important to be aware of the strengths and limitations of the databases being used. The purpose for which the database was created, the assumptions made, and information that was included or excluded all influence the extent to which the database can address the health questions being asked. While the specific strengths and limitations for the databases used to examine disease rates will be described in their respective sections, there are some general strengths and limitations to the data sources.

Strengths of HOD include:

- Ability to address whether there is a higher rate of disease in an area than expected
- Provides specific information on the health status of a community, for a specified time period, geographic area, and disease outcome
- Provides established methods to conduct analyses.

Limitations of HOD:

- Cannot be used to establish "cause and effect"
- Data are not collected for all diseases that may be of interest
- The data collection area and the geographic area of interest may not overlap
- Long latency of some diseases makes migration in and out of the area an important factor

- Information on additional risk factors (such as occupational exposures, smoking and diet history, and length of residency) that could be associated with the disease often are unknown
- Small numbers of cases or a small exposed population result in unstable estimates that are more influenced by chance.

For this review, standard, accepted statistical and epidemiological methods were used in analyzing cancer and birth defects registry data and other databases. The results presented included at least a 95% *confidence interval* as a measure of the precision of the calculated rates or ratios. The number of cases of a disease in a given area influences the size of the confidence interval. Sometimes a larger geographic unit was needed to capture more cases and provide for a more meaningful statistical comparison. While using a larger geographic unit may influence the interpretation of the findings with respect to being representative of the study area, patient privacy and confidentiality restrictions often prevent the evaluation of smaller geographic areas. Additionally, the rates and ratios for small geographic areas can be highly unstable with one more or one less case having a considerable impact on the result. This will be reflected in the extremely wide confidence interval for the resulting rate or ratio.

In this document, a multitude of health outcomes were evaluated. Because a statistical test is performed to evaluate each of these hundreds of individual health outcomes, some statistically significant findings are to be expected based on chance alone. For example, if a hundred different health outcomes were evaluated using a significance level of 0.05, one would expect to find 5 statistically significant findings purely by chance. Statistical methods exist to control for findings that are statistically significant by chance alone when evaluating numerous health outcomes. However, these methods can be very conservative and impractical in exploratory analyses [Sainani 2009]. Given that this health consultation was exploratory, no statistical correction was made to account for the multiple outcomes evaluated in the registries and databases used in this document. Therefore, any statistically significant findings should be viewed cautiously.

This document also evaluates the health outcome combined categories “any monitored birth defect”, “total cancer”, and total childhood cancers (age 0-19)”. While both birth defects and cancers are groups of diseases, each with their own potential cause, the combined categories are shown to give readers an overall view of the incidence and prevalence of these types of diseases as a whole.

As part of the first health consultation [ATSDR 2015a] addressing Midlothian area air quality, dispersion modeling analysis was performed that determined the potential area of impact around the four facilities of concern in Midlothian. Where possible and appropriate and when *geocoded data* were available, this potential impact area was used in updated registry and vital statistic analyses performed by DSHS for the HOD review. When the use of geocoded data was not available, the most suitable geographic unit, such as ZIP code, that most closely aligned with the potential impact area was used. For some databases and in other previous studies, other geographic areas including surrounding ZIP codes and counties were used for reporting. Appendix B, Figures B.3.1 and B.3.2, respectively, present these geographic areas with the impact area superimposed.

In health outcome data reviews, a comparison population is needed to determine whether the incidence or prevalence rates of a health outcome in the study population are higher, lower, or similar to background rates. Some comparison populations will contain the study population (county, public health region, state) while others compare a population in a neighboring town or county. The prevalence ratios presented in this health consultation are calculated by excluding the data from the smaller geographic area and comparing it to the remaining larger comparison population. In general, for public health analyses, overlaps of less than 10% of the whole population are usually not of concern for analyses [Hayes 2006]. In this health consultation, disease characteristics as well as issues related to the respective database influenced which comparison population was used and how closely it resembled the study population. Whenever possible and appropriate, adjustments for gender, age, and race were made to more closely compare populations and control for any demographic confounders or risk factors for the particular health outcome.

The community had also voiced health concerns related to the Midlothian area for which there are no public health reporting systems or standard databases available for analyses. For some of these concerns, there are only anecdotal reports or convenience surveys that report the conditions. There are some alternate sources of data that have been suggested as a surrogate for health conditions (for example, school attendance records). As with the more standard databases used in the HOD review, it is important to recognize the limitations inherent in these sources. Most importantly, these alternate sources often lack a suitable baseline population. For conditions that cannot be addressed by more robust epidemiological and statistical methods, this evaluation attempted to put a perspective on the disease burden for the community. The medical literature was reviewed for the known causes of these diseases and the chemicals of concern to determine diseases associated with exposures comparable to the exposures in Midlothian. These conditions are primarily discussed in Sections 4.5 and 4.6.

3.2 Epidemiological and Statistical Methods Used in this Health Consultation

In this consultation, standard, accepted statistical and epidemiological methods were used to present information on various health outcomes. The results are often expressed as either rates or ratios.

A *rate* is a measure of the frequency or number of events that occur in a defined population within a specified time period. *Incidence rate* or *cumulative incidence* refers to the number of new occurrences of birth, death, disease, or other conditions over a defined time period divided by the number of people in the population at risk for that same time period. Some examples in this report are birth rate per 1,000 population (see Table 4.1.17) and mortality rate per 100,000 population (see Table 4.3.1). *Prevalence* refers to the number of cases (both new and existing) of a disease or condition in a defined population at a designated time period. An example in this consultation is the percent of adults ever diagnosed with asthma (see Table 4.5.1). To measure the occurrence of birth defects, the prevalence at birth, or birth prevalence, is calculated using the number of live births as the defined population. In general, the defined population is the sums of that population over all study years.

When either incidence or prevalence is calculated within a population without accounting for the effects of any other characteristics of the underlying populations, it is referred to as a *crude* or *unadjusted rate*. While one can compare crude rates, findings for some conditions might be misleading if the underlying populations of the geographic areas being compared differ in some significant way. Some diseases or conditions vary by sex, age, or race/ethnicity. For example, since the death rate for colorectal cancer in the state of Texas is higher among blacks than whites, without accounting for race one would expect a higher death rate from colorectal cancer in Midlothian than what you find. However, the black population is 3.4% in the city of Midlothian and 9.2% in Ellis County (see Table 2.1). Without accounting for variability of race, one may draw spurious conclusions. One would therefore examine death rates for colorectal cancer in black and white populations separately (calculate race-specific rates) for these two areas to be able to more accurately interpret these rates.

Adjusted rates are therefore calculated to capture population variability, such as sex, age and race/ethnicity. This can be done by stratifying the data and calculating rates within each sex, age and race/ethnicity stratum or by regression analyses. *Standardization*, another form of adjustment, may also be conducted. Standardization allows you to remove, as much as possible, the effects of sex, age and race/ethnicity from the calculated rates when comparing two or more populations, by using as weights the distribution of a standard population. In this health consultation, the state of Texas population for the given time period is used as the primary standard or reference population when crude rates for a smaller population subset are standardized. An example of direct standardization from this consultation is the maternal age and race/ethnicity-adjusted prevalence of birth defects per 10,000 live births (see Table 4.1.2).

The adjustment of rates using direct standardization requires the calculation of separate rates for each characteristic for which adjustment is necessary (calculation of age- and sex-specific rates, for example), which are then combined into one overall age- and sex-adjusted rate. Because of this, for small populations, some of the strata for which rates are calculated might be based on a very small number of cases (perhaps even 0 cases for some combinations of characteristics). As will be explained in the discussion on confidence intervals below, a small number of cases increases the uncertainty one has about the accuracy of the rate. Occasionally, adjustment of the rates turns out to be unnecessary, in which case the adjustment has little effect on the rates. That is, the disease or condition might not be influenced by the characteristic for which the adjustment was done. For example, over the last few years, the incidence (not mortality) of breast cancer has been similar in black and white women in the United States, so adjusting for race may not cause a marked change in this rate. Sometimes, there is not enough information known about the characteristics that influence the rate of a disease or condition. One rule of thumb is to check if the unadjusted rate differs from the adjusted rate by about 10% or more. If it does, it would suggest that the characteristics that were adjusted for did have some influence on the frequency of that disease or condition.

For some of the epidemiological comparisons used in this consultation, ratio estimates were used. A *ratio* shows the relative size of two quantities and is the result of one quantity divided by another. In this report, for example, a *prevalence ratio* was calculated for birth defects in Midlothian compared to the rest of Ellis County (see Table 4.1.3) by dividing the prevalence in Midlothian by the prevalence in the remainder of Ellis County. Ratios can be used to compare

crude or adjusted incidence, prevalence, or mortality between two populations. Table 4.1.16 provides maternal age and race/ethnicity adjusted rate ratios for selected birth outcomes in the potential area of impact compared to the rest of Ellis County.

Odds ratios (ORs) were generated for primary hospital discharge data (section 4.5 and 4.6), which show the odds of being discharged from a hospital for a given condition if you live in one area relative to the odds of being discharged with that condition if living in another area. For example, Table 4.5.9 provides an odds ratio for being discharged from a hospital with a primary diagnosis of acute myocardial infarction for residents of Midlothian ZIP code 76065 relative to all other state of Texas residents.

Two other ratios that are used in this report are the *standardized mortality ratio* (SMR) and the *standardized incidence ratio* (SIR). These ratios are another method of standardizing or adjusting estimates so that two populations can be compared, and is often called indirect standardization. With indirect standardization, the result is not a standardized rate for each area, but a ratio of the observed number of events in the population of interest to the expected number of events for that population. The expected number of events in the population is based upon the rate of events observed in the reference or comparison population applied to the distribution of characteristics to be adjusted for in the smaller area for which the SMR or SIR is calculated. In this report, the expected number of events or cases are adjusted (standardized) for sex (male/female), age (5-year age groups to age 85 and then over 85), and race (white, black, Hispanic, or other). SMRs are used in the mortality data section (4.3), and both SIRs and SMRs are used in the cancer registry data section (4.2).

To interpret the ratio measures in this document, a ratio greater than 1.0 indicates a higher incidence, prevalence, or odds of having the condition within a certain population as compared to a reference population. Conversely, a ratio less than 1.0 indicates a lower incidence, prevalence, or odds of having the condition. The significance of the ratio value depends on the magnitude of the ratio and the population size or number of cases used to calculate the ratio. Ratios based on a larger number of cases are more stable; ratios based on a fewer number are more influenced by chance and show more variability from one time period to the next.

The rates and ratios generated in this report are only considered to be estimates of the true rate or ratio. To take into account the influence of chance and uncertainty in the rate or ratio, a 95% or 99% confidence interval (CI) was calculated for the rates and ratios in this report. A 95% CI is an interval, or range of values, that has a 95% probability of containing the true value of the parameter that is being estimated. Likewise, a 99% CI is an interval that has a 99% probability of containing the true value of the parameter.

A confidence interval is a statistical measure that gives an idea of the potential difference between the true value of a parameter and the estimated value. It is a measure of the variability around the estimated rates and ratios, and thus shows the precision of these estimated values. A narrower confidence interval will reflect greater precision, and a wider confidence interval indicates less precision. In general, a smaller population or number of cases results in greater variability and therefore less precision in the estimate. For example, the 95% CI for the crude prevalence rate (per 10,000 live births) of the birth defect patent ductus arteriosus (PDA) for

Public Health Region 3, which had about 5,200 cases during 1999-2008, is 49.3 – 52.0, while for Midlothian, which only had 12 cases, the 95% CI is 20.4 – 68.8 (see Table 4.1.4).

In some sections of this report, the method of non-overlapping confidence intervals was used to determine statistical significance. The method of non-overlapping confidence intervals is generally considered to be an approximation of a more rigorous statistical test. While this approach may be more conservative and more appropriate as a screening method, the decision to include this method was based on the large number of multiple comparisons in this report. The approach allows readers to compare rates across different geographic areas for themselves rather than needing a *p-value* for each separate comparison of two geographic areas.

In using this approach, if the confidence intervals for the rates being compared overlapped, the rates were not considered to be statistically significantly different from each other. In some cases where the confidence intervals only slightly overlap, the statistical test performed on the rates may indicate a statistical difference exists while the non-overlapping confidence intervals method may not. However, if confidence intervals of the rates being compared did not overlap, the rates were considered to be statistically significantly different from each other (one rate was considered to be significantly higher or lower than the other rate). If there was no overlap, a comparable statistical test would also always indicate there was a significant difference.

In the PDA example above (estimates shown in Table 4.1.4), using the method on non-overlapping confidence intervals, the two crude prevalence estimates were found to be not statistically significantly different from each other, even though the crude prevalence in Midlothian for PDA was 39.4 cases per 10,000 live births as compared to the crude prevalence in Public Health Region 3 of 50.6 cases per 10,000 live births. This occurred because the confidence interval for Midlothian (20.4-68.8) overlapped with the confidence interval for Public Health Region 3 (49.3-52.0). Table 4.1.5 also demonstrates the use of the technique of non-overlapping confidence intervals to determine statistical significance.

For ratio estimates (such as Odds Ratios, SMRs, and SIRs), if the confidence interval includes the value 1.0, no statistically significant difference is indicated between the rates of the two areas or groups being compared (or between observed and expected number of cases). However, if the confidence interval does not include 1.0, this indicates a statistically significant difference between the rates of the two groups being compared (or between observed and expected number of cases). If the ratio and both upper and lower confidence limits are all greater than 1.0, the number of cases in the study population is significantly higher than expected. Conversely, if the ratio and both upper and lower confidence limits are all less than 1.0, the number of cases in the study population is significantly lower than expected.

A statistically significant 95% CI for a ratio estimate corresponds to a statistically significant hypothesis test with a significance level (α -level) of 0.05. That is, when a hypothesis test of whether two estimates differ results in a *p-value* of <0.05 , the corresponding 95% CI of the ratio estimate will not encompass 1.0. Similarly, a statistically significant 99% CI corresponds to a statistically significant hypothesis test with a significance level (α -level) of 0.01. Table 4.2.4 illustrates statistically significant findings for the SIR for various cancers.

For many health outcomes, crude rates for a subset of the population (such as a zip code or a county) should only be compared to the state crude rates as an initial screening measure. For these health outcomes for a more meaningful comparison, the rates in the subset should be adjusted for factors such as age, race and/or sex to account for differences in the potential risk factors between the two population groups. Directly standardized rates (such as age, race, and/or sex-adjusted rates) from one area may be compared with similar rates from another area, but only if both rates have been directly standardized to the same population (e.g., Texas 2000 or 2010 population, US 2000 or 2010 population, or some other well-defined and stable population distribution). Indirectly standardized ratios such as SIRs and SMRs from one zip code or county should not be compared with SIRs and SMRs from another zip code or county. If a comparison between two different areas or populations is desired, one area should be indirectly standardized to the other area, and a new SIR or SMR should be calculated. Because the underlying populations in each prevalence ratio are different, such as in the prevalence ratios calculated for this document (Section 4.1), comparisons among the different prevalence ratios cannot be made.

Confidence intervals for many of the estimates presented in this HOD health consultation were calculated based on the Poisson distribution. The Poisson is a probability distribution that is often used to obtain the probability of the occurrence of rare events. For larger numbers of events or cases (usually 100 cases or more), a normal distribution can be used to approximate Poisson probabilities, although probabilities using the Poisson distribution can still be obtained. To calculate prevalence ratios and rate ratios in section 4.1 (Birth-related Health Outcomes), a statistical technique called Poisson regression was used. *Poisson regression* is a type of regression analysis that is used for evaluating outcomes that have positive integer values, such as number of cases or other ‘count’ data. This technique uses the Poisson distribution to model the number of expected events occurring in a time interval. One advantage of using a regression analysis such as this is that it allows one to look at associations between the outcome and multiple variables or risk factors thought to be related to the outcome, and ratios adjusted for many population characteristics can be obtained easily.

Some of the vital statistics records used for generating frequencies and rates within the potential area of impact did not contain sufficient address information to allow for geocoding. For example, individuals with only P.O. box address information do not have a geocodable address. Since DSHS could not be certain whether these cases fell within the potential area of impact boundaries, these records were not included when generating rates and ratios for the potential area of impact (Table 3.1). Also, when calculating prevalence or rate ratio estimates comparing the potential area of impact to the rest of Ellis County, those records with no geocoding information were excluded entirely from analysis. For individuals where it could be established based on residence county that they did not live in the potential area of impact, records were not excluded even if there was no geocodable address. For Texas Cancer Registry data (Section 4.2), population data could not be accurately obtained or estimated for the modeled potential area of impact, so only the number of observed new cases of cancer within the impact area is provided.

Throughout this health consultation, statistical significance testing is used to provide information on whether or not the rate or ratio of a disease or condition for one population is statistically different from that of another population. Statistical significance is not the same as biological significance and does not suggest practical importance. For example, the SMR for heart disease

in Ellis County is statistically significantly higher with respect to the state of Texas (1.05, 95% CI: 1.01 to 1.09) (Table 4.3.3), however this may not be of practical importance because the ratio is so close to 1.0. Conversely, there may be some non-significant statistical findings that may merit a second look because of a strong point estimate. In determining if a health outcome warrants further inspection, among other things, the reader should take into account the number of cases, the magnitude of the point estimate, and the width of the confidence interval. The analyses provided in this health consultation should be considered exploratory and while they could be used to evaluate whether or not further studies would be appropriate, they cannot be used to provide a cause and effect evaluation related to the chemicals of concern identified at the site.

Table 3.1 Number and percentage of birth defect, live birth, infant death, and fetal death records not geocoded for residents of the four counties in which the Midlothian potential area of impact lies, tabulated by county of residence, 1999-2008. Data Source: DSHS, TBDES, and CHS.

	Ellis County	Johnson County	Dallas County	Tarrant County	Four County Total
Total birth defects cases [†]	1,003	1,018	20,117	14,938	37,076
Cases not geocoded	92	77	405	234	808
% Cases not geocoded	9.17%	7.56%	2.01%	1.57%	2.18%
Total live births	19,715	19,974	427,652	274,240	741,581
Live births not geocoded	1,914	1,607	8,934	4,305	16,760
% Live births not geocoded	9.71%	8.05%	2.09%	1.57%	2.26%
Total infant deaths	132	137	2,925	2,017	5,211
Infant deaths not geocoded	21	12	113	60	206
% Infant deaths not geocoded	15.91%	8.76%	3.86%	2.97%	3.95%
Total fetal deaths	70	111	2,779	1,940	4,900
Fetal deaths not geocoded	7	10	128	75	220
% Fetal deaths not geocoded	10.00%	9.01%	4.61%	3.87%	4.49%

[†] Infants and fetuses with any monitored birth defect, 1999-2008.

4.0 Health Outcome Data Review

4.1 Birth-Related Health Outcomes

Birth Defects

The DSHS Birth Defects Epidemiology and Surveillance (TBDES) Branch has issued several reports and responded to numerous citizen inquiries on the occurrence of birth defects in the Midlothian area. Many of these citizens were, and continue to be, concerned about the prevalence of *Down syndrome* or *hypospadias* in the community, as well as the general rate of birth defects.

Birth defects are structural or functional abnormalities in the newborn that are present at birth. Birth defects are a public health concern because they are a leading cause of infant mortality and lifelong disabilities. While there are some known causes of birth defects, such as some maternal viral infections, medications, and alcohol use, the cause of most birth defects are unknown. Some birth defects are related to the age of the mother and some occur more frequently in some racial and ethnic groups.

Air sampling data evaluated in the Midlothian health consultation on the criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a] revealed that there were some time periods in which sulfur dioxide (SO₂) and fine particulate matter (PM_{2.5}) were present at concentrations in Midlothian that may be of health concern to sensitive individuals. There have been some recent articles that have looked at associations of birth defects with air pollutants such as SO₂ and particulates [Rankin 2009; Vrijheid 2011]. These studies found weak or no association between air pollutants and congenital cardiac, nervous system, or other birth defects.

Data on benzene air concentrations were evaluated in the Midlothian health consultation on volatile organic compounds [ATSDR 2015b] found concentrations similar to other urban environments and was more closely related to proximity to major highways. A study in Texas found that mothers living in census tracts with the highest air concentrations of benzene were more likely to have children with *spina bifida* than women living in census tracts with the lowest levels [Lupo 2011]. The authors did not find an association with benzene and other neural tube defects.

Texas Birth Defects Registry

TBDES maintains the Texas Birth Defects Registry (Registry) which was established as part of the Texas Birth Defects Act of 1993 to identify and describe the patterns of birth defects in Texas. TBDES is a member of the National Birth Defects Prevention Network (NBDPN), an organization focused on birth defects surveillance, research, and prevention. The network provides guidelines (http://www.nbdpn.org/birth_defects_surveillance_gui.php) for conducting birth defects surveillance and issues an annual congenital malformation surveillance report from data provided by network members (www.nbdpn.org).

Since 1997, TBDES has conducted surveillance for birth defects in Texas Public Health Region 3, which includes Midlothian and Ellis County. Because the Registry did not have complete

statewide coverage until 1999, comparison of rates with the entire state cannot accurately be made prior to 1999.

To be included in the Texas Birth Defects Registry, all of the following criteria must be met:

- The mother's residence at the time of delivery must be in an area covered by the Registry. Since 1999, the Registry has covered the entire state of Texas.
- The infant or fetus must have a birth defect monitored by the Registry.
- The defect must be diagnosed prenatally or within one year after delivery. This is extended to six years of age for special cases, currently only for fetal alcohol syndrome.

The current Registry case definition includes all pregnancy outcomes (live births, spontaneous fetal deaths, and induced pregnancy terminations) at all lengths of gestation. Prior to April 5, 2001, when the current case definition was adopted, the Registry did not collect information on birth defects among fetal deaths before 20 weeks gestation. Data had already been collected for over 90% of the Registry cases delivered during 1999 and over a third of the cases delivered during 2000 at the time this case definition went into effect. As a result, the 1999 and 2000 data in the Registry include only a very small number of fetal deaths before 20 weeks gestation.

For the Registry, TBDES conducts active surveillance at delivery hospitals, pediatric and tertiary care hospitals, midwifery facilities, and other birthing centers. Trained TBDES staff members review log books, discharge lists and other records in order to identify potential cases of birth defects in infants and fetuses. Potential cases that are reviewed for possible inclusion in the Registry are any chart with ICD-9-CM (International Classification of Diseases, Ninth Revision, Clinical Modification) codes 740-759 and certain other codes, certain medical conditions, infants delivered before 34 weeks gestation, all stillborn infants, and certain induced pregnancy terminations. The medical records for these potential cases are requested and reviewed. If the Registry case definition is met, relevant demographic and diagnostic information is abstracted from the medical records. Maternal information gathered includes illnesses/conditions, prenatal care, pregnancy/delivery complications, risk factors, family history of birth defects, and maternal residence at the time of delivery. Birth defects are coded using 6-digit birth defect codes, commonly called BPA codes; these codes are based on the British Pediatric Association (BPA) Classification of Diseases (1979) and the ICD-9-CM (1979). The cases are then matched to vital records for additional demographic data. Linkage to vital records has allowed for geographic coding of the location of maternal residence at the time of delivery.

Quality control procedures for finding cases, abstracting information, and coding defects are in place to ensure completeness and accuracy of the Registry. However, since the Registry is created using data abstracted from medical records, discrepancies may occur because of charting errors, diagnostic errors, variations in diagnosis, and omissions of terminations performed in non-accessed facilities. This may result in either over or under reporting of conditions and rates. Some children have birth defects with subtle physical findings that may not be recognized in the first year of life unless they were detected by prenatal procedures such as amniocentesis. For example, *Trisomy 23* (Klinefelter's syndrome – 47, XXY or Triple X syndrome – 47, XXX) is typically not detected by physical findings until puberty, if at all, and would be an under reported birth defect. The Registry includes some conditions that may be either acquired or congenital

(for example, *plagiocephaly*, in which one side or the back of the head is flattened), which may result in over reporting of rates of those birth defects.

While all major structural birth defects and *fetal alcohol syndrome* are monitored by TBDES, only 48 standard birth defects categories are typically currently included in Texas Birth Defects Registry reports. This reporting is similar to NBDPN guidelines. The number of children with birth defects differs from the total number of birth defects because some children are born with multiple birth defects. Children with Down syndrome (Trisomy 21), for example, have numerous craniofacial abnormalities including *microtia* (small ears) and frequently have cardiac septal defects, gastrointestinal defects (*Hirschsprung disease*, intestinal *atresia* (absence/loss of a section of the intestine)) and *cryptorchidism* (undescended testes).

Previous Birth Defects Cluster Investigations in the Midlothian Area

Four cluster investigations were identified that DSHS (formerly Texas Department of Health) performed on the prevalence of birth defects in Ellis County (<http://www.dshs.state.tx.us/birthdefects/ClusterPage/BDclusters.shtm>). These possible birth defects clusters were brought to the attention of TBDES (formerly Texas Birth Defects Monitoring Division) by concerned parents and community members. A cluster is defined as a higher than expected number of children with birth defects in a defined time period and geographic area.

Cluster investigation requests to TBDES proceed in a stepwise process which determines the extent of the evaluation. One of the Ellis County investigations, which concerned *anencephaly* (Cluster Investigation Number 2002.03), was closed after initial contact and response because only two cases were identified and at least three or more cases are needed to continue an investigation. One cluster investigation (Number 1998.02), reached the preliminary evaluation stage. The two other cluster investigations (Numbers 1995.04 and 2005.04) proceeded to the case finding and case verification stage. Cluster Investigation Number 1995.04 continued to the etiological investigation stage. These latter three cluster investigations are described below by chronological order.

In 1996, TBDES issued a report titled “Down syndrome Cluster in Three Texas Counties, 1992-1994” [DSHS 1996]. In that report, cases of Down syndrome in children born between 1992 and 1994 to mothers residing in Ellis County (Cluster Investigation Number 1995.04) and nearby Hood and Somervell Counties (Cluster Investigation Number 1994.05) (Figure B.3.2) were evaluated both separately and combined. Neighboring Johnson County was evaluated, but since their rates were slightly lower than expected, Johnson County was not included in the consolidated investigation. Because the Texas Birth Defects Registry was not available for this time period, case ascertainment involved the initial reported cases, review of vital records, self-reports, media reports, and reports from the Early Childhood Intervention program. Because of demographic similarities, California’s Down syndrome rates were used for comparison since Texas statewide data were not available at that time.

TBDES performed face to face interviews of case mothers of the children who were born between 1992 and 1994 and diagnosed with Down syndrome in an effort to identify risk factors associated with the cluster. They administered a questionnaire that included occupational and

environmental sections and Down syndrome risk factors that were ascertained from the scientific literature. Twelve cases were identified in Ellis County, primarily in the northeast quadrant of the county. After adjusting for maternal age, rates in Ellis County were 3 times higher than expected and this was statistically significant at the 95% confidence level. No common pattern of exposure to radiation or proximity to industries, cultivated land, and hazardous waste sites was found to help explain the elevated rates.

As a follow-up to this report on Down syndrome, TBDES evaluated the prevalence of Down syndrome in Ellis, Hood and Somervell Counties with Registry data from January 1997 through December 2001 [DSHS 2004]. The prevalence of Down syndrome was not statistically significantly elevated in any of these three counties during that time period.

Data from the first year the Registry began collecting data in Health Service Region 3 [DSHS 2001a] provided the information for the evaluation of Cluster Investigation Number 1998.02 [DSHS 2001b]. This investigation compared rates of 50 different birth defects among 1997 deliveries to residents of Ellis, Dallas, Johnson, Kaufman, Navarro, and Tarrant Counties (Figure B.3.2.) to rates for the Texas Birth Defects Registry overall in 1997. Based on a single year of data, with the exception of two birth defects (*microcephaly* and obstructive genitourinary defect) in Dallas County, none of the remaining 50 birth defects examined in these counties had a rate that was statistically significantly higher than the rate for the Registry overall in 1997.

In 2005, TBDES performed a cluster investigation (Number 2005.04) of birth defects in Midlothian, Venus, and Cedar Hill, Texas [DSHS 2005a] (Figure B.3.1). These communities were selected because of the requestor's concerns about the possible relationship between pollution from cement kilns in or near these communities and birth defects. The Registry was searched to identify cases delivered between 1997 and 2001 to mothers residing in these three communities. Prevalence rates for 48 types of birth defects and any birth defect monitored by the Registry for each community were calculated separately and were compared to the prevalence rates for Texas during 1999-2001 (as noted earlier, 1999 was the first year of complete statewide birth defects registry coverage). Prevalence rates were considered statistically significantly different if their 95% confidence intervals did not overlap. Any statistically significant unadjusted prevalence was adjusted for maternal age, maternal race/ethnicity, and sex of the infant.

During 1997-2001, neither Venus nor Cedar Hill had any birth defects examined that were statistically significantly higher than the statewide prevalence in 1999-2001. However, the unadjusted prevalence for 'any monitored birth defect' and for 'hypospadias or *epispadias*' were elevated in Midlothian. After adjusting for maternal race/ethnicity, the prevalence of 'any monitored birth defect' decreased and was no longer statistically significantly different indicating that differences in race/ethnic distribution of women having children in Midlothian and in Texas overall could have been responsible for the unadjusted elevation observed. The prevalence of 'any monitored birth defect' is higher in non-Hispanic white women and Midlothian is predominantly a non-Hispanic, white community (see Demographics, Section 2.2).

TBDES calculated adjusted rates for 'hypospadias or *epispadias*' and determined that none of the three factors (maternal age, maternal race/ethnicity, or infant sex) could explain the difference in

rates between Midlothian and state of Texas. The rates were all statistically significantly higher than the statewide rates. Unadjusted prevalence was approximately 102 cases per 10,000 live births, a rate 3.5 times the unadjusted state prevalence. Closer examination of maternal age found that the prevalence of ‘hypospadias or epispadias’ in children delivered to mothers who were less than 20 years of age in Midlothian (based on 3 cases) was statistically significantly higher than the entire state. Since the total number of cases in this time period was small (12 cases), all confidence intervals for these sub-analyses were broad and imprecise. The distribution of cases based on the date of conception did not suggest any clustering in time. As described in the report, a spot map of the 12 cases did not show any evidence of geographic clustering within Midlothian. Seven of the residences were within city limits and five were outside city limits.

As an addendum to the cluster investigation report, TBDES provided a literature review of risk factors for hypospadias. TBDES reported that while hypospadias had some association with pharmaceutical chemicals, several authors found there was no strong evidence associating the defect to polychlorinated biphenyls (PCBs), dioxins, phthalates, or organochlorine pesticides (example, DDT). TBDES also found that according to several authors, hypospadias rates were also not influenced by residence in proximity to a variety of industries and hazardous waste sites. TBDES plans to re-examine the occurrence of hypospadias and epispadias among Midlothian resident deliveries in subsequent Registry years.

Update on Birth Defects Prevalence in Midlothian

For this HOD health consultation, TBDES provided the number of cases and prevalence for a comprehensive range of birth defects categories covering the entire range of defects monitored, plus a category for infants and fetuses with any monitored birth defects. Data were obtained from births during 1999 (the first year the Birth Defects Registry was statewide) through 2008 (the last year of cleaned complete data available at the time of the request). To accomplish this, the usual 6-digit birth defect codes, excluding conditional inclusion codes, were consolidated to the first four digits for these analyses (referred to as BPA4 codes in this document). (Note: exceptions were spina bifida (consolidated to the first three digits), cleft lip with or without cleft palate (two 4-digit codes were combined) and *omphalocele* and *gastroschisis* (five digits are required to differentiate these conditions)). This resulted in 185 birth defects with 1 or more cases found in Texas during the specified time period, plus the category for cases with any monitored birth defects.

TBDES was requested to use geocoded data corresponding to the potential area of impact (AOI) around the four facilities of concern in Midlothian that was determined by air contaminant dispersion modeling analysis described in the first health consultation [ATSDR 2015a] that addressed Midlothian area air quality (Appendix B, Figure B.3.1). For comparison populations, birth defects prevalence and number of cases among residents of the city of Midlothian, Ellis County, Public Health Service Region 3, and the state of Texas were requested for the same birth defect categories (Appendix B, Figure B.2.1).

In this section, a case is an infant or fetus with the specified birth defect. For the potential area of impact in 1999-2008, there were 120 infants/fetuses with any monitored congenital anomaly (birth defect) (Table 4.1.1). Several of the 185 birth defect categories had no cases, especially in the smaller geographic areas. For example, in the potential area of impact, 119 of the birth defect

categories had no cases found. For the remaining 66 birth defects categories with any cases found in the potential area of impact, 49 of the categories had between 1 and 4 cases. The average number of birth defects per case ranged from 2.1 to 2.3.

Table 4.1.1. Number of birth defects categories with number of cases, total number of birth defects and total cases, and average (mean) number of birth defects per case for the potential area of impact (AOI), Midlothian, Ellis County, Public Health Region 3, and Texas, 1999-2008. Data Source: DSHS TBDES.

Geographic area	Number of birth defects categories with number of cases			Total number of birth defects	Total cases [†]	Average number of birth defects per case
	Zero cases	5 or more cases	Any cases			
Potential AOI	119	17	66	248	120	2.1
Midlothian	104	20	81	339	163	2.1
Ellis County	45	84	140	2,211	1,003	2.2
Public Health Region 3	3	167	182	110,071	50,589	2.2
Texas	0	178	185	348,732	153,039	2.3

[†]Total cases are the number of infants and fetuses with any monitored congenital anomaly.

For the first level of analysis, TBDES provided data on the number of cases and calculated the crude birth prevalence (cases per 10,000 live births) by BPA4 code for birth defects. These prevalence rates were not adjusted for maternal age and race. The number of cases and prevalence for the 185 BPA4 codes for all geographic areas can be found in Appendix A, Tables A.4.1.a to A.4.1.e. A comparison of the five geographic regions for the 17 birth defects in the potential area of impact that had 5 or more cases during the ten year period and any monitored congenital anomaly can be found in Appendix A, Table A.4.1.f.

While crude rates are sometimes not adjusted for maternal race/ethnicity and age unless there are statistically significant findings, for this health consultation, TBDES provided birth defect prevalence data adjusted for maternal age and race/ethnicity for four of the five geographic regions for the 17 birth defects that had 5 or more cases in the potential area of impact and any monitored congenital anomaly for the period 1999-2008. Birth defect prevalence data for the potential area of impact, city of Midlothian, Ellis County, and Public Health Region 3 were directly standardized to the maternal race/ethnic-and-age-group distribution of all Texas resident live births during 1999-2008.

Because these adjusted prevalence rates were all directly standardized to the state of Texas resident live birth distribution during 1999-2008, the adjusted rates can be compared to the crude prevalence rates for the state of Texas, 1999-2008, and the adjusted rates can also be compared to each other. For both the crude and adjusted prevalence, the technique of non-overlapping confidence intervals was used to determine statistical significance. A comparison of the adjusted prevalence rates for these conditions for the four regions along with the state of Texas prevalence can be found in Appendix A, Table A.4.1.g. The crude and adjusted prevalence for the potential area of impact, Midlothian, Ellis County and Public Health Region 3 as compared to the crude or unadjusted prevalence for Texas for these conditions can be found in Appendix A, Tables A.4.1.h through A.4.1.k, respectively.

For the next level of analysis presented in this birth defects section, TBDES calculated crude prevalence ratios (CPR) to determine the relative occurrence of birth defects in an area compared to another area. CPRs were calculated for birth defects with one or greater cases for nine pairings: the potential area of impact as compared to the remainder of Ellis County, Public Health Region 3, and the state of Texas; the city of Midlothian as compared to the remainder of Ellis County, Public Health Region 3, and the state of Texas; Ellis County as compared to the remainder of Public Health Region 3 and the state of Texas; and Public Health Region 3 as compared to the remainder of Texas. The CPR was calculated by dividing the crude prevalence in the smaller geographic area by the crude prevalence in the larger geographic area determined after the cases and live births in the smaller area were removed from the larger area. These 9 analyses used the number of cases and live births for the period 1999-2008 and there was no adjustment made for maternal age and race.

As will be discussed in the next sub-section on “any monitored birth defect”, the analysis found that the crude prevalence of any monitored congenital anomaly in the potential area of impact, Midlothian, Ellis County, and Public Health Region 3 were not statistically significantly different from each other, but all were significantly different as compared to the remainder of Texas. Because of the disparity between the crude prevalence in Public Health Region 3 as compared to the remainder of Texas (the remaining 10 public health regions) and because over 25% of the live births in the state occurred in Public Health Region 3, Public Health Region 3 was used as the basis of comparison to evaluate the crude prevalence ratios for birth defects with one or more cases found. The crude prevalence ratios for the potential area of impact, city of Midlothian and Ellis County as compared to their respective remainder of cases in Public Health Region 3 were examined (Appendix A, Tables A.4.1.l, A.4.1.m, and A.4.1.n, respectively) for all birth defect codes with one or more cases.

Regardless of whether or not the CPR was statistically significant, TBDES was requested to provide maternal age (categorized as <20, 20-24, 25-29, 30-34, 35-39, and 40+ years of age) and race/ethnicity (white non-Hispanic, black non-Hispanic, Hispanic, and other non-Hispanic) adjusted prevalence ratios (APR) for the potential area of impact, the city of Midlothian, and Ellis County compared to their respective remainder of cases in Public Health Region 3 (Appendix A, Tables A.4.1.o, A.4.1.p, and A.4.1.q, respectively). APRs were calculated for all birth defect codes with one or more cases reported using demographic information from Public Health Region 3 for the period 1999-2008.

TBDES also calculated crude and adjusted prevalence ratios for the potential area of impact and city of Midlothian as compared to their respective remainder of cases in Ellis County for all birth defect codes with one or more cases (Appendix A, Tables A.4.1.r through A.4.1.u). Because of the small number of cases in these comparison pairings, TBDES could only calculate APRs for six birth defects and for any monitored congenital anomaly in either the potential area of impact or Midlothian as compared to the remainder of Ellis County.

As explained in Section 3, a prevalence ratio greater than 1.00 indicates a higher prevalence of birth defects as compared to the remaining area and a prevalence ratio lower than 1.00 indicates a lower prevalence of birth defects as compared to the remaining area. Ratios based on fewer cases are more influenced by chance. TBDES used Poisson regression to generate prevalence

ratios, 95% CIs for the prevalence ratios, and the p-values. If the confidence interval for the prevalence ratio excludes 1.00, a statistical significance is indicated. A p-value of less than 0.05, corresponding to a 95% confidence interval that excludes 1.00, was selected to indicate whether the prevalence ratio was statistically significant or not in these analyses.

Any monitored birth defect

The total cases and the crude and adjusted prevalence rates for total cases of birth defects in each geographic area were determined by using the category, any monitored congenital anomaly (birth defect). The crude and adjusted prevalence rates of infants and fetuses with any monitored congenital anomaly per 10,000 live births can be found in Table 4.1.2. By using the technique of non-overlapping confidence intervals, the crude prevalence was significantly higher in all geographic areas as compared to Texas and the adjusted prevalence of all birth defects was not significantly higher in the potential area of impact and Midlothian as compared to the state.

Table 4.1.2. Total cases (infants and fetuses with any monitored congenital anomaly), total live births, crude prevalence and maternal age and race adjusted[†] prevalence of birth defects per 10,000 live births with 95% confidence intervals (CI) for Midlothian potential area of impact (AOI), city of Midlothian, Ellis County, Public Health Region 3, and Texas, 1999-2008. Data Source: DSHS TBDES.

Geographic area	Total Cases [†]	Total Live Births	Crude Prevalence (per 10,000 live births)		Adjusted [‡] Prevalence (per 10,000 live births)	
			Rate	95% CI	Rate	95% CI
Potential AOI	120	2,112	568.2*	466.5-669.8	497.7	361.7 - 633.7
Midlothian	163	3,045	535.3*	453.1-617.5	482.4	369.2 - 595.7
Ellis County	1,003	19,715	508.8*	477.3-540.2	486.6*	452.9 - 520.3
Public Health Region 3	50,589	1,024,522	493.8*	489.5-498.1	492.9*	488.6 - 497.3
Texas	153,039	3,806,299	402.1	400.1-404.1		

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals.

† Total cases are the number of infants and fetuses with any monitored congenital anomaly.

‡ Directly standardized to the maternal race/ethnic-and-age-group distribution of all Texas resident live births during 1999-2008.

The crude prevalence ratio (CPR) analyses for the 9 comparison pairings for infants and fetuses with any monitored congenital anomaly are presented in Table 4.1.3. This analysis found that the prevalence of infants and fetuses with birth defects was significantly higher (p value < 0.05) in the potential area of impact, Midlothian, Ellis County, and Public Health Region 3 as compared to the remainder of the state. The analysis also found that the crude prevalence of any monitored congenital anomaly in the potential area of impact, Midlothian, Ellis County, and Public Health Region 3 were not statistically significantly different from each other. Adjusted prevalence ratios for any monitored congenital anomaly for the potential area of impact, Midlothian, and Ellis County as compared to Public Health Region 3 were not significant (Appendix A, Tables A.4.1.o through A.4.1.q).

Table 4.1.3. Total birth defects cases (infants and fetuses with any monitored congenital anomaly), total live births, crude prevalence of birth defects per 10,000 live births and crude prevalence ratios with 95% confidence intervals (CI) and p-values for Midlothian potential area of impact (AOI), city of Midlothian, Ellis County, Public Health Region 3, and Texas, as compared to each other, 1999-2008. Data Source: DSHS TBDES

Any monitored congenital anomaly	Cases	Live Births	Crude Prevalence per 10,000 live births		Crude Prevalence Ratio		
			Rate	95% CI	Ratio	95% CI	p-value
Potential AOI compared to rest of:	120	2,112	568.18	466.52-669.84			
Ellis County	792	15,757	502.63	467.63-537.64	1.13	0.93-1.36	0.2177
Public Health Region 3	49,661	1,005,650	493.82	489.48-498.16	1.15	0.96-1.37	0.1337
Texas	152,111	3,787,427	401.62	399.60-403.64	1.41*	1.18-1.68	0.0003
Midlothian compared to rest of:	163	3,045	535.30	453.12-617.48			
Ellis County	840	16,672	503.84	469.77-537.91	1.06	0.90-1.25	0.4821
Public Health Region 3	50,426	1,021,477	493.66	489.35-497.97	1.08	0.93-1.26	0.3083
Texas	152,876	3,803,254	401.96	399.95-403.98	1.33*	1.14-1.55	0.0005
Ellis County compared to rest of:	1,003	19,715	508.75	477.26-540.24			
Public Health Region 3	49,586	1,004,807	493.49	489.14-497.83	1.03	0.97-1.10	0.3419
Texas	152,036	3,786,584	401.51	399.49-403.53	1.27*	1.19-1.35	<.0001
PHR 3 compared to rest of:	50,589	1,024,522	493.78	489.48-498.08			
Texas	102,450	2,781,777	368.29	366.03-370.54	1.34*	1.33-1.36	<.0001

* Significant at an alpha level of 0.05, as determined by Poisson regression analysis.

Birth defects with 5 or more cases in the potential area of impact

The 17 birth defects categories that had 5 or more cases reported in the potential area of impact were evaluated for statistical significance. Of these 17 conditions, two were significantly lower, five were significantly higher and ten were not found to be significantly different as compared to rates in Texas.

Two of the 17 conditions with 5 or more cases in the potential area of impact were found to have significantly lower maternal age and race adjusted prevalence when compared to Texas prevalence and Public Health Region 3 adjusted prevalence (Table 4.1.4):

- Ostium secundum type atrial septal defect (745.5): is one of the most common types of atrial septal defects (ASD). In this congenital heart defect, there is an opening between the left and right atria (upper chambers) of the heart which allows shunting of blood. The causes of ASDs are unknown, but believed to have some hereditary factors since an infant is slightly more likely to have an ASD if their parents have an ASD. About half the infants with Down syndrome will have some type of congenital heart defect. Smoking during pregnancy has been linked to septal defects.
- Patent ductus arteriosus (PDA) (747.0): is a congenital heart defect in which a fetal blood vessel (the ductus arteriosus) between the aorta and pulmonary artery fails to close (remains patent) within a few days after birth. This prevents normal circulation in the newborn because it allows for mixing of oxygen-rich and oxygen-poor blood. PDA is more common in premature births. The cause of PDA is unknown but believed to include some hereditary factors. Infants with Down syndrome and children born to mothers who had German measles during pregnancy are more likely to have PDA.

The adjusted prevalence for ostium secundum type ASD (745.5) was statistically significantly lower in the city of Midlothian compared to both the Texas prevalence and the Public Health Region 3 adjusted prevalence. The adjusted prevalence for PDA (747.0) was significantly lower in both the potential area of impact and Midlothian when compared to the Texas prevalence and when compared to the adjusted prevalence in Ellis County and Public Health Region 3. The adjusted prevalences for both of these conditions in the impact area and in Midlothian are markedly different than their respective crude prevalences. This suggests that maternal age and race/ethnicity are confounders for the observed higher crude prevalence of these conditions and it is appropriate to evaluate these conditions using the adjusted rates.

TBDES calculated the crude and adjusted prevalence ratios for the potential area of impact, the city of Midlothian, and Ellis County as compared to the remainder of Public Health Region 3 and for the potential area of impact and the city of Midlothian as compared to the remainder of Ellis County. None of the crude and adjusted prevalence ratios calculated for these two congenital heart conditions were statistically significant (Appendix A, Tables A.4.1.o through A.4.1.q and A.4.1.t and A.4.1.u).

Table 4.1.4. Birth defects with significantly lower adjusted prevalence in potential area of impact or Midlothian as compared to Texas with total cases, crude and maternal age and race adjusted[†] prevalence per 10,000 live births for potential area of impact, Midlothian, Ellis County, and Public Health Region 3 with 95% confidence intervals (CI) and crude prevalence for Texas, 1999-2008. Data Source: DSHS TBDES.

Birth Defect	Total Cases	Crude Prevalence (per 10,000 live births)		Adjusted [†] Prevalence (per 10,000 live births)	
		Rate	95% CI	Rate	95% CI
745.5 Ostium secundum type atrial septal defect					
Potential Area of Impact	18	85.23	50.51-134.7	64.9	25.02 - 104.85
Midlothian	25	82.10	53.13-121.2	54.9***	25.91 - 83.95
Ellis County	172	87.24	74.20-100.28	83.9	70.13 - 97.61
Public Health Region 3	10,073	98.32	96.40-100.24	97.2	95.22 - 99.11
Texas	36,510	95.92	94.94-96.90		
747.0 Patent ductus arteriosus (PDA)					
Potential Area of Impact	10	47.35	22.71-87.08	22.2***§	8.35 - 35.98
Midlothian	12	39.41	20.36-68.84	17.9***§	7.74 - 28.09
Ellis County	103	52.24	42.15-62.33	52.9	41.77 - 64.13
Public Health Region 3	5,188	50.64	49.26-52.02	49.9	48.52 - 51.32
Texas	18,908	49.68	48.97-50.38		

[†] Directly standardized to the maternal race/ethnic-and-age-group distribution of all Texas resident live births during 1999-2008.

** Significantly lower than Texas prevalence based on non-overlapping confidence intervals.

‡ Significantly lower than Public Health Region 3 adjusted prevalence based on non-overlapping confidence intervals.

§ Significantly lower than Ellis County adjusted prevalence based on non-overlapping confidence intervals.

Five of the 17 birth defect categories examined had a statistically significantly higher crude prevalence in the potential area of impact and city of Midlothian as compared to the crude prevalence in Texas (Table 4.1.5). These conditions and their BPA4 codes are:

- Other specified anomalies of the ear (744.2): includes the conditions such as microtia (an abnormally small external ear), macrotia (unusually large external ears), misshapen ears (for example, bat-like, elfin, or cauliflower ears) and displaced ears (for example, low-set or rotated). These external ear anomalies can occur either as an isolated finding or may be

associated with a syndrome. Microtia is typically one-sided, occurs more often in boys, and is usually an isolated finding. While there are some links to certain acne medications, the cause of microtia is considered unknown but believed to result from decreased blood flow which prevents normal development.

- Congenital hypertrophic pyloric stenosis (750.5): is a birth defect in which there is thickening of the muscles of the valve that controls the emptying of the stomach into the small intestine. While the cause is unknown, it believed to be inherited since it is more common in children and siblings born to parents who had this condition. It is more common in boys than in girls.
- Hypospadias, epispadias, and congenital chordee (752.6): includes three different birth defects. Hypospadias is a congenital defect in which the urinary outlet is on the underside of the penis; epispadias is a very rare congenital defect in which the urinary outlet is on the upper aspect of the penis; and congenital chordee is a condition in which there is a curvature or bowing of the penis, usually in a downward direction. Congenital chordee often occurs with hypospadias. This birth defect code will be discussed in more detail in the next sub-section.
- Certain anomalies of skull, face, and jaw (754.0): applies to musculoskeletal deformities such as asymmetric or compressed face, Potter's facies (a facial characteristic indicative of a severe renal malformation), dolichocephaly (a long, narrow head) and plagiocephaly. Some of the conditions may be present in cases of certain syndromes and some may be acquired after birth.
- Other specified anomalies of muscle, tendon, and connective tissue (756.8): includes sub-codes for conditions that involve an absence of muscle and tendon, having an accessory muscle, Ehlers-Danlos syndrome (an inherited condition in which there is a defect in collagen) and congenital torticollis (a condition in which the infant's head is tilted). Torticollis often co-occurs with plagiocephaly (754.0).

With the exception of congenital hypertrophic pyloric stenosis (750.5), these birth defects were also found to be significantly higher in Ellis County and Public Health Region 3.

After adjusting for maternal age and race, none of these five conditions remained significantly higher within the potential area of impact compared to Texas. One condition (other specified anomalies of the ear (744.2)) remained significantly higher in Midlothian compared to the Texas prevalence (Table 4.1.5).

The loss of statistical significance with adjustment should be interpreted with caution for other specified anomalies of the ear (744.2) in the potential area of impact and for congenital hypertrophic pyloric stenosis (750.5) in the potential area of impact and in Midlothian, because the adjusted prevalences were similar to the crude prevalences. This would suggest that maternal age and race/ethnicity are not confounders for the observed higher crude prevalence of these conditions in the potential area of impact or Midlothian compared to Texas overall. In contrast, the adjusted prevalence for hypospadias, epispadias, and congenital chordee (752.6); certain anomalies of skull, face, and jaw (754.0); and other specified anomalies of muscle, tendon, and connective tissue (756.8) were markedly different than the crude prevalence, suggesting that it was appropriate to correct for maternal age and race/ethnicity when evaluating these birth defects.

Table 4.1.5. Birth defects with significantly higher crude prevalence in the potential area of impact or Midlothian as compared to Texas with total cases, crude and maternal age and race adjusted[†] prevalence per 10,000 live births for potential area of impact, Midlothian, Ellis County, and Public Health Region 3 with 95% confidence intervals (CI) and crude prevalence for Texas, 1999-2008. Data Source: DSHS TBDES

Birth Defect	Total Cases	Crude Prevalence (per 10,000 live births)		Adjusted [†] Prevalence (per 10,000 live births)	
		Rate	95% CI	Rate	95% CI
744.2 Other specified anomalies of ear					
Potential Area of Impact	12	56.82*	29.36-99.25	53.2	14.60 - 91.86
Midlothian	18	59.11*¶	35.03-93.42	68.2*	26.06 - 110.42
Ellis County	89	45.14*¶	36.25-55.55	40.8*	31.48 - 50.13
Public Health Region 3	3,444	33.62*	32.49-34.74	34.3*	33.13 - 35.48
Texas	8,900	23.38	22.90-23.87		
750.5 Congenital hypertrophic pyloric stenosis					
Potential Area of Impact	11	52.08*¶	26.00-93.19	52.2	4.35 - 100.12
Midlothian	12	39.41*¶	20.36-68.84	36.5	5.39 - 67.59
Ellis County	45	22.83	16.65-30.54	18.6	12.54 - 24.62
Public Health Region 3	1,867	18.22**	17.40-19.05	18.9	18.03 - 19.79
Texas	7,433	19.53	19.08-19.97		
752.6 Hypospadias, epispadias, and congenital chordee					
Potential Area of Impact	15	71.02*	39.75-117.14	59.5	2.00 - 116.97
Midlothian	24	78.82*¶	50.50-117.27	74.2	20.07 - 128.28
Ellis County	104	52.75*	42.61-62.89	44.2*	34.79 - 53.60
Public Health Region 3	4,279	41.77*	40.51-43.02	38.5*	37.29 - 39.65
Texas	12,745	33.48	32.90-34.07		
754.0 Certain anomalies of skull, face, and jaw					
Potential Area of Impact	20	94.70*	57.84-146.25	60.9	26.49 - 95.32
Midlothian	27	88.67*	58.43-129.01	62.2	31.65 - 92.83
Ellis County	162	82.17*	69.52-94.82	71.6*	58.92 - 84.33
Public Health Region 3	7,086	69.16*	67.55-70.77	71.8*	70.05 - 73.48
Texas	13,141	34.52	33.93-35.11		
756.8 Other spec anom of muscle, tendon, connective tissue					
Potential Area of Impact	10	47.35*	22.71-87.08	39.9	7.97 - 71.75
Midlothian	11	36.12*	18.03-64.64	27.4	6.60 - 48.12
Ellis County	72	36.52*¶	28.57-45.99	31.6*	23.55 - 39.66
Public Health Region 3	2,614	25.51*	24.54-26.49	25.6*	24.56 - 26.58
Texas	4,484	11.78	11.44-12.13		

[†] Directly standardized to the maternal race/ethnic-and-age-group distribution of all Texas resident live births during 1999-2008. -

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals. -

** Significantly lower than Texas prevalence based on non-overlapping confidence intervals. -

¶ Significantly higher than Public Health Region 3 crude prevalence based on non-overlapping confidence intervals. -

Using the crude prevalence of Public Health Region 3 as the comparison rate, the crude prevalence of congenital hypertrophic pyloric stenosis (750.5) was significantly higher in the potential area of impact and Midlothian than in Public Health Region 3. The crude prevalence of other specified anomalies of the ear (744.2) and hypospadias, epispadias, and congenital chordee (752.6) were also significantly higher in the city of Midlothian as compared to Public Health Region 3. There were no BPA4 codes that were significantly higher or lower for maternal age

and race adjusted prevalence rates for the potential area of impact and Midlothian as compared to the adjusted prevalence for Public Health Region 3 (Table 4.1.5).

There were a few statistically significant findings for the BPA4 birth defect codes with at least 5 cases in the potential area of impact, for the TBDES crude and adjusted prevalence ratio calculations (CPR and APR) for the potential area of impact and the city of Midlothian as compared to the remainder of Public Health Region 3 (Table 4.1.6). The CPR, but not the APR, for other specified anomalies of the ear (744.2) was statistically significant for Midlothian in relation to the remainder of Public Health Region 3. The CPR and the APR for congenital hypertrophic pyloric stenosis (750.5) were significantly higher in both the potential area of impact and Midlothian as compared to the remainder of Public Health Region 3.

Table 4.1.6. Number of cases, crude and adjusted prevalence ratios with 95% confidence intervals (CI) and p-values for Midlothian potential area of impact (AOI), city of Midlothian, and Ellis County, as compared to the remainder of Public Health Region 3, for BPA4 Code 744.2 (other specified anomalies of the ear) and 750.5 (congenital hypertrophic pyloric stenosis), 1999-2008. Data Source: DSHS TBDES.

Other specified anomalies of the ear (744.2)	Cases	Crude Prevalence Ratio compared to remainder of Public Health Region 3			Adjusted Prevalence Ratio compared to remainder of Public Health Region 3		
		Ratio	95% CI	p-value	Ratio	95% CI	p-value
Potential AOI	12	1.69	0.90 - 2.84	0.0955	1.67	0.59 - 3.60	0.2953
Remainder of PHR3	3,384						
Midlothian	18	1.76*	1.07 - 2.71	0.0283	1.72	0.87 - 3.01	0.1121
Remainder of PHR3	3,426						
Ellis County	89	1.35*	1.09 - 1.66	0.0074	1.36*	1.03 - 1.74	0.0295
Remainder of PHR3	3,355						
Congenital hypertrophic pyloric stenosis (750.5)	Cases	Crude Prevalence Ratio compared to remainder of Public Health Region 3			Adjusted Prevalence Ratio compared to remainder of Public Health Region 3		
		Ratio	95% CI	p-value	Ratio	95% CI	p-value
Potential AOI	11	2.87*	1.49 - 4.93	0.0029	2.41*	1.40 - 3.83	0.0027
Remainder of PHR3	1,824						
Midlothian	12	2.17*	1.16 - 3.65	0.0176	1.83*	1.10 - 2.83	0.0216
Remainder of PHR3	1,855						
Ellis County	45	1.26	0.92 - 1.67	0.1412	1.09	0.80 - 1.44	0.5621
Remainder of PHR3	1,822						

* Significant at an alpha level 0.05, as determined by Poisson regression analysis.

Other statistically significant findings in the prevalence ratio analyses include the CPR for hypospadias, epispadias, and congenital chordee (752.6) in Midlothian as compared to the remainder of Public Health Region 3 and the APR for Down syndrome in the potential area of impact and Ellis County as compared to the remainder of Public Health Region 3 (both are discussed in following sub-sections).

As stated previously, TBDES calculated CPRs and APRs for the potential area of impact, city of Midlothian and Ellis County as compared to their respective remainder of cases in Public Health Region 3 for all birth defect codes with one or more cases. Because a small number of cases increases the statistical uncertainty and can potentially compromise patient privacy, only BPA4 codes with 5 or more cases are discussed in the body of the report. The summary of statistically significant findings for these crude prevalence ratios is presented in Table 4.1.7. Appendix A, Tables A.4.1.1 through A.4.1.q presents the prevalence ratios that could be calculated.

Table 4.1.7. Number of crude prevalence ratios not significant or significantly higher or lower at $\alpha = 0.05$ for birth defect codes with any cases by instances of 1 to 4 cases or 5 or more cases for the Midlothian potential area of impact (AOI), city of Midlothian and Ellis County as compared to the respective remainder of Public Health Region 3, Texas, 1999-2008. Data Source: DSHS TBDES.

Geographic area	Number of categories of birth defects with number of cases		Significance of crude prevalence ratio at $\alpha=0.05$				
			Number of crude prevalence ratios				Not significant
	Zero cases	1 or more cases	with 1 - 4 cases significantly		with 5 or more cases significantly		
			higher	lower	higher	lower	
Potential AOI	119	66	4	0	1	0	61
Midlothian	104	81	5	1	3	0	72
Ellis County	45	140	3	1	8	1	127

TBDES calculated crude prevalence ratios for the potential area of impact and city of Midlothian as compared to their respective remainder of cases in Ellis County for all birth defect codes with one or more cases. The only BPA4 birth defect code with a statistically significant CPR that had at least 5 cases in the potential area of impact was congenital hypertrophic pyloric stenosis (750.5), which was significantly higher as compared to the remainder of Ellis County (CPR 2.83; 95% CI:1.35-5.50). Crude prevalence ratios for four other birth defects with fewer than five cases were also statistically significantly higher (Appendix A, Table A.4.1.r). There were eight statistically significant crude prevalence ratios for the city of Midlothian as compared to the remainder of Ellis County (Appendix A, Table A.4.1.s). One of these was significantly lower, the remainder was significantly higher. Hypospadias, epispadias, and congenital chordee (752.6) (discussed in the following sub-section) were the only birth defect category with a statistically significant finding that had at least 5 cases reported in Midlothian.

Because of the small number of cases in the groups being compared, TBDES could only calculate APRs for six birth defects and for any monitored congenital anomaly in either the potential area of impact or Midlothian with respect to the remainder of Ellis County (Appendix A, Table A.4.1.t and A.4.1.u, respectively). None of the adjusted prevalence ratios were statistically significant.

Hypospadias, Epispadias, and Congenital Chordee (BPA4 752.6)

Since the TBDES 2005 finding of a significantly higher than expected prevalence of hypospadias in Midlothian (Cluster Investigation Number 2005.04) [DSHS 2005a], community members have expressed concern about the occurrence of this birth defect. In that cluster investigation, the crude prevalence (102 cases per 10,000 live births) for ‘hypospadias or epispadias’ was elevated in Midlothian (1997-2001) as compared to the statewide prevalence (1999-2001). TBDES calculated adjusted rates for ‘hypospadias or epispadias’ and determined that none of the three factors (maternal age, maternal race/ethnicity, or infant sex) could explain the difference in rates between Midlothian and Texas. There were 12 cases in this five year period, seven within city limits and five outside the city limits.

For this health consultation, TBDES provided birth defects data for the ten-year period 1999-2008 for 185 birth defects, including BPA4 code 752.6—hypospadias, epispadias, and congenital chordee for the potential area of impact, Midlothian, Ellis County, Public Health Region 3, and Texas. Crude prevalence and maternal age and race adjusted prevalence for BPA4 code 752.6 for each of these geographic areas are provided in Table 4.1.8. Using the method of non-overlapping confidence intervals, the crude prevalence rates were found to be statistically significantly higher for all geographic areas as compared to the Texas rate. After adjusting for maternal age and race/ethnicity, the adjusted prevalence rates in Ellis County and Public Health Region 3 were statistically significantly higher than the state, while the adjusted prevalence rates in the potential area of impact and Midlothian were no longer statistically significant.

Table 4.1.8. Total number of cases, crude prevalence and maternal age and race adjusted[†] prevalence of birth defects per 10,000 live births with 95% confidence intervals (CI) for Midlothian potential area of impact, city of Midlothian, Ellis County, Public Health Region 3, and Texas for BPA4 752.6 (Hypospadias, epispadias, and congenital chordee), 1999-2008. Data Source: DSHS TBDES.

752.6 Hypospadias, epispadias, and congenital chordee	Total Cases	Crude Prevalence (per 10,000 live births)		Adjusted [†] Prevalence (per 10,000 live births)	
		Rate	95% CI	Rate	95% CI
Potential Area of Impact	15	71.02*	39.75-117.14	59.5	2.00 - 116.97
Midlothian	24	78.82*¶	50.50-117.27	74.2	20.07 - 128.28
Ellis County	104	52.75*	42.61-62.89	44.2*	34.79 - 53.60
Public Health Region 3	4,279	41.77*	40.51-43.02	38.5*	37.29 - 39.65
Texas	12,745	33.48	32.90-34.07		

[†] Directly standardized to the maternal race/ethnic-and-age-group distribution of all Texas resident live births during 1999-2008. -

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals. -

¶ Significantly higher than Public Health Region 3 crude prevalence based on non-overlapping confidence intervals. -

As described earlier, TBDES also provided crude prevalence ratios for hypospadias, epispadias, and congenital chordee (752.6) for the period 1999-2008. For completeness, a summary of all 9 comparison pairings, including the comparison of each geographic region with the respective remainder of Texas, are provided in Table 4.1.9. The crude prevalence ratios for the potential area of impact, Midlothian, Ellis County, and Public Health Region 3 were all significantly higher (p-value < 0.05) when the comparison prevalence rate was the remainder of the state of Texas. The crude prevalence ratios were not statistically significant (p-value ≥ 0.05) for the potential area of impact compared to the rest of Ellis County or the rest of Public Health Region

3. The crude prevalence ratios were statistically significantly higher (p-value < 0.05) for Midlothian compared to the rest of Ellis County or the rest of Public Health Region 3 and for Ellis County compared to the rest of Public Health Region 3.

Table 4.1.9. Number of cases, total live births, crude prevalence of birth defects per 10,000 live births and crude prevalence ratios with 95% confidence intervals (CI) and p-values for potential area of impact (AOI), city of Midlothian, Ellis County, Public Health Region 3, and Texas, as compared to each other for BPA4 code 752.6 (hypospadias, epispadias and congenital chordee), 1999-2008. Data Source: DSHS TBDES.

752.6 Hypospadias, epispadias, and congenital chordee	Cases	Live Births	Crude Prevalence per 10,000 live births		Crude Prevalence Ratio		
			Rate	95% CI	Ratio	95% CI	P-value
Potential AOI compared to rest of:	15	2,112	71.02	39.75-117.14			
Ellis County	81	15,757	51.41	40.82-63.89	1.38	0.77-2.32	0.2680
Public Health Region 3	4,205	1,005,650	41.81	40.55-43.08	1.70	0.98-2.71	0.0597
Texas	12,671	3,787,427	33.46	32.87-34.04	2.12*	1.22-3.39	0.0096
Midlothian compared to rest of:	24	3,045	78.82	50.50-117.27			
Ellis County	80	16,672	47.98	38.05-59.72	1.64*	1.02-2.55	0.0419
Public Health Region 3	4,255	1,021,477	41.66	40.40-42.91	1.89*	1.23-2.76	0.0048
Texas	12,721	3,803,254	33.45	32.87-34.03	2.36*	1.53-3.43	0.0002
Ellis County compared to rest of:	104	19,715	52.75	42.61-62.89			
Public Health Region 3	4,175	1,004,807	41.55	40.29-42.81	1.27*	1.04-1.53	0.0205
Texas	12,641	3,786,584	33.38	32.80-33.97	1.58*	1.29-1.91	<.0001
PHR 3 compared to rest of:	4,279	1,024,522	41.77	40.51-43.02			
Texas	8,466	2,781,777	30.43	29.79-31.08	1.37*	1.32-1.42	<.0001

* Significant at an alpha level 0.05, as determined by Poisson regression analysis.

Maternal age and race/ethnicity-adjusted prevalence ratios were calculated for the potential area of impact, city of Midlothian and Ellis County as compared to their respective remainder of cases in Public Health Region 3 for hypospadias, epispadias, and congenital chordee (752.6) for the period 1999-2008. None of these adjusted prevalence ratios were statistically significant (p-value ≥ 0.05) (Table 4.1.10). TBDES was unable to calculate APRs for the potential area of impact and city of Midlothian as compared to the remainder of Ellis County.

The addendum to the TBDES cluster investigation (Number 2005.04) report [DSHS 2005a], TBDES provided a literature review of risk factors for hypospadias. TBDES did not find articles that supported a relationship between numerous chemicals or proximity to industrial or hazardous waste sites and the occurrence of hypospadias. The birth defect registry data presented for crude prevalence rates, adjusted prevalence rates, crude prevalence ratios, and adjusted prevalence ratios in the analyses for this health consultation do not allow for conclusions to be made for any causal relations between the occurrence of hypospadias, epispadias, and congenital chordee and exposures to airborne contaminants in the potential area of impact in Midlothian.

Table 4.1.10. Number of cases, crude and adjusted prevalence ratios with 95% confidence intervals (CI) and p-values for Midlothian potential area of impact (AOI), city of Midlothian, and Ellis County, as compared to the remainder of Public Health Region 3, for BPA4 Code 752.6 (hypospadias, epispadias, and congenital chordee), 1999-2008. Data Source: DSHS TBDES

Hypospadias, epispadias, and congenital chordee (752.6)	Cases	Crude Prevalence Ratio compared to remainder of Public Health Region 3			Adjusted Prevalence Ratio compared to remainder of Public Health Region 3		
		Ratio	95% CI	p-value	Ratio	95% CI	p-value
Potential AOI	15	1.70	0.98-2.71	0.0597	1.40	0.81-2.23	0.2120
Remainder of PHR3	4,205						
Midlothian	24	1.89*	1.23-2.76	0.0048	1.56	0.99-2.33	0.0567
Remainder of PHR3	4,255						
Ellis County	104	1.27*	1.04-1.53	0.0205	1.19	0.98-1.42	0.0728
Remainder of PHR3	4,175						

* Significant at an alpha level 0.05, as determined by Poisson regression analysis.

Down syndrome (BPA4 758.0)

The prevalence of children born with Down syndrome has been raised as a concern by residents in Midlothian. As reported earlier in this section, TBDES performed a cluster investigation (Cluster Investigation Number 1995.04) for cases of Down syndrome in children born between 1992 and 1994 to mothers residing in Ellis County [DSHS 1996]. Using self-reports, media reports and other sources of information, twelve cases were identified in Ellis County, primarily in the northeast quadrant of the county. TBDES, formerly Texas Birth Defects Monitoring Division, performed face to face interviews in an effort to identify the cause of the cluster. After controlling for maternal age and using California Down syndrome rates for comparison, the rate in Ellis County was found to be three times what was expected. No consistent environmental cause was suggested from the questionnaire responses.

A follow-up evaluation of the prevalence of Down syndrome in Ellis County using birth defect registry data from 1997-2001 found that the prevalence was not significantly elevated [DSHS 2004]. In the 2005 TBDES cluster investigation (Number 2005.04) of birth defects in Midlothian, Venus, and Cedar Hill, Texas [DSHS 2005a], Down syndrome was one of the 48 types of birth defects evaluated in the investigation. The prevalence rate for Down syndrome from 1997 to 2001 in Midlothian (25.60 cases per 10,000 live births, 95% CI: 5.28-74.81) and the other two communities were not statistically significantly different than the statewide prevalence in 1999-2001.

For this health consultation, TBDES provided data on Down syndrome (BPA4 Code 758.0) for the ten-year period 1999-2008 for the potential area of impact, Midlothian, Ellis County, Public Health Region 3, and Texas. Crude prevalence and maternal age and race adjusted prevalence for Down syndrome for each of these geographic areas are provided in Table 4.1.11. Using the method of non-overlapping confidence intervals, the crude prevalence and adjusted prevalence rates for Down syndrome were found to be statistically significantly higher for Public Health Region 3 as compared to Texas. The crude prevalence and adjusted prevalence rates were not

found to be statistically significantly different for the potential area of impact, Midlothian, and Ellis County as compared to Texas.

Table 4.1.11. Total number of cases, crude prevalence and maternal age and race adjusted[†] prevalence of birth defects per 10,000 live births with 95% confidence intervals (CI) for Midlothian potential area of impact, city of Midlothian, Ellis County, Public Health Region 3, and Texas, for BPA4 758.0 (Down syndrome), 1999-2008. Data Source: DSHS TBDES

758.0 Down syndrome	Total Cases	Crude Prevalence (per 10,000 live births)		Adjusted [†] Prevalence (per 10,000 live births)	
		Rate	95% CI	Rate	95% CI
Potential Area of Impact	6	28.41	10.43-61.83	23.1	0.00 - 47.17
Midlothian	7	22.99	9.24-47.37	16.9	0.73 - 33.06
Ellis County	36	18.26	12.79-25.28	19.3	12.43 - 26.16
Public Health Region 3	1,510	14.74*	14.00-15.48	14.5*	13.74 - 15.26
Texas	4,945	12.99	12.63-13.35		

[†] Directly standardized to the maternal race/ethnic-and-age-group distribution of all Texas resident live births during 1999-2008.

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals.

Crude prevalence ratios for Down syndrome (758.0) for the period 1999-2008 were also provided by TBDES. For completeness, a summary of all 9 comparison pairings, including the comparison of each geographic region with the respective remainder of Texas, are provided in Table 4.1.12. With the exception of the crude prevalence ratio for Public Health Region 3 as compared to the rest of Texas, all other crude prevalence ratio analyses for the potential area of impact, Midlothian, and Ellis County as compared to the remainder of the different geographic areas were not statistically significantly different (p-value ≥ 0.05).

Table 4.1.12. Number of cases, total live births, crude prevalence of birth defects per 10,000 live births and crude prevalence ratios with 95% confidence intervals (CI) and p-values for Midlothian potential area of impact (AOI), city of Midlothian, Ellis County, Public Health Region 3, and Texas, as compared to each other for BPA4 code 758.0 (Down syndrome), 1999-2008. Data Source: DSHS TBDES

758.0 Down syndrome	Cases	Live Births	Crude Prevalence per 10,000 live births		Crude Prevalence Ratio		
			Rate	95% CI	Ratio	95% CI	p-value
Potential AOI compared to rest of:	6	2,112	28.41	10.43-61.83			
Ellis County	30	15,757	19.04	12.85-27.18	1.49	0.56-3.34	0.3923
Public Health Region 3	1,483	1,005,650	14.75	14.00-15.50	1.93	0.76-3.91	0.1481
Texas	4,918	3,787,427	12.99	12.62-13.35	2.19	0.87-4.44	0.0898
Midlothian compared to rest of:	7	3,045	22.99	9.24-47.37			
Ellis County	29	16,672	17.39	11.65-24.98	1.32	0.53-2.85	0.5201
Public Health Region 3	1,503	1,021,477	14.71	13.97-15.46	1.56	0.67-3.03	0.2727
Texas	4,938	3,803,254	12.98	12.62-13.35	1.77	0.76-3.43	0.1677
Ellis County compared to rest of:	36	19,715	18.26	12.79-25.28			
Public Health Region 3	1,474	1,004,807	14.67	13.92-15.42	1.24	0.88-1.70	0.2097
Texas	4,909	3,786,584	12.96	12.60-13.33	1.41	1.00-1.92	0.0526
PHR 3 compared to rest of:	1,510	1,024,522	14.74	14.00-15.48			
Texas	3,435	2,781,777	12.35	11.94-12.76	1.19*	1.12-1.27	<.0001

* Significant at an alpha level 0.05, as determined by Poisson regression analysis.

TBDES provided maternal age and race/ethnicity-adjusted prevalence ratios for the potential area of impact, city of Midlothian and Ellis County as compared to their respective remainder of cases in Public Health Region 3 for Down syndrome (758.0) for the period 1999-2008. Both the APR for the potential area of impact and Ellis County with respect to Public Health Region 3 were statistically significant (p-value < 0.05) for Down syndrome (Table 4.1.13). The APR for Down syndrome for Midlothian with respect to the remainder of Public Health Region 3 was not statistically significant. TBDES was unable to calculate APRs for Down syndrome for the potential area of impact and city of Midlothian as compared to the remainder of Ellis County.

Table 4.1.13. Number of cases, crude and adjusted prevalence ratios with 95% confidence intervals (CI) and p-values for Midlothian potential area of impact (AOI), city of Midlothian, and Ellis County, as compared to the remainder of Public Health Region 3, for BPA4 Code 758.0 (Down syndrome), 1999-2008. Data Source: DSHS TBDES

Down syndrome (758.0)	Cases	Crude Prevalence Ratio compared to remainder of Public Health Region 3			Adjusted Prevalence Ratio compared to remainder of Public Health Region 3		
		Ratio	95% CI	p-value	Ratio	95% CI	p-value
Potential AOI Remainder of PHR3	6 1,483	1.93	0.76-3.91	0.1481	2.12*	1.09-3.65	0.0283
Midlothian Remainder of PHR3	7 1,503	1.56	0.67-3.03	0.2727	1.70	0.96-2.75	0.0661
Ellis County Remainder of PHR3	36 1,474	1.24	0.88-1.70	0.2097	1.40*	1.04-1.83	0.0260

* Significant at an alpha level 0.05, as determined by Poisson regression analysis.

As with the other birth defect registry data presented in this health consultation for crude prevalence rates, adjusted prevalence rates, crude prevalence ratios, and adjusted prevalence ratios, the analyses do not allow for conclusions to be made for any causal relations between the occurrence of Down syndrome and exposures from the Midlothian site. In most cases, Down syndrome occurs when there is an extra copy of chromosome 21. The age of the mother is the only factor shown to increase the risk of having a baby with Down syndrome. The 2004-2006 data from NBDPN determined that the estimated national prevalence for Down syndrome adjusted for maternal age was 14.5 per 10,000 live births [Parker 2010]. This prevalence is consistent with the rates found in the potential area of impact, Midlothian, Ellis County, and Public Health Region 3.

In summary, the birth defect registry data provided by TBDES based on the four digit BPA4 code for 185 birth defects and any monitored birth defect for crude prevalence rates, adjusted prevalence rates, crude prevalence ratios, and adjusted prevalence ratios do not allow for conclusions to be made for any causal relationship between the occurrence of birth defects and exposures from the Midlothian site. While the statistically significant findings were presented, the vast majorities of the 185 birth defect codes either had zero cases reported or were not significantly different in the potential area of impact and Midlothian as compared to Texas or to Public Health Region 3. Birth defects are rare, and even with 10 years of data, there are small numbers of infants and fetuses with specific types of birth defects among residents of the

potential area of impact and Midlothian, limiting the power to detect statistically significant findings.

Crude prevalence rates for the total cases with any monitored congenital anomaly were about 30% higher for the potential area of impact, city of Midlothian, Ellis County, and Public Health Region 3 than Texas. Maternal age and race/ethnicity-adjusted prevalence for the potential area of impact and Midlothian were not significantly different than the Texas prevalence rate for total cases.

The adjusted prevalence for ostium secundum type atrial septal defect was significantly lower in the city of Midlothian compared to both the Texas prevalence and the Public Health Region 3 adjusted prevalence. The adjusted prevalence for patent ductus arteriosus was significantly lower in both the potential area of impact and Midlothian when compared to the Texas prevalence and when compared to the adjusted prevalence in Ellis County and Public Health Region 3. Neither the crude nor adjusted prevalence ratios for the potential area of impact and Midlothian with respect to the remainder of Public Health Region 3 were statistically significant for these two birth defects.

Crude prevalence, for congenital hypertrophic pyloric stenosis was statistically significantly higher in the potential area of impact and Midlothian as compared to Public Health Region 3 and Texas, but not to Ellis County. Crude and adjusted prevalence ratios for congenital hypertrophic pyloric stenosis were also statistically significant in the potential area of impact and Midlothian with respect to the remainder of Public Health Region 3. The crude prevalence for other specified anomalies of the ear was statistically significantly higher in all four geographic areas as compared with Texas and the adjusted prevalence in Midlothian was also significantly higher with respect to Texas. The crude prevalence ratio, but not the adjusted prevalence ratio, was statistically significant in Midlothian with respect to the remainder of Public Health Region 3 for other specified anomalies of the ear.

Crude prevalence and the crude prevalence ratio for the city of Midlothian were statistically significantly higher as compared to Public Health Region 3 for hypospadias, epispadias, and congenital chordee. However, the adjusted prevalence and the adjusted prevalence ratio for the city of Midlothian were not significantly different with respect to Public Health Region 3 for this birth defect category, and no statistical significance was found among the comparisons between the potential area of impact and Public Health Region 3 for this birth defect category.

Crude and adjusted Down syndrome prevalence was not significantly higher for the potential area of impact, Midlothian, and Ellis County, as compared to Public Health Region 3. The adjusted prevalence ratio, but not the crude prevalence ratio, was statistically significant for the potential area of impact with respect to the remainder of Public Health Region 3 for Down syndrome. Both the crude and adjusted prevalence ratios for Down syndrome for Midlothian with respect to the remainder of Public Health Region 3 were not statistically significant.

Additional queries on birth defects rates for other Health Service Regions and counties can be made at the DSHS Texas Health Data website (<http://healthdata.dshs.texas.gov>).

Adverse Birth Outcomes

Community members in the Midlothian area have expressed concerns about not only the prevalence of birth defects but about the occurrence of other adverse birth outcomes. There have been many studies in the United States and worldwide that have found suggestive associations between *in utero* exposure to outdoor air pollution and some adverse birth outcomes [Maisonet 2004; Šrám 2005; Dadvand 2013] and reduced *fecundity* [Dejmek 2000; Veras 2010]. Adverse birth outcomes are an important predictor of subsequent health outcomes, including infant and childhood mortality, and are hypothesized to increase the risk of some adult diseases such as hypertension and diabetes [Barker 2004; Calkins 2011]. Adverse birth outcomes can also be an emotional and financial burden to the family.

Information at the state and county levels is available at the DSHS Center for Health Statistics (CHS) website for birth rate, preterm births, low birth weight births, and very low birth weight births (<http://soupfin.tdh.state.tx.us/birthdoc.htm>). CHS issues vital statistics annual reports that include infant mortality and fetal death rates at the county and public health service region level (<http://www.dshs.state.tx.us/chs/vstat/annrpts.shtm>). However, no published reports were identified that evaluated the rates of these adverse birth outcomes for the city of Midlothian or the Midlothian ZIP code.

For this health consultation, the DSHS Environmental and Injury Epidemiology and Toxicology (EIET) Branch was requested to provide data for several adverse birth outcomes. These birth outcomes included low birth weight (a live birth with a birth weight of less than 2500 grams), very low birth weight (a live birth with a birth weight of less than 1500 grams), preterm (premature) birth (a live birth delivered at gestational age of 36 weeks or less), fetal death (also known as stillbirth, a death of a fetus after the 20th week of pregnancy), and infant mortality (the death of a live-born infant less than one year of age). To evaluate fecundity, data on general fertility rates (live births born to women between the ages of 15 and 44) and live birth rates were requested.

EIET was asked to provide these data for the potential area of impact around the four facilities of concern in Midlothian that was determined by dispersion modeling analysis described in the first health consultation [ATSDR 2015a]. Adverse birth outcome rates for the city of Midlothian, Ellis County, Public Health Service Region 3 (PHR 3), and the state of Texas were requested for comparison purposes (Appendix B, Figure B.2.1). Data used for the analyses included birth and death certificate data for the period 1999-2008, obtained from DSHS Center for Health Statistics (CHS), Vital Statistics Unit. This ten-year period matches the time period used in the analyses from the DSHS Birth Defects Registry data. Geocoded data were used to obtain information on the potential area of impact. Crude rates and 95% CIs were calculated for the birth outcomes described above. For any outcomes in which the unadjusted rate in the potential area of impact appeared significantly higher than any of the comparison populations using the method of non-overlapping 95% confidence interval values, EIET was asked when possible to adjust the rates for maternal age and race. In order to compare rates in the area of concern to a similar nearby area that did not include the area of concern, Poisson regression analyses were performed and *rate ratios* obtained comparing the area of concern to the remainder of Ellis County.

Preterm, low birth weight, very low birth weight births, fetal deaths, and infant mortality

Table 4.1.14 presents the percent of low birth weight, very low birth weight, and preterm live births (among infants for which the necessary birth weight or gestational age information was available) for each geographical area for the ten year period of 1999-2008. For all geographical areas studied, gestational age information was missing for approximately 5% of live births, and birth weight information was missing for about 1% of live births. This prevented the use of the entire population of live births for the corresponding areas to compute rates of preterm births and low birth weight/very low birth weight births. For all three of these adverse birth outcomes, using the method of non-overlapping 95% confidence intervals, there were no statistically significant difference in crude rates between the potential area of impact and the city of Midlothian, Ellis County, Public Health Region 3, and Texas. Because these rates were not statistically significant, no adjustments were made for maternal age or race.

Table 4.1.14 Number and crude rate (%) of live births with preterm birth, low birth weight and very low birth weight by geographic area with 95% confidence intervals (CI), 1999-2008. Data source: DSHS CHS.

<i>Birth Outcome/Area</i>	Number of cases	Number of live births†	Crude rate (%)	95% CI
<i>Preterm birth</i>				
Area of impact	235	2,009	11.70	10.20 - 13.19
Midlothian	333	2,891	11.52	10.28 - 12.76
Ellis County	2,214	18,578	11.92	11.42 - 12.41
PHR 3	115,010	970,542	11.85**	11.78 - 11.92
Texas	445,851	3,614,908	12.33	12.30 - 12.37
<i>Low birth weight births‡</i>				
Area of impact	165	2,112	7.81	6.62 - 9.00
Midlothian	213	3,044	7.00	6.06 - 7.94
Ellis County	1,431	19,704	7.26**	6.89 - 7.64
PHR 3	79,473	1,023,924	7.76**	7.71 - 7.82
Texas	303,285	3,804,263	7.97	7.94 - 8.00
<i>Very low birth weight births</i>				
Area of impact	25	2,112	1.18	0.77 - 1.75
Midlothian	29	3,044	0.95**	0.64 - 1.37
Ellis County	216	19,704	1.10**	0.95 - 1.24
PHR 3	14,456	1,023,924	1.41	1.39 - 1.43
Texas	52,952	3,804,263	1.39	1.38 - 1.40

†Number of live births where information about the condition is known. -

‡Count for low birth weight births includes very low birth weight births. -

** Significantly lower than Texas unadjusted rates based on non-overlapping confidence intervals. -

Crude rates for two other adverse birth outcomes, fetal death rate and infant mortality rate, are presented in Table 4.1.15. Because there were no significantly higher rates in the potential area of impact or Midlothian, no adjustments were made for maternal age or race. The rate for fetal deaths was calculated by dividing the number of fetal deaths by the sum of the fetal deaths and live births for the corresponding area and time period and expressing the value per 1000 of the sum. The fetal death rates in the potential area of impact, Midlothian, and Ellis County were

lower than the fetal death rate for the state of Texas. Because the number of fetal deaths in the potential area of impact during the ten year period was small, the fetal death rate for this area was not regarded as significantly lower than that of the state. Using the method of non-overlapping 95% confidence intervals, the city of Midlothian and Ellis County both had significantly lower fetal death rates than either the state or Public Health Region 3. There was no significant difference in infant mortality rates among the potential area of impact, Midlothian, Ellis County, and Texas in the ten year period evaluated.

Table 4.1.15 Number and crude rates of fetal death and infant mortality for communities of interest as compared to Texas with 95% confidence intervals (CI), 1999-2008. Data source: DSHS CHS.

<i>Birth Outcome/Area</i>	Number of cases	Total population†	Crude rate	95% CI
<i>Fetal deaths (rate per 1,000 live births plus fetal deaths)</i>				
Area of Impact	6	2,118	2.83	1.04 - 6.17
Midlothian	9	3,054	2.95**	1.35 - 5.59
Ellis County	70	19,785	3.54**	2.76 - 4.47
PHR 3	6,450	1,030,972	6.26*	6.10 - 6.41
Texas	22,886	3,829,185	5.98	5.90 - 6.05
<i>Infant mortality (rate per 1,000 live births)</i>				
Area of Impact	12	2,112	5.68	2.94 - 9.93
Midlothian	21	3,045	6.90	4.27 - 10.54
Ellis County	132	19,715	6.70	5.55 - 7.84
PHR 3	6,707	1,024,522	6.55*	6.39 - 6.70
Texas	23,665	3,806,299	6.22	6.14 - 6.30

†For fetal rates, the population is the sum of fetal deaths and live births for the corresponding area. For infant mortality rates, the population is the number of live births for the corresponding area.

* Significantly higher than Texas unadjusted rates based on non-overlapping confidence intervals.

** Significantly lower than Texas unadjusted rates based on non-overlapping confidence intervals.

While the statistical analyses described above for low birth weight, very low birth weight, preterm live births, fetal deaths, and infant mortality did not show any significantly higher unadjusted rates, these five adverse birth outcomes were further explored by using Poisson regression analyses to compare the potential area of impact versus the remaining area of Ellis County. These analyses are used to demonstrate if the potential area of impact has a disproportionate contribution to the rate of adverse outcomes in the geographic area (in this case, Ellis County) that primarily includes this region. For all but infant mortality rates, where no maternal demographic data were available, the analyses adjusted for maternal age and maternal race/ethnicity. The adjusted rate ratios for low birth weight, very low birth weight, preterm live births, and fetal deaths and the crude rate ratio for infant mortality are presented in Table 4.1.16. There was no significant difference ($p < 0.05$) in the rate ratios of these five adverse birth outcomes in the area of interest versus the rest of Ellis County.

Table 4.1.16. Adjusted[†] rate ratios of preterm birth, low birth weight, very low birth weight, and fetal death and unadjusted rate ratio of infant mortality for the potential area of impact as compared to the remainder of Ellis County with 95% confidence intervals (CI) and p-values, 1999-2008. Data source: DSHS CHS.

Birth Outcome	Rate Ratio	95% CI	p-value [‡]
Preterm birth [†]	1.051	0.899 - 1.223	0.525
Low birth weight births [†]	1.167	0.916 - 1.468	0.207
Very low birth weight births [†]	1.109	0.574 - 1.962	0.743
Fetal deaths [†]	0.744	0.327 - 1.465	0.415
Infant mortality	0.895	0.467 - 1.562	0.713

[†]Adjusted for maternal age and maternal race/ethnicity as a categorical variable – Maternal age: <20, 20-24, 25-29, 30-34, 35+; Maternal race/ethnicity: White, black, Hispanic, other/unknown.

[‡] All rate ratios were not significant at an alpha level of 0.05.

Fertility and birth rates

Fecundity, the capability of producing offspring, was addressed by comparing general fertility rates and unadjusted birth rates among geographic areas of interest for the years 1999 through 2008, when available. Although some researchers have measured paternal contribution to fecundity by looking at sperm quality [Hammoud 2010], the information available from vital statistics data cannot separate maternal and paternal influences on these rates. Geocoded data was not available to allow for calculation of rates for the potential area of impact for either fertility rates or birth rates. Stratified race/ethnicity and age information was not available for the city of Midlothian in the database used for the mid-year population estimates which prevented standardizing for these factors.

The ten year (1999-2008) average annual fertility rates and crude birth rates for Ellis County, Public Health Region 3, and Texas are presented in Table 4.1.17. The crude birth rates for Midlothian are included in this table. Mid-year population estimates by age and sex were not available for Midlothian to allow for a calculation of fertility rates, so fertility rates for Midlothian were calculated using 5-year average annual population data from the American Community Survey (2005-2009) and a four year average for live births (2005-2008). The fertility rate for Midlothian appeared to be higher than the rates in other areas evaluated. However, because of the use of a different data source and time period for this fertility rate, this rate was not directly comparable to the other geographic area rates.

Crude birth rates for each of the ten years reviewed were evaluated to determine if there was any variation in trends over this 10-year period. Figure 4.1 illustrates yearly birth rates per 1,000 mid-year population without confidence intervals for Midlothian, Ellis County and Texas. Data for Public Health Region 3 was similar to Ellis County and Texas and was not included in the figure. With the exception of 2008 in which the birth rate for Midlothian was not statistically significantly different than the birth rate for Texas, Midlothian crude birth rates were significantly higher for all other years and geographic areas. The figure and the data suggest that the crude birth rate in Midlothian is decreasing at a faster rate than that of Ellis County or Texas. Given that the general fertility rate for Midlothian (Table 4.1.17) calculated for the 5 year period (2005-2009) remains significantly higher than the state of Texas, one possible explanation for the decreasing birth rate is that while there has been a doubling of the population in Midlothian in

the ten year time period, there has also been a shift of demographics with a lower proportion of women in childbearing years.

Table 4.1.17. Crude 10-year average general fertility and birth rates per 1,000 for communities of interest with 95% confidence intervals (CI), 1999-2008. Data sources: DSHS CHS and American Community Survey 2005-2009.

	General fertility rate (per 1,000) [‡]	95% CI	Crude birth rate (per 1,000) [§]	95% CI
Midlothian [¶]	87.34 [†]	78.10 - 96.59	23.09 [†]	22.27 - 23.91
Ellis County	71.37 ^{**}	70.37 - 72.37	15.50 ^{**}	15.28 - 15.71
PHR 3	74.96 ^{**}	74.81 - 75.10	17.15 [*]	17.12 - 17.18
Texas	76.91	76.83 - 76.99	17.05	17.04 - 17.07

[‡]Based on number of live births per 1,000 females aged 15 through 44, mid-year population estimates. -

[§]Based on number of live births per 1,000 mid-year population estimates. -

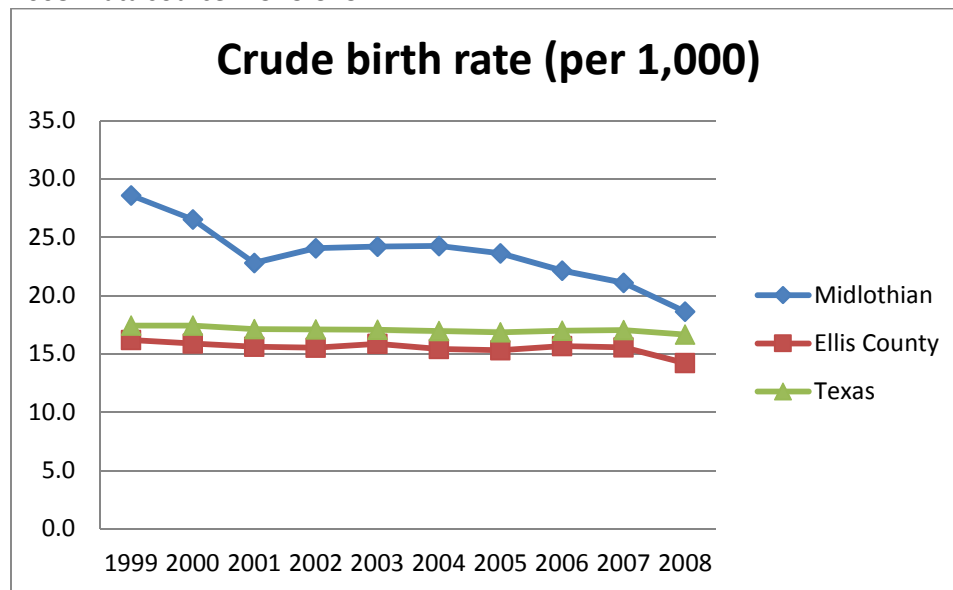
[¶]Data for general fertility rate for Midlothian based on 5 year average population estimate data (2005-2009) and 4 year average live birth data (2005-2008). -

[†]While appearing significantly higher than Texas unadjusted rates based on non-overlapping confidence intervals, results should be interpreted with caution since the populations are not directly comparable. -

^{*} Significantly higher than Texas unadjusted rates based on non-overlapping confidence intervals. -

^{**} Significantly lower than Texas unadjusted rates based on non-overlapping confidence intervals. -

Figure 4.1 Crude birth rates per 1,000 mid-year population for Midlothian, Ellis County and Texas, 1999-2008. Data source: DSHS CHS.



Besides suggestive associations of air pollution with adverse birth outcomes found in the scientific literature, there are known factors that influence birth outcomes. These include maternal age and race, which were not standardized for in our statistical analyses because the lack of significant differences among the unadjusted rates did not suggest the need for additional analyses. The vital statistics data used in this analysis does not provide sufficient information on other known adverse impacts on birth outcomes such as maternal tobacco, alcohol or drug use,

maternal nutrition, and occupational or other exposures, so no correction or standardization was made for these risk factors.

In summary, based on the rates presented for preterm births, low birth weight births, very low birth weight births, fetal deaths, and infant mortality, there did not appear to be any statistically significant difference between rates in the potential area of impact or Midlothian and Ellis County, Public Health Region 3 or Texas. For the years 1999-2008, Midlothian appeared to have had significantly higher crude birth rates and general fertility rates than Ellis County, Public Health Region 3 and Texas. However, over the last ten years (1999-2008), the crude birth rate for Midlothian appeared to be decreasing and is becoming similar to the state rate.

4.2 Cancer

The DSHS Texas Cancer Registry (TCR), Cancer Epidemiology and Surveillance Branch has issued several reports and responded to numerous citizen inquiries about possible elevation of cancer rates in the Midlothian area. Specific cancer concerns have been raised about the incidence of leukemia, as well as total adult and childhood cancers.

The Texas Cancer Registry is a statewide population-based registry responsible for the collection, maintenance, and dissemination of cancer data. These cancer data are used to measure and evaluate the Texas cancer burden, cancer control efforts, and health disparities, as well as to support cancer related research activities and respond to inquiries on cancer rates. TCR meets the CDC National Program of Cancer Registries high quality data standards and is Gold Certified by the North American Association of Central Cancer Registries.

TCR receives reports from hospitals, cancer treatment centers, ambulatory surgery centers, pathology laboratories, and physicians' offices located throughout the state. Information from Texas residents who are diagnosed and receive treatment in other states are forwarded to the TCR for inclusion in their surveillance system. The primary cancer site in the body, the cancer stage, and patient characteristics are reported. Cancer incidence data has been collected state-wide since 1995. Prior to that year, cancer investigations performed by DSHS (formerly Texas Department of Health) relied on cancer mortality data as a surrogate.

In carrying out cancer cluster investigations, TCR follows CDC recommendations [CDC 1990]. A cancer cluster is defined as a greater than expected number of the same type of cancer developing among people who live or work in the same area within a short time of each other. The investigations start with an initial contact of the requestor to collect more information. Often the investigation is resolved because the additional information demonstrates that the cluster definition is not met. If a potential cluster is suspected, an assessment is performed that involves data evaluation to see if the number of cancer cases in a population over a specified time period is greater than would normally be expected. Statistical testing is used to determine if an increase can be explained by chance or if further investigation is needed.

Cancer refers to a group of diseases noted for uncontrolled growth and spread of abnormal cells through the body. Cancer is common and in the United States one in three women and one in two

men will develop cancer in their lifetime. Lung, breast, prostate and colon cancers have the highest incidence. Data from the National Cancer Institute (seer.cancer.gov) shows that while generally the rate of cancer increases with age, some cancers are more common in younger populations (for example, acute lymphocytic leukemia) or have two peaks of incidence (for example, Hodgkin's disease). Some cancers are more common in women (for example, thyroid cancer) or are more common in men (for example, kidney cancer). Cancer incidence varies with racial groups. Black men have a higher incidence rate of cancer than white men, who have a higher incidence rate than Asian men. Because of these known different occurrence patterns, cancer rates are adjusted for type, age, sex and race/ethnicity to allow for comparisons between populations.

Cancer cluster investigations cannot determine whether the cancers are caused by any environmental exposure. Cancer usually results from a combination of factors including lifestyle (example, smoking and diet), heredity, and environment (physical, biological and chemical). The cancer registry provides only limited information on personal risk factors. Cancer takes many years to develop before it is diagnosed. Many cancers have latencies of ten to twenty years or more from the time of exposure to the determination of cancer. Thus, a person may have been living or working in a different location when the cancer started, but the reporting is for the current place of residency (or death, for mortality studies). When reporting cancer incidence, ten year time periods are frequently evaluated even if longer time frames are available. Diagnostic techniques and cancer prevention methods have changed over time, so calendar year will impact the incidence rate. However, for smaller geographic areas, combined data from ten years or more are sometimes needed to obtain a large enough number of cases for statistical analysis.

Epidemiological evaluations of cancer may look at cancer incidence (the number of new cancer cases) or cancer mortality (the number of deaths from cancer). Both provide different measures of health burden. Cancer mortality is impacted by stage and age at diagnosis, access to care, and type and completeness of treatment. These factors are known to differ by race, ethnicity, and income. Public health measures to improve cancer mortality rates may involve increased screening for earlier detection and better access to care. In this health consultation, updated information on both cancer incidence and cancer mortality is included.

Previous Cancer Cluster Investigations in Midlothian

Four cancer cluster investigation reports dating to 1995 were identified that DSHS (formerly Texas Department of Health) performed on cancer mortality in Midlothian, Texas (ZIP code 76065) (Figure B.3.1). Table 4.2.1 summarizes the four investigations and includes the years evaluated and cancer sites examined for men and women.

For these cancer cluster investigations, standardized mortality ratios (SMRs) were calculated. The SMR was calculated by dividing the number of observed cancer deaths identified in Midlothian by the expected number using the state as a comparison population for the same time period. Data on cancer deaths were obtained from the DSHS Center for Health Statistics (CHS) Mortality file. The expected number of cases was adjusted for race, age, and sex to compare the Midlothian population with the state.

Table 4.2.1 Summary of four cancer mortality studies for Midlothian, Texas (ZIP code 76065) -

Cluster Investigation Number	Period Covered	Sites Evaluated [†]	Reference
95042	1984-1993	Leukemia; total cancer	DSHS 1995
98004	1990-1996	Colon; pancreas; lung; trachea; brain; leukemia; prostate (M); breast (F)	DSHS 1998a
98016	1990-1996	Liver; breast	DSHS 1998b
05026	1993-2002	Larynx; lung & bronchus; colorectal, bladder; non-Hodgkin's lymphoma; brain/CNS; acute lymphocytic leukemia; chronic lymphocytic leukemia; acute myeloid leukemia; chronic myeloid leukemia; aleukemic, subleukemic & NOS; total childhood cancers (age 0-19); prostate (M); breast (F); corpus & uterus (F)	DSHS 2005b

[†] Both males (M) and females (F) were evaluated for each cancer site unless otherwise designated.
 CNS: Central nervous system; NOS: Not otherwise specified.

To interpret an SMR, a ratio greater than 1.0 indicates more cancer deaths than expected; a ratio less than 1.0 indicates fewer deaths than expected. The interpretation of the ratio depends on both the size of the ratio and the number of cases used to calculate the ratio. Ratios based on a larger number of cases are more stable; ratios based on a fewer number are more influenced by chance. To take this into account, a 95% or 99% confidence interval (CI) is calculated. This statistical measure shows the precision of the estimated risk ratio. A small interval will reflect greater precision. If the confidence interval contains 1.0, no statistically significant excess or deficit of cancer deaths is indicated. If the confidence interval does not contain 1.0, the number of cancer deaths is statistically significantly different (either higher or lower) than expected. None of the four analyses for cancer mortality for Midlothian indicated that there were a significant excess number of cancers deaths of any type or grouping examined. For men in Midlothian, during the period 1993-2002, the mortality from prostate cancer was fewer than expected at the 99% confidence level [DSHS 2005b].

The 2005 cancer cluster investigation also calculated standardized mortality ratios in Cedar Hill, Texas (ZIP code 75104) and Venus, Texas (ZIP code 76084) (Figure B.3.1). No statistically significant excess or deficit in the expected number of cancer deaths of any type or grouping for the period 1993-2002 was identified for these two communities [DSHS 2005b].

In addition to the mortality studies, TCR examined the incidence of cancer in Midlothian, Cedar Hill and Venus, Texas (ZIP codes 76065, 75104, and 76084, respectively) in cancer cluster investigation number 05026 (Figure B.3.1) [DSHS 2005b]. Incidence data were available for the period 1995-2002. The cancer sites examined were the same as described for the cancer mortality evaluation performed for this cluster investigation (Table 4.2.1). These cancer sites were selected based on a literature review of possible scientific associations between these cancer types and exposure to chemicals that the requestor had expressed concerns about because of the nearby cement plants in Midlothian.

For the incidence of cancer, standardized incidence ratios (SIRs) were calculated. Similar to the analysis of the SMR, the SIR was calculated by dividing the number of observed cancer cases identified in a ZIP code by the expected number using the state as a comparison population for

the 1995-2002 time period. Data on cancer cases were obtained from the Texas cancer registry. The expected number of cases was adjusted for race, age, and sex to compare the populations with that of the state. A SIR greater than 1.0 indicated more cases than expected; a ratio less than 1.0 indicated fewer cases than expected. A 99% confidence interval was calculated for each SIR (Note that calculation of a 99% confidence interval and not a 95% confidence interval is the current practice by TCR). If the confidence interval contained 1.0, no statistically significant excess or deficit of cases was indicated. If the confidence interval did not contain 1.0, the number of cancer deaths was statistically significantly different (either higher or lower) than expected.

In this cancer cluster investigation (Number 05026), none of the SIR analyses indicated that there were a significant excess number of cancers of any type or grouping in Midlothian, Cedar Hill or Venus, Texas. There were statistically significantly fewer cases than expected of prostate cancer in men residing in Venus, Texas (ZIP code 76084). All other cancer types and groupings evaluated were within normal ranges in both males and females [DSHS 2005b].

Update on Cancer Incidence in Midlothian

For this HOD health consultation, TCR was asked to provide standardized incidence ratios for the Midlothian ZIP code (76065), Ellis County, and Public Health Region 3 (PHR 3) for the most recent complete ten years of the Texas cancer registry data. At the time of the request, this period included the years 1999 to 2008. Cancer types and groupings requested for investigation included all cancer sites combined, total childhood cancers (age 0-19), total childhood leukemia (age 0-19), total leukemia, 5 leukemia sub-types, and 25 additional cancers grouped by site. The SIRs were evaluated using a 99% confidence interval. Tables 4.2.2 and 4.2.3 present the SIRs and 99% confidence intervals for each of the three geographic areas for total, total childhood (age 0-19), and the five most common newly diagnosed cancers based on the observed number of cases in ZIP code 76065 for males and females, respectively.

Table 4.2.2 Standardized Incidence Ratios (SIR), Males, Total, total childhood (age 0-19), and top 5 cancers, 1999-2008 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3. SIR based on race-, sex-, and age-adjusted cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals (CI). Data source: DSHS TCR.

Site	ZIP Code 76065#		Ellis County		Public Health Region 3	
	SIR	99% CI	SIR	99% CI	SIR	99%CI
Total Cancer	0.8**	0.7 – 0.9	0.9	0.9 – 1.0	1.0	1.0 – 1.0
Total Childhood Cancers (Age 0-19)	0.7	0.2 – 2.0	0.6	0.3 – 1.0	1.0	0.9 – 1.0
Prostate	0.7**	0.5 – 0.9	0.9	0.8 – 1.0	1.0	1.0 – 1.0
Lung and Bronchus	1.0	0.8 – 1.4	1.0	0.9 – 1.2	1.0	1.0 – 1.0
Colon and Rectum	1.0	0.7 – 1.4	1.1	1.0 – 1.3	1.0	1.0 – 1.0
Kidney and Renal Pelvis	1.2	0.7 – 2.1	1.3	1.0 – 1.6	1.0	1.0 – 1.0
Bladder	0.8	0.4 – 1.4	1.0	0.8 – 1.2	1.0	0.9 – 1.0

** Significantly lower than expected at the p< 0.01 level.
 # Based on the average of the 2000 and 2010 census population.

Table 4.2.3 Standardized Incidence Ratios (SIR), Females, Total, total childhood (ages 0-19), and top 5 cancers, 1999-2008 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3. SIR based on race-, sex-, and age-adjusted cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals (CI). Data source: DSHS TCR.

Site	ZIP Code 76065 [#]		Ellis County		Public Health Region 3	
	SIR	99% CI	SIR	99% CI	SIR	99%CI
Total Cancer	0.9	0.8 – 1.0	1.0	0.9 – 1.0	1.0	1.0 – 1.0
Total Childhood Cancers (Age 0-19)	1.5	0.5 – 3.3	1.0	0.6 – 1.5	1.0	0.9 – 1.1
Breast	0.9	0.7 – 1.1	0.9	0.8 – 1.0	1.0	1.0 – 1.0
Lung and Bronchus	0.9	0.6 – 1.3	1.1	0.9 – 1.2	1.0	1.0 – 1.1
Colon and Rectum	1.1	0.7 – 1.7	1.2	1.0 – 1.4	1.0	1.0 – 1.0
Non-Hodgkin’s Lymphoma	1.0	0.5 – 1.9	1.2	1.0 – 1.6	1.0	1.0 – 1.1
Corpus & Uterus	0.7	0.3 – 1.4	1.1	0.8 – 1.4	1.0	1.0 – 1.0

Based on the average of the 2000 and 2010 census population.

None of these SIR analyses indicated a statistically significant excess number of cancers or either males or females for any cancer site or grouping in all three regions evaluated as compared to the state of Texas during the period 1999-2008. The top three leading causes of cancer in men or in women were the same in both the Midlothian ZIP code and the state of Texas [Risser 2011]. Both the fourth and fifth ranked newly diagnosed cancer sites were in reverse order (melanomas excluded) for both males and females for the ZIP code as compared to the state. This may reflect a difference in demographics since the Texas rankings are not adjusted for race or age. A more comprehensive summation of the SIR analysis is provided in Appendix A, Tables A.4.2.a to A.4.2.h.

The comparison rates used to calculate the expected number of cases in Ellis County and PHR 3 were derived from Texas statewide data on annual cancer incidence adjusted for age, sex, and race. The population base for the non-census years use annual population estimates from the DSHS Center for Health Statistics (CHS) (<http://www.dshs.state.tx.us/chs/popdat/ST2001.shtm>). Annual population estimates by age, race and sex are not available at the ZIP code level. Only the 2000 census year data and 2010 population estimates were available. Because of the high population growth in Midlothian and the Midlothian ZIP code, as described in section 2.0 (Tables 2.2 and 2.3), the 2000 census would underestimate expected cases and the 2010 estimates would overestimate the number of expected cases for the ZIP code for the period 1999-2008, resulting in an overestimated SIR for 2000 and an underestimated SIR for 2010. Thus, the TCR was requested to provide the SIRs for the ZIP code 76065 using the average of the 2000 and 2010 census population in lieu of having the annual data.

Table 4.2.4 contains the ten cancer sites or groupings that resulted in either a significantly higher or lower number of cancer cases than expected (an SIR significantly higher or lower than 1.0) for ZIP code 76065 using 2000 census, 2010 census, or the average of these two census years to calculate the expected number of cases. Using 2000 census data, there were 6 instances of an SIR that was significantly higher than 1.0; using 2010 data, there were 7 instances of an SIR significantly lower than 1.0; and using the average population, there were 2 instances of an SIR significantly lower than 1.0. The latter result, which used the average of the two population

years, is more in line with previous cancer cluster investigations performed in this area. However, since using the average implies an unverified linear population growth pattern for the ZIP code, the implication of having lower than expected incidence of male total cancer and prostate cancer cannot be surmised.

After the 2009 data became available, TCR provided standardized incidence ratios for the Midlothian ZIP code (76065), Ellis County, and Public Health Region 3 (PHR 3) for the ten year period 2000 to 2009. As with the previous analysis of the period 1999-2008, the SIRs calculated for ZIP code 76065 used the average of the 2000 and 2010 census population. For ZIP code 76065, the SIRs for all cancer types and groupings were not statistically significant for either males or females for the period 2000-2009, including male total cancer (SIR: 0.9, 99% CI: 0.8-1.0) and prostate cancer (SIR: 0.8, 99% CI: 0.6-1.1). The SIRs for ZIP code 76065 can be found in Appendix A.4.2.i and A.4.2.j. The SIRs for Ellis County and PHR3 for the 2000-2009 period were similar to those presented for the period 1999-2008.

Table 4.2.4 Standardized Incidence Ratios (SIR), Selected Cancers with significantly higher or lower SIRs, 1999-2008 for Midlothian ZIP code 76065. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals, using census year 2000, census year 2010, or the average of the two census years data for population rates. Data source: DSHS TCR.

Site	Sex	ZIP CODE 76065					
		Census Year 2000		Average Population [#]		Census Year 2010	
		SIR	99% CI	SIR	99% CI	SIR	99% CI
Total Cancer	Male	1.3*	1.1 – 1.5	0.8**	0.7 – 0.9	0.6**	0.5 – 0.7
Total Cancer	Female	1.4*	1.2 – 1.6	0.9	0.8 – 1.0	0.7**	0.6 – 0.8
Colon and Rectum	Female	1.7*	1.1 – 2.5	1.1	0.7 – 1.7	0.8	0.5 – 1.3
Pancreas	Male	0.5	0.1 – 1.7	0.3	0.0 – 1.1	0.2**	0.0 – 0.8
Lung and Bronchus	Male	1.6*	1.2 – 2.2	1	0.8 – 1.4	0.8	0.5 – 1.0
Lung and Bronchus	Female	1.3	0.9 – 1.9	0.9	0.6 – 1.3	0.6**	0.4 – 0.9
Breast	Female	1.4*	1.1 – 1.7	0.9	0.7 – 1.1	0.7**	0.5 – 0.9
Prostate	Male	1.2	0.9 – 1.5	0.7**	0.5 – 0.9	0.5**	0.4 – 0.7
Kidney and Renal Pelvis	Male	1.9*	1.1 – 3.2	1.2	0.7 – 2.1	0.9	0.5 – 1.5
Non-Hodgkin’s Lymphoma	Male	0.8	0.3 – 1.6	0.5	0.2 – 1.1	0.4**	0.1 – 0.8

* Significantly higher number of cases than expected at the p< 0.01 level.

** Significantly lower number of cases than expected at the p< 0.01 level.

Based on the average of the 2000 and 2010 census population.

TCR was requested to use geocoded data to tabulate the number of cancer cases for the potential area of impact around the four facilities of concern in Midlothian that was determined by dispersion modeling analysis described in the first health consultation [ATSDR 2015a] that addressed Midlothian air quality (Appendix B, Figures B.3.1 and B.3.2). Because population data could not be accurately obtained or estimated for this modeled geographic area, no SIRs could be generated. Table 4.2.5 (and Appendix A.4.2.k) presents the observed cases in the different geographic areas for total, total childhood (age 0-19), and the eight most common newly diagnosed cancers based on the observed number of cases in the potential area of impact for combined males and females between 1999 and 2008. Without rates or incidence ratios, the areas are not directly comparable. The potential area of impact, while primarily in ZIP code 76065, includes portions of several counties and ZIP codes. One observation from the table is

that the number of observed cases in the potential area of impact is the same or less than that of ZIP code 76065.

Table 4.2.5 Observed number of newly diagnosed cancer cases, Total, total childhood (age 0-19), and top 8 cancers, in the potential area of impact, ZIP code 76065, and Ellis County, male and female combined, 1999-2008. Data source: DSHS TCR.

Site	Area of Impact	ZIP 76065	Ellis County
Total Cancer	635	743	4,838
Total Childhood Cancers (Age 0-19)	14	14	56
Breast	112	119	684
Lung and Bronchus	100	118	761
Colon and Rectum	70	85	578
Prostate	66	89	613
Kidney and Renal Pelvis	29	34	212
Bladder	22	25	172
Non-Hodgkin’s Lymphoma	21	26	214
Total Leukemia	18	21	139

Update on Cancer Mortality in Midlothian

For this HOD health consultation, DSHS TCR was asked to provide standardized mortality ratios for the Midlothian ZIP code (76065), Ellis County, and Public Health Region 3 (PHR 3) for the ten year period 2000-2009. TCR obtained these data from the DSHS Center for Health Statistics (CHS). Cancer types and groupings requested for investigation included all cancer sites combined, total childhood cancers (age 0-19), total childhood leukemia (age 0-19), total leukemia, 5 leukemia sub-types, and 25 cancers grouped by site. The SMRs were evaluated using a 99% confidence interval.

Tables 4.2.6 and 4.2.7 present the SMRs and 99% confidence intervals for each of the three geographic areas for total, total childhood (age 0-19), and the three most commonly found cause of cancer deaths based on the observed number of deaths in ZIP code 76065, Ellis County, and Public Health Region 3, for males and females, respectively.

There was no significantly higher number of deaths than expected for either males or females for any cancer site or grouping in all three regions evaluated as compared to the state of Texas during the period 2000-2009. Summary tables of the SMR analyses for all three regions are provided in Appendix A, Tables A.4.2.1 to A.4.2.s.

During the ten year period 2000-2009, there were a total of 294 deaths from cancer in ZIP code 76065. About one third of these deaths were attributable to lung and bronchus cancer. Lung cancer is also the leading cause of cancer mortality in Ellis County, Public Health Region 3 and the state of Texas. In 2011, lung cancer accounted for about one quarter of the cancer deaths in the state [Risser 2011]. A table of rankings based on observed number of cancer deaths for combined males and females can be found in Appendix A, Table A.4.2.t.

Table 4.2.6 Standardized Mortality Ratios (SMR), Males, Total, total childhood (age 0-19), and top 3 cancers (ranked by number of observed deaths), 2000-2009 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3. SMR based on race-, sex-, and age-adjusted cancer mortality rates for Texas during the period 2000–2009 rounded to the first decimal place with 99% confidence intervals (CI). Data source: DSHS TCR and TCHS.

Site	ZIP Code 76065 [#]			Ellis County			PHR 3		
	Rank	SMR	99% CI	Rank	SMR	99% CI	Rank	SMR	99%CI
Total Cancer		0.9	0.8 – 1.2		1.1	1.0 – 1.1		1	1.0 – 1.0
Total Childhood Cancers (Age 0-19)		1.8	0.1 – 8.1		0.6	0.1 – 1.9		0.9	0.8 – 1.0
Lung and Bronchus	1	1.1	0.7 – 1.5	1	1.1	0.9 – 1.2	1	1	1.0 – 1.0
Colon and Rectum	2	0.8	0.3 – 1.6	2	1.1	0.9 – 1.4	2	1	0.9 – 1.0
Kidney and Renal Pelvis	3	1.5	0.5 – 3.5	6	1.5	1.0 – 2.1	9	1	0.9 – 1.1
Prostate	7	0.5	0.1 – 1.4	3	0.9	0.7 – 1.2	3	1	1.0 – 1.0

Based on the average of the 2000 and 2010 census population.

Table 4.2.7 Standardized Mortality Ratios (SMR), Females, Total, total childhood (ages 0-19), and top 3 cancers, (ranked by number of observed deaths), 2000-2009 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3. SMR based on race-, sex-, and age-adjusted cancer mortality rates for Texas during the period 2000–2009 rounded to the first decimal place with 99% confidence intervals (CI). Data source: DSHS TCR and TCHS.

Site	ZIP Code 76065 [#]			Ellis County			PHR 3		
	Rank	SMR	99% CI	Rank	SMR	99% CI	Rank	SMR	99%CI
Total Cancer		1.1	0.8 – 1.3		1.1	1.0 – 1.2		1	1.0 – 1.0
Total Childhood Cancers (Age 0-19)		1.1	0.0 – 8.0		1.5	0.5 – 3.5		1	0.8 – 1.2
Lung and Bronchus	1	1	0.7 – 1.6	1	1.1	1.0 – 1.3	1	1	1.0 – 1.0
Breast	2	1.1	0.6 – 1.8	2	0.9	0.7 – 1.2	2	1	1.0 – 1.0
Corpus & Uterus	3	1.1	0.5 – 2.1	11	1	0.5 – 1.7	8	1.1	1.0 – 1.1
Colon and Rectum	4	1	0.4 – 2.1	3	1.2	1.0 – 1.6	3	1	1.0 – 1.1

Based on the average of the 2000 and 2010 census population.

Leukemia

Because of community concerns, TCR 1999-2008 cancer registry data on leukemia incidence was evaluated by looking at total leukemia cases, total childhood leukemia (age 0-19), and 5 leukemia sub-type categories (acute lymphocytic, chronic lymphocytic, acute myeloid, chronic myeloid, and aleukemic, subleukemic, and not otherwise specified (NOS)). Table 4.2.8 presents the leukemia incidence data for males and females for ZIP code 76065 and Ellis County. For confidentiality, because of the small number of observed cases, ZIP code cancer data for many of the leukemia sub-types are suppressed. As discussed in General Approach and Methods (Section 3), a small number of cases can result in unstable estimates and one more or one less case will have a considerable impact on the result. The combined male and female total childhood leukemia observed cases is also less than 5 cases for this ten year period. There was no indication of an excess number of cancer cases for any of the leukemia categories.

Table 4.2.8 Observed and expected number of cases and Standardized Incidence Ratios (SIR), Males and Females, Total leukemia, total childhood leukemia (ages 0-19), and 5 leukemia subtypes, 1999-2008 for Midlothian ZIP code 76065 and Ellis County, TX. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals. Data source: DSHS TCR.

MALES	ZIP Code 76065 [#]				Ellis County			
	Observed	Expected	SIR	99% CI	Observed	Expected	SIR	99% CI
Total Leukemia	11	14.6	0.8	0.3 – 1.6	82	84.4	1.0	0.7 – 1.3
Total Childhood Leukemia (Age 0-19)	<5	NS	1.0	0.1 – 4.8	10	11.1	0.9	0.3 – 1.9
Acute Lymphocytic Leukemia	<5	NS	0.5	0.0 – 3.7	9	11.7	0.8	0.3 – 1.7
Chronic Lymphocytic Leukemia	<5	NS	0.8	0.1 – 2.5	29	29.2	1.0	0.6 – 1.6
Acute Myeloid Leukemia	<5	NS	0.8	0.1 – 3.0	23	21.2	1.1	0.6 – 1.8
Chronic Myeloid Leukemia	<5	NS	1.1	0.1 – 5.1	9	10.7	0.8	0.3 – 1.9
Aleukemic, Subleukemic, & NOS	0	0.6	0	0.0 – 9.6	<5	NS	0.9	0.1 – 3.2
FEMALES	ZIP Code 76065 [#]				Ellis County			
	Observed	Expected	SIR	99% CI	Observed	Expected	SIR	99% CI
Total Leukemia	10	10	1.0	0.4 – 2.2	57	63.4	0.9	0.6 – 1.3
Total Childhood Leukemia (Age 0-19)	<5	NS	1.3	0.1 – 6.1	9	8.7	1.0	0.4 – 2.3
Acute Lymphocytic Leukemia	<5	NS	2.0	0.2 – 7.4	11	8.9	1.2	0.5 – 2.6
Chronic Lymphocytic Leukemia	<5	NS	0.3	0.0 – 2.4	21	20.2	1.0	0.6 – 1.8
Acute Myeloid Leukemia	5	2.9	1.7	0.4 – 4.8	11	18	0.6	0.2 – 1.3
Chronic Myeloid Leukemia	<5	NS	0.8	0.0 – 5.9	7	8.1	0.9	0.3 – 2.1
Aleukemic, Subleukemic, & NOS	0	0.4	0	0.0 – 12.4	5	3.1	1.6	0.4 – 4.6

SIR based on the average of the 2000 and 2010 census population. -

NOS—Not otherwise specified. -

NS—Not shown. For confidentiality, observed and expected number of cases is suppressed when there are 1-4 observed cases. -

Similarly, Table 4.2.9 presents the leukemia mortality data for males and females for ZIP code 76065 and Ellis County for the ten year period 2000-2009 provided by DSHS TCR. None of the SMRs for total leukemia cases, total childhood leukemia (age 0-19), and 5 leukemia sub-type categories (acute lymphocytic, chronic lymphocytic, acute myeloid, chronic myeloid, and aleukemic, subleukemic, and not otherwise specified (NOS)) were found to be statistically significantly different.

Table 4.2.9 Observed and expected number of deaths and Standardized Mortality Ratios (SMR), Males and Females, Total leukemia, total childhood leukemia (ages 0-19), and 5 leukemia subtypes, 2000-2009 for Midlothian ZIP code 76065 and Ellis County, TX. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals. Data source: DSHS TCR and TCHS.

MALES	ZIP Code 76065 [#]				Ellis County			
	Observed	Expected	SMR	99% CI	Observed	Expected	SMR	99% CI
Total Leukemia	6	6.9	0.9	0.2 – 2.3	50	44.7	1.1	0.8 – 1.6
Total Childhood Leukemia (Age 0-19)	<5	NS	3.1	0.0 – 23.0	<5	NS	0.5	0.0 – 3.9
Acute Lymphocytic Leukemia	0	0.6	0	0.0 – 9.3	5	3.6	1.4	0.3 – 3.9
Chronic Lymphocytic Leukemia	0	1.3	0	0.0 – 4.2	9	8.4	1.1	0.4 – 2.4
Acute Myeloid Leukemia	<5	NS	0.7	0.0 – 3.4	20	16.9	1.2	0.6 – 2.1
Chronic Myeloid Leukemia	<5	NS	2.4	0.0 – 17.8	<5	NS	1.1	0.1 – 4.0
Aleukemic, Subleukemic, & NOS	<5	NS	1	0.0 – 7.3	<5	NS	0.4	0.1 – 1.6
FEMALES	ZIP Code 76065 [#]				Ellis County			
	Observed	Expected	SMR	99% CI	Observed	Expected	SMR	99% CI
Total Leukemia	9	4.7	1.9	0.7 – 4.2	37	33.8	1.1	0.7 – 1.7
Total Childhood Leukemia (Age 0-19)	0	0.3	0	0.0 – 20.9	<5	NS	2.7	0.5 – 8.4
Acute Lymphocytic Leukemia	0	0.4	0	0.0 – 12.0	<5	NS	1.1	0.1 – 3.8
Chronic Lymphocytic Leukemia	<5	NS	4.3	0.5 – 15.7	11	5.9	1.9	0.7 – 3.8
Acute Myeloid Leukemia	5	2	2.5	0.5 – 7.1	11	13	0.8	0.3 – 1.8
Chronic Myeloid Leukemia	0	0.3	0	0.0 – 20.4	<5	NS	1	0.1 – 4.8
Aleukemic, Subleukemic, & NOS	<5	NS	1.5	0.0 – 10.9	5	5.5	0.9	0.2 – 2.6

SMR based on the average of the 2000 and 2010 census population. -

NOS—Not otherwise specified. -

NS—Not shown. For confidentiality, observed and expected number of deaths is suppressed when there are 1-4 observed deaths. -

Childhood Cancer

Residents of Midlothian expressed some specific concerns about the number of childhood cancers. TCR cancer incidence and mortality data on total childhood cancer (age 0-19) and total childhood leukemia (age 0-19) were evaluated to address these concerns. Table 4.2.10 presents the childhood cancer incidence data for males and females for ZIP code 76065, Ellis County, and Public Health Region 3 for the ten year period 1999-2008. Table 4.2.11 provides the childhood cancer mortality data for males and females for ZIP code 76065, Ellis County, and Public Health Region 3 for the ten year period 2000-2008. None of the SIRs or SMRs for total childhood cancer or total childhood leukemia was found to be statistically significant. Childhood cancer and mortality are relatively rare events and as discussed in General Approach and Methods (Section 3), a small number of cases can result in unstable estimates that are more influenced by chance.

Table 4.2.10 Observed and expected number of cases and Standardized Incidence Ratios (SIR), Males and Females, Total childhood cancer (ages 0-19) and total childhood leukemia (ages 0-19), 1999-2008 for Midlothian ZIP code 76065, Ellis County, TX and Public Health Region 3. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals. Data source: DSHS TCR.

Site/Geographic Area	Males				Females			
	Observed	Expected	SIR	99% CI	Observed	Expected	SIR	99% CI
Total Childhood Cancers (Age 0-19)								
Midlothian ZIP code 76065#	5	7.3	0.7	0.2 – 2.0	9	6.1	1.5	0.5 – 3.3
Ellis County, TX	23	39.4	0.6	0.3 – 1.0	33	33.0	1	0.6 – 1.5
Public Health Region 3	1,684	1,742.7	1	0.9 – 1.0	1,442	1,463.9	1	0.9 – 1.1
Total Childhood Leukemia† (Age 0-19)								
Midlothian ZIP code 76065#	<5	NS	1	0.1 – 4.8	<5	NS	1.3	0.1 – 6.1
Ellis County, TX	10	11.1	0.9	0.3 – 1.9	9	8.7	1	0.4 – 2.3
Public Health Region 3	475	509.7	0.9	0.8 – 1.1	406	405.8	1	0.9 – 1.1

SIR based on the average of the 2000 and 2010 census population. -

NS—Not shown. For confidentiality, observed and expected number of cases is suppressed when there are 1-4 observed cases. -

† Total Childhood Leukemia (age 0-19) includes the 5 leukemia sub-types (acute lymphocytic, chronic lymphocytic, acute myeloid, chronic myeloid, and aleukemic, subleukemic and not otherwise specified (NOS)).

Table 4.2.11 Observed and expected number of deaths and Standardized Mortality Ratios (SMR), Males and Females, Total childhood cancer (ages 0-19) and total childhood leukemia (ages 0-19), 2000-2009 for Midlothian ZIP code 76065, Ellis County, TX and Public Health Region 3. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals. Data source: DSHS TCR and TCHS.

Site/Geographic Area	Males				Females			
	Observed	Expected	SMR	99% CI	Observed	Expected	SMR	99% CI
Total Childhood Cancers (Age 0-19)								
Midlothian ZIP code 76065#	<5	NS	1.8	0.1 – 8.1	<5	NS	1.1	0.0 – 8.0
Ellis County, TX	<5	NS	0.6	0.1 – 1.9	8	5.3	1.5	0.5 – 3.5
Public Health Region 3	255	288.2	0.9	0.8 – 1.0	231	231.6	1	0.8 – 1.2
Total Childhood Leukemia† (Age 0-19)								
Midlothian ZIP code 76065#	<5	NS	3.1	0.0 – 23.0	0	0.3	0	0.0 – 20.9
Ellis County, TX	<5	NS	0.5	0.0 – 3.9	<5	NS	2.7	0.5 – 8.4
Public Health Region 3	69	83.5	0.8	0.6 – 1.1	71	66	1.1	0.8 – 1.5

SMR based on the average of the 2000 and 2010 census population. -

NS—Not shown. For confidentiality, observed and expected number of deaths is suppressed when there are 1-4 observed deaths. -

† Total Childhood Leukemia (age 0-19) includes the 5 leukemia sub-types (acute lymphocytic, chronic lymphocytic, acute myeloid, chronic myeloid, and aleukemic, subleukemic and not otherwise specified (NOS)).

In summary, in the Midlothian ZIP code 76065, the standardized incidence ratios of cancer for the ten year period 1999-2008 and the standardized mortality ratios of cancer for the ten year period 2000-2009 did not show a significantly higher incidence or mortality than expected for any of the cancer groupings or sites, including leukemia and childhood cancers. These data were comparable to previous cancer cluster investigations on cancer mortality and cancer incidence by the TCR that found the SIRs and SMRs were within expected ranges for men and women in the

Midlothian ZIP code. No incidence rates or SIRs are available for the potential area of impact. The observed number of cases between 1999-2008 for the different cancer groupings and sites in the potential area of impact appear consistent with the other geographical units. These analyses do not allow for conclusions to be made for any association or causal relation between the occurrence of cancer and exposures from airborne contaminants in the Midlothian area.

Queries on cancer mortality and incidence rates for other Public Health Service Regions, counties or metro statistical areas can be made at the DSHS Texas Cancer Registry website (<http://www.cancer-rates.info/tx/index.php>). Other publications, statistical data, and fact sheets on cancer in Texas can be found at the TCR site (<http://www.dshs.state.tx.us/tcr/>).

4.3 Mortality

In this Midlothian health consultation on health outcome data, birth rates are discussed in section 4.1. This section covers mortality or death rates for the main causes of death. Two causes of death have been discussed in more detail in previous sections: infant and fetal mortality in section 4.1 and cancer mortality in section 4.2. While increased death rates were not a specific concern raised by Midlothian community members, this health endpoint was included to complete the overview of vital statistics.

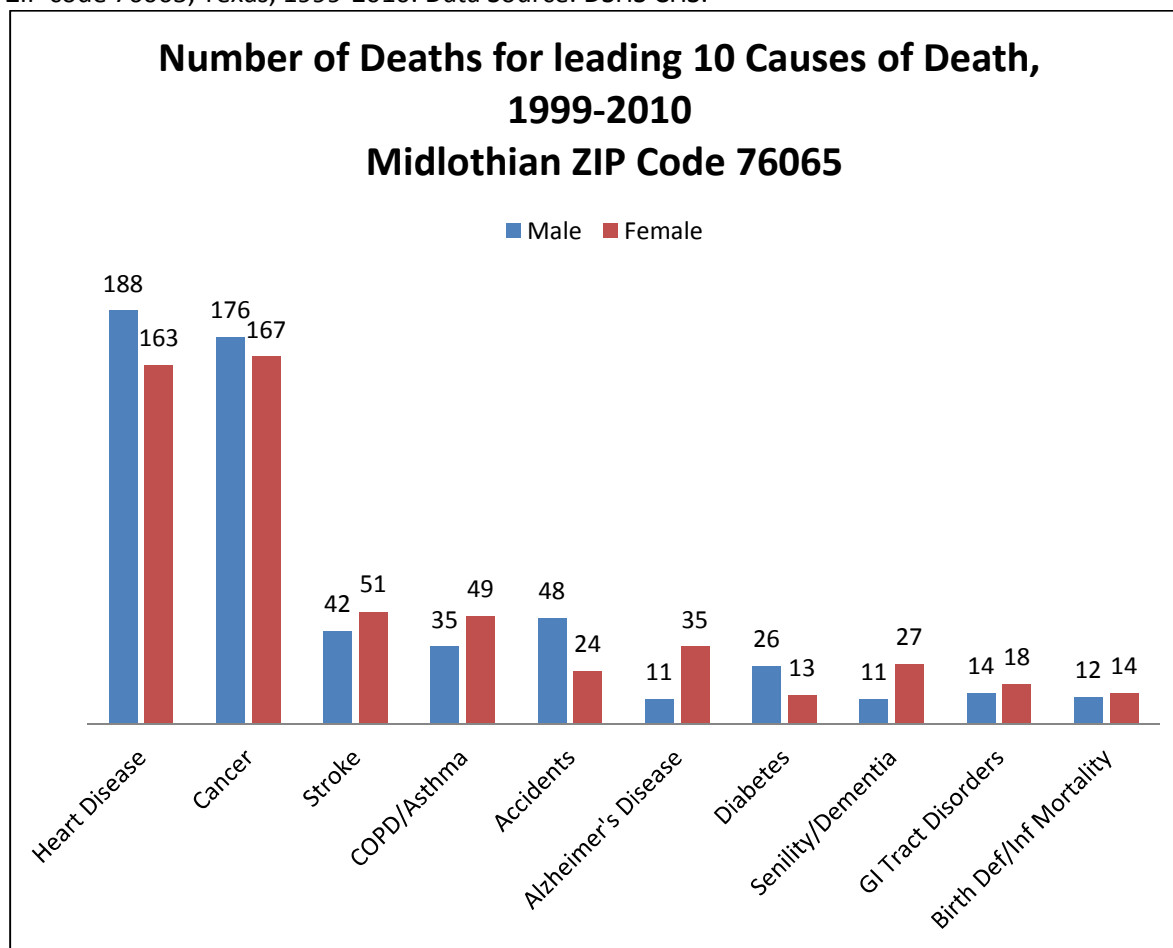
Air sampling data evaluated in the Midlothian health consultation on criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a] revealed that during various time periods fine particulate matter (PM_{2.5}), ozone, and sulfur dioxide (SO₂) were present at concentrations in Midlothian that may be of health concern for some sensitive individuals. Various air pollutants have been associated with a range of adverse health effects, including increased mortality. A review of epidemiologic studies of short term and long term exposure to particulate matter and other pollutants have demonstrated excess mortality in populations that are more exposed to air pollutants [Samet 2007].

For this HOD health consultation, the DSHS Health Assessment and Toxicology (HAT) Program was asked to provide crude mortality rates and standardized mortality ratios (SMRs) for the Midlothian ZIP code (76065), Ellis County, Public Health Region 3 (PHR 3), and Texas. HAT obtained this data from the DSHS Center for Health Statistics (CHS), Vital Statistics Unit for the twelve year period 1999-2010 for the 33 leading causes of death and all deaths. The coding system used for mortality data is the International Classification of Diseases, Tenth Revision (ICD-10) which has been in use since 1999. This coding system allows for comparability of cause of death statistics reported from different countries or other areas. A table of the ICD-10 codes included for the leading causes of death categories for this health consultation can be found in Appendix A, Table A.4.3.a. As with other databases, there are limitations which include correct ascertainment of the disease or condition. For mortality data, this may include not being able to identify the underlying cause of death. Particularly for some conditions such as Alzheimer's disease, this may result in an underestimate in some categories, so differences between categories may result from coding practices.

The number of deaths, percentage of deaths, and crude mortality rates (rates which are not adjusted for age and race/ethnicity) were provided for males, females, and total population for

the four geographic areas can be found in Appendix A, Tables A.4.3.b to A.4.3.e. Heart disease and cancer accounted for about 50% of the deaths in all of these areas. During the 12 year period, there were 1,406 deaths reported in ZIP code 76065 with a crude mortality rate of about 515 per 100,000 population. The number of deaths in males and females for the top 10 leading causes of death in ZIP code 76065 are displayed in Figure 4.3.1.

Figure 4.3.1 Number of deaths for the ten leading causes of death in males and females in Midlothian ZIP code 76065, Texas, 1999-2010. Data Source: DSHS CHS.

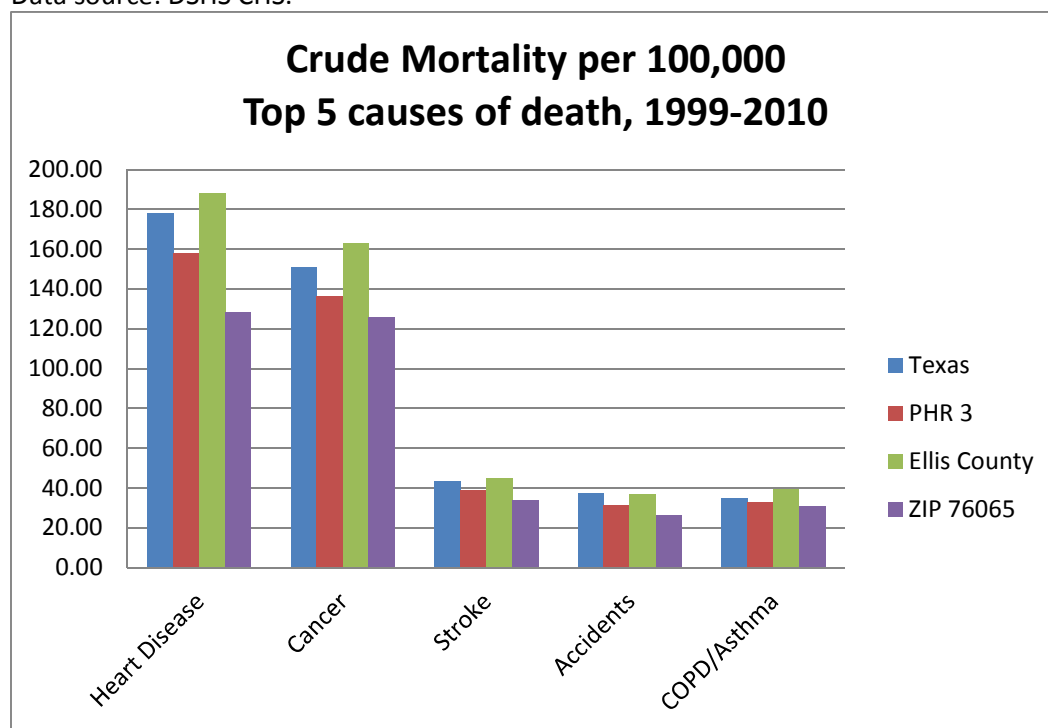


A comparison of the crude mortality rates for all causes and the 33 leading causes of death for males, females, and total population for the four geographic areas can be found in Appendix A, Table A.4.3.f. The crude mortality rates for all cause mortality in Midlothian ZIP code 76065 for males, females, and combined males and females were lower than that of Ellis County, Public Health Region 3, and Texas (Table 4.3.1). Crude mortality rates for the top 5 leading causes of death were lower in ZIP code 76065 than that of Ellis County, Public Health Region 3, and Texas (Figure 4.3.2).

Table 4.3.1. Crude mortality rates per 100,000 for males, females, and combined males and females for all causes of death for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3), and Texas, 1999-2010. Data source: DSHS CHS.

Mortality Area	Male	Female	Total
Midlothian ZIP Code 76065	525.17	504.76	514.94
Ellis County	707.83	734.23	721.03
Public Health Region 3	601.70	616.37	609.02
Texas	693.37	679.06	686.21

Figure 4.3.2 Crude mortality rates per 100,000 for males and females for the 5 leading causes of death for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR3), and Texas, 1999-2010. Data source: DSHS CHS.



To account for differences in demographics, since age and race will influence death rates, standardized mortality ratios (SMRs) with 95% confidence intervals were calculated for ZIP code 76065, Ellis County, and Public Health Region 3, using Ellis County, Public Health Region 3, and Texas as comparison populations for the same time period. In all, there were six comparison pairings. Tables presenting SMRs for males, females, and combined for the 33 leading causes of death for the six comparison pairings can be found in Appendix A, Tables A.4.3.g to A.4.3.l. A summary table for these pairings for the combined males and females can be found in Appendix A, Table A.4.3.m.

As described in Section 4.2 on cancer mortality, to interpret an SMR, a ratio greater than 1.0 indicates more cancer deaths than expected; a ratio less than 1.0 indicates fewer deaths than expected. The interpretation of the ratio depends on both the size of the ratio and the number of cases used to calculate the ratio. Ratios based on a larger number of cases are more stable; ratios based on a fewer number are more influenced by chance. To take this into account, a confidence

interval (CI) is calculated. This statistical measure shows the precision of the estimated risk ratio. A small interval will reflect a greater precision. If the confidence interval contains 1.0, no statistically significant excess number of cancer deaths is indicated.

From 1999-2010, none of the SMRs for the 33 leading causes of death for ZIP code 76065 compared to Ellis County were statistically significant, either for males, females, or for both males and females combined. Of the 5 leading causes of death, cancer mortality for combined males and females was statistically significantly lower in ZIP code 76065 than in Public Health Region 3, and accident mortality was statistically significantly lower in ZIP code 76065 compared to Texas (Table 4.3.2). Male cancer mortality was also statistically significantly lower for ZIP code 76065 as compared to Public Health Region 3 (SMR: 0.85, 95% CI: 0.73-0.99). Suicide mortality was statistically significantly lower for ZIP code 76065 as compared to Public Health Region 3 for males (SMR: 0.56, 95% CI: 0.31-0.94) and total population (SMR: 0.59, 95% CI: 0.35-0.92) (see also Appendix A, Table A.4.3.h).

Table 4.3.2 Standardized Mortality Ratios (SMR) for combined males and females for the top 5 leading causes of death for Midlothian ZIP code 76065 using comparison populations for Ellis County, Public Health Region 3, and Texas with 95% Confidence Intervals (CI), 1999-2010. Data source: DSHS CHS.

ZIP code 76065 as compared to:									
Cause of Death	Ellis County			Public Health Region 3			Texas		
	SMR	Lower 95% CI	Upper 95% CI	SMR	Lower 95% CI	Upper 95% CI	SMR	Lower 95% CI	Upper 95% CI
Heart Disease	0.93	0.84	1.04	0.97	0.87	1.08	0.97	0.87	1.08
Cancer	0.91	0.82	1.01	0.89**	0.80	0.99	0.95	0.85	1.06
Stroke	1.10	0.89	1.35	1.05	0.85	1.29	1.20	0.97	1.47
Accidents	0.80	0.62	1.01	0.86	0.68	1.09	0.71**	0.55	0.89
COPD/Asthma	0.96	0.77	1.19	1.01	0.81	1.25	1.03	0.82	1.27

** Significantly lower than expected at the p<0.05 level.

In addition to accident deaths, during 1999-2010, suicides, liver disease deaths (Figure 4.3.3), and all other causes of death (SMR: 0.49, 95% CI: 0.23-0.90) were statistically significantly lower for ZIP code 76065 as compared to Texas for the total population. Accidents (SMR: 0.72, 95% CI: 0.53-0.95) and suicides (SMR: 0.50, 95% CI: 0.28-0.985) were statistically significantly lower for ZIP code 76065 as compared to Texas for the male population. Only Alzheimer’s disease was statistically significantly higher for ZIP code 76065 as compared to Texas females (SMR: 1.58, 95% CI: 1.10-2.20) and total population (Figure 4.3.3). The complete table of SMRs for the 33 leading causes of death in males, females, and total population for ZIP code 76065 with respect to Texas can be found in Appendix A, Table A.4.3.i.

Standardized mortality ratios for the 33 leading causes of death in Ellis County as compared to Texas were reviewed (Appendix A, Table A.4.3.k). There were 10 causes of death that were statistically significantly different in males, females, total population, or a combination of groups (Table 4.3.3). Similar to results comparing mortality rates of ZIP code 76065 to Texas, there were statistically significantly lower rates of male and total accident deaths and suicides and a statistically significantly higher rate for female and total Alzheimer’s disease related deaths in Ellis County compared to Texas.

Figure 4.3.3 Standardized Mortality Ratios (SMR) for combined males and females for the top 15 leading causes of death for Midlothian ZIP code 76065 using Texas as the comparison population with 95% Confidence Intervals (CI), 1999-2010. Data source: DSHS CHS.

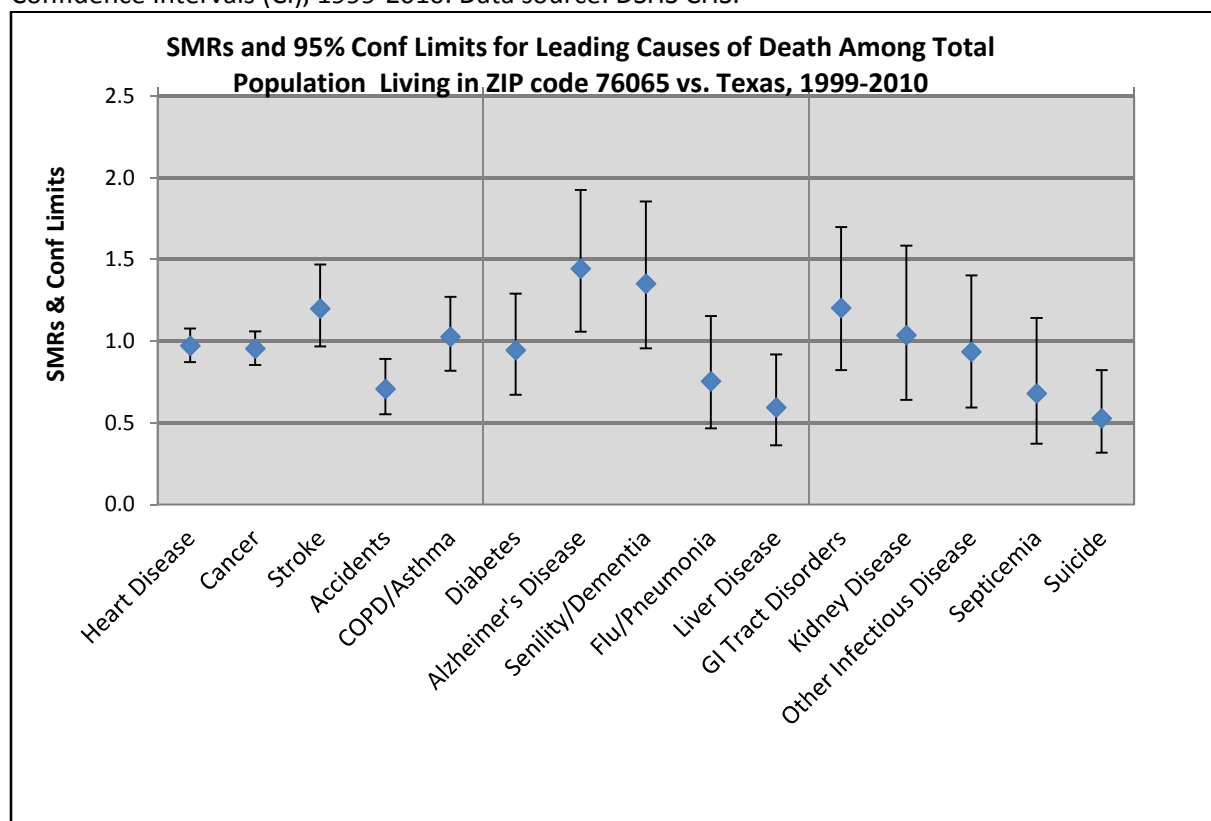


Table 4.3.3 Standardized Mortality Ratios (SMR) for males, females, and combined males and females for the statistically significant leading causes of death for Ellis County using comparison populations for Texas with 95% confidence intervals (CI), 1999-2010. Data source: DSHS CHS.

Cause of Death	Males			Females			Total		
	SMR	95% CI		SMR	95% CI		SMR	95% CI	
		Lower	Upper		Lower	Upper		Lower	Upper
Heart Disease	1.02	0.97	1.08	1.08*	1.02	1.13	1.05*	1.01	1.09
Cancer	1.03	0.98	1.09	1.06	1.00	1.12	1.04*	1.00	1.08
Accidents	0.88**	0.79	0.97	0.93	0.80	1.06	0.89**	0.82	0.97
Diabetes	1.20*	1.04	1.39	0.97	0.82	1.13	1.08	0.97	1.21
Alzheimer's Disease	1.50*	1.24	1.78	1.70*	1.53	1.89	1.64*	1.50	1.80
Senility/Dementia	1.40*	1.14	1.70	1.23*	1.08	1.39	1.27*	1.14	1.42
Liver Disease	0.72**	0.58	0.87	0.91	0.70	1.17	0.78	0.66	0.91
Suicide	0.78**	0.64	0.93	0.86	0.60	1.19	0.79**	0.67	0.93
Hypertension	0.88	0.59	1.26	1.30*	1.01	1.64	1.14	0.93	1.39
HIV Disease	0.64**	0.44	0.91	0.71	0.32	1.34	0.66**	0.47	0.89
All Other Causes	0.75**	0.56	0.98	0.65**	0.48	0.87	0.70**	0.57	0.85

* Significantly higher than expected at the p< 0.05 level.

** Significantly lower than expected at the p< 0.05 level.

In summary, in the Midlothian ZIP code 76065, the crude mortality rate for all deaths was less than the rate in Ellis County, Public Health Region 3, and Texas. Crude mortality rates for the top 5 leading causes of death were similar for these geographic areas, with heart disease deaths and cancer deaths accounting for about half of the mortality. Standardized mortality ratios (SMRs) for the twelve year period 1999-2010 indicated that for the 33 leading causes of death for ZIP code 76065, mortality due to accidents, suicide, liver disease, and ‘all other causes of death’ were significantly lower compared to Texas, and Alzheimer’s disease mortality was significantly higher compared to Texas. These analyses do not allow for conclusions to be made for any causal relation between the crude mortality rates or SMRs and air pollution exposures in the Midlothian area.

Vital statistics including mortality data by public health region and county are available on line by year from the DSHS Center for Health Statistics at <http://www.dshs.state.tx.us/chs/vstat/annrpts.shtm> .

4.4 Childhood Lead Exposure

Because of the presence of the steel mill and three cement manufacturing facilities in Midlothian which have reported lead emissions based on the Texas Commission on Environmental Quality (TCEQ) Point Source Emission Inventory and EPA’s Toxics Release Inventory (TRI) data [ATSDR 2016a], there was a request by individuals in the community to examine if there was an elevated number of cases of childhood lead poisoning in the Midlothian area.

Data on air emissions of lead evaluated in the Midlothian health consultation on criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a], found that lead air exposures during the period 1993 to 1998, in a localized area just north of the Gerdau Ameristeel fence line, were at concentrations that may have harmed the health of children who resided or frequently played in the area. That area was sparsely populated, and it was unknown how few, if any, children lived there. Using a model developed by the EPA to estimate childhood blood lead levels (Integrated Exposure Uptake Biokinetic Model, IEUBK), it was predicted that there was not an appreciable risk of these exposures resulting in children in that area having blood lead levels above 5 micrograms of lead per deciliter ($\mu\text{g}/\text{dL}$). This section presents the clinical blood lead data obtained from the Texas Department of State Health Services (DSHS).

Lead is a naturally occurring metal that is a common environmental contaminant. Living in older housing (especially pre-1950s) is a major risk factor for childhood exposure to lead because of deteriorated lead-based paint. In addition, some areas around mines, smelters, and other industries have higher soil lead concentrations. More recently, some imported children’s toys and metal jewelry have been found to contain high concentrations of lead. Most significant childhood exposures occur from direct ingestion (e.g., paint chips or home remedies containing lead) or through hand to mouth behavior after coming in contact with highly contaminated soil and dust. Lead is not a required nutrient in the body and there is no known benefit from ingesting lead. Lead toxicity can affect every organ system in the body. The nervous system, kidneys, and blood are primary target organs. Even fairly low blood lead levels (BLL) are associated with more subtle health effects including childhood learning disabilities and behavior problems [ATSDR

2007]. After absorption of lead into the body, the lead distributes from the blood to soft tissues and mineralizing tissues such as bones and teeth. Lead that is not excreted in the feces or urine will accumulate in the bone and be released very slowly. Blood lead levels therefore reflect predominantly recent or ongoing exposures with only a small contribution from past exposures from the somewhat fixed burden of lead in the bones.

In the United States, children's BLLs have dramatically dropped since the 1970s when leaded gasoline was phased out and lead paint was banned. According to data from the National Health and Nutrition Examination Surveys (NHANES), between 1976 and 1980 over 88% of children between the ages of 1 and 5 had BLLs above 10 µg/dL. In the 1999-2002 NHANES report, this percentage was 1.6% [CDC 2007]. While no safe blood lead level has been defined, starting in 1991, the BLL at which the CDC recommended that public health actions be initiated was 10 µg/dL. In January 2012, the Advisory Committee on Childhood Lead Poisoning Prevention recommended that CDC use a childhood BLL reference value based on the NHANES 97.5th percentile of the population BLL in children ages 1 to 5 (currently 5 µg/dL) [CDC 2012a]. CDC adopted these and other ACCLPP recommendations in 2013.

Until recently, the CDC provided funding to state and local health departments for childhood lead poisoning prevention programs to ensure that children identified with elevated blood lead levels receive medical follow-up and care. The program also provided training and education for public health practitioners and the public to assist in primary prevention strategies. From 2000 to 2011, DSHS received funding from CDC for its Childhood Lead Poisoning Prevention Program (TXCLPPP) (<http://www.dshs.state.tx.us/lead/>).

TXCLPPP provided annual reporting to the CDC on childhood blood lead levels that are available on their website. These data are presented at the county level. For this HOD health consultation, the TXCLPPP was asked to provide a summary of blood lead level testing results for children less than 15 years of age residing in the city of Midlothian, Texas for all available years. At the time of the request, complete datasets were available from 1997-2009. Prior to 1997, the state only required that laboratories and health care providers submit data for BLLs that were 10 µg/dL or above. Since 1997, there is a mandatory reporting requirement for laboratories and health care providers that all blood lead results (both capillary and venous) be reported to the state. For the comparison population, data from the entire state was also requested. Table 4.4.1 is a summary of the TXCLPPP data analysis.

The 1997-2009 data showed 21 cases out of 891 in Midlothian (2.36%) where BLL was at or above 10 µg/dL in children between the ages of 0 and 14, and only one of these cases was reported from a venous blood sample. The percent of Midlothian children tested who had BLL at or above 10 µg/dL was comparable to the percent in Texas as a whole (2.31%) for this time period. The majority (788 of 891) of the children tested in Midlothian were between the ages of 0 and 5 and this group comprised 20 of the 21 cases of BLL at or above 10 µg/dL. In five of the thirteen years, no child had a blood lead sample that exceeded this elevated BLL value. The maximum BLL reported in Midlothian was 27 µg/dL for a capillary blood sample.

Table 4.4.1. Summary TXCLPPP Blood lead level (BLL) testing data (1997-2009) for Children 0-14 years of age residing in Midlothian, Texas and the entire state of Texas†. Data source: TXCLPPP.

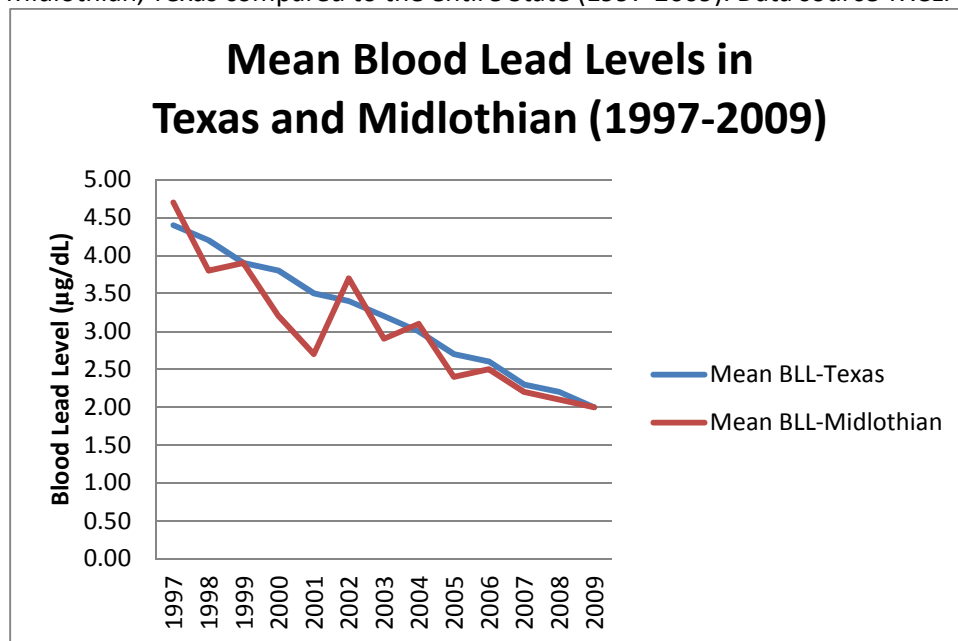
Year	Midlothian				Texas			
	Number tested	Number with BLL $\geq 10\mu\text{g/dL}$	BLL ($\mu\text{g/dL}$)		Number tested	Number with BLL $\geq 10\mu\text{g/dL}$	BLL ($\mu\text{g/dL}$)	
			Maximum	Mean			Maximum	Mean
1997	78	7	21	4.7	280,369	14,991	327	4.4
1998	37	2	15	3.8	284,098	14,016	192	4.2
1999	54	2	12	3.9	246,224	9,870	120	3.9
2000	27	0	9	3.2	227,686	9,596	334	3.8
2001	25	0	6	2.7	222,247	6,133	186	3.5
2002	34	4	14	3.7	250,466	7,386	485	3.4
2003	38	1	11	2.9	295,645	6,187	149	3.2
2004	65	2	14	3.1	344,484	5,208	224	3.0
2005	91	0	9	2.4	322,934	3,946	326	2.7
2006	100	2	20	2.5	304,029	3,857	237	2.6
2007	80	0	7	2.2	332,686	3,276	605	2.3
2008	126	0	17	2.1	375,152	3,181	121	2.2
2009	136	1	27	2.0	438,755	3,028	152	2.0
Total	891	21	27		3,924,775	90,675	605	

† All counts are for unduplicated children per given year using the highest blood lead level reported. Elevated counts (children with BLL $\geq 10\mu\text{g/dL}$) include results for capillary, venous, or unknown sample types. All results are ‘as reported’ even if timely retesting may later determine a potential false elevation.

In Texas, it is recommended that children with BLL at or above $10\mu\text{g/dL}$ receive follow-up and confirmatory venous blood lead testing. An Environmental Lead Investigation is performed at the child’s residence to determine potential lead sources if the child’s venous BLL is at $20\mu\text{g/dL}$ or greater or if two venous BLLs taken 12 weeks apart are between $15\text{-}19\mu\text{g/dL}$ (*n.b.* effective July 1, 2010, the latter criteria was amended to two venous BLLs taken 12 weeks apart that are between $10\text{-}19\mu\text{g/dL}$). Between 1997 and 2009, there were no children tested in Midlothian who met the qualifying criteria for venous blood lead to trigger an Environmental Lead Investigation. A possible upcoming change is the recommendation by a stakeholder group that advises TXCLPPP to use a blood lead level of $5\mu\text{g/dL}$ to trigger follow-up actions by health care providers.

A Welch’s two-tailed t-test for unpaired data of unequal variances statistical analysis was performed on the data to determine if there was a difference between the mean BLL found in children tested between the ages of 0 and 14 living in Midlothian as compared to those tested in the state for each surveillance year. Because the Midlothian population sampled each year represented less than 0.05% of the state population sampled, the two populations were considered independent. Generally, in public health measure comparisons, if the overlap of populations is less than 10% no correction factor is needed when comparing populations [Hayes 2006]. With the exception of the year 2001, in which the mean BLL for the state was statistically greater (with 95% confidence) than the mean BLL for the city of Midlothian, the means for the two groups of children tested were statistically similar. Figure 4.4.1. provides a graph of the mean values for the two populations. The downward trend of mean BLL for the city and state data over the last thirteen years can be appreciated from this figure.

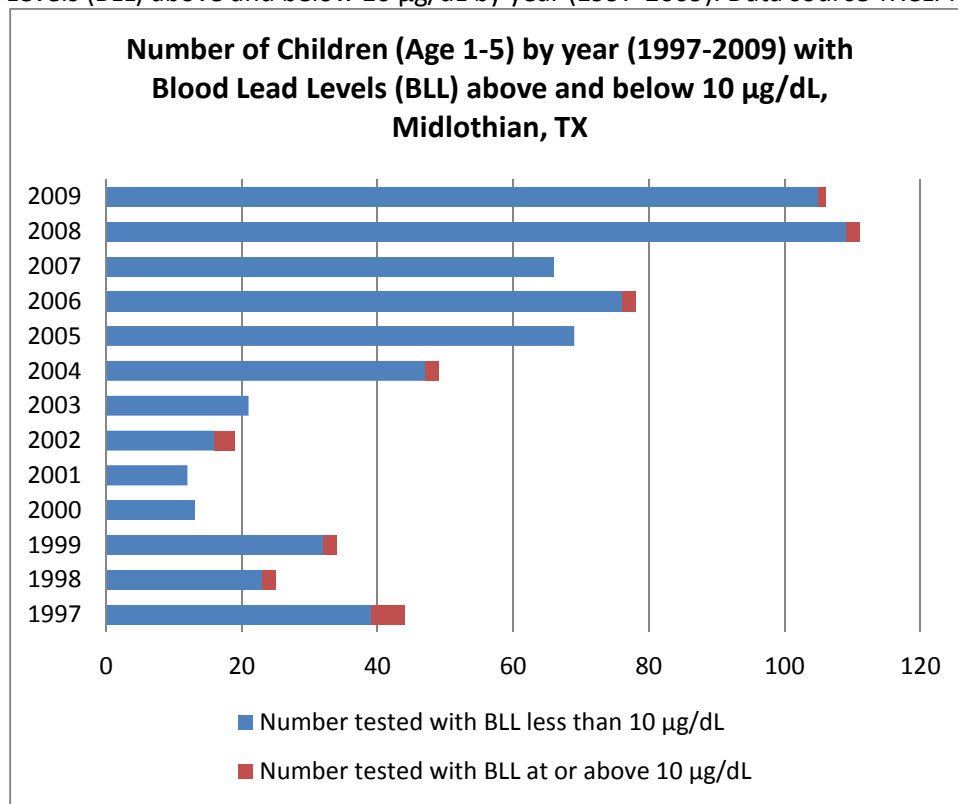
Figure 4.4.1 Mean Blood Lead Levels (BLL) ($\mu\text{g}/\text{dL}$) for Children tested 0-14 years of age residing in Midlothian, Texas compared to the entire State (1997-2009). Data source TXCLPPP.



Since very young children are particularly susceptible to adverse health effects from lead exposure, a subset of the TXCLPPP data was evaluated for the children tested who were between the ages of 1 and 5. Factors such as hand to mouth behavior and playing outdoors or on the floor that may have lead contaminated soils and dusts increase the likelihood of lead exposure to young children. Figure 4.2.2 shows the number of Midlothian children tested in this age category by year with blood lead levels at or above $10 \mu\text{g}/\text{dL}$. Between 1997 and 2009, 19 of 647 Midlothian children (age 1-5) had venous or capillary BLLs at or above $10 \mu\text{g}/\text{dL}$. Similarly, about 2.9% of the children (age 1-5) tested in Texas had BLLs at or above $10 \mu\text{g}/\text{dL}$ for that same time period. Only one child tested in Midlothian who was between the ages of 1 and 5 had a venous blood lead level above $10 \mu\text{g}/\text{dL}$. In 2009, the mean BLL for Midlothian children (age 1-5) tested was $2.2 \mu\text{g}/\text{dL}$.

Data from the NHANES 2007-2008 survey presented in the Fourth National Report on Human Exposure to Environmental Chemicals, Updated Tables [CDC 2011a] show that nationwide, the geometric mean BLL for children between the ages of 1-5 is $1.51 \mu\text{g}/\text{dL}$ with 75th and 95th percentile concentrations of $2.20 \mu\text{g}/\text{dL}$ and $4.10 \mu\text{g}/\text{dL}$, respectively. These venous-only blood samples were collected from a representative nationwide survey of children. A comparison of earlier NHANES surveys reveals that for their corresponding years, the arithmetic mean BLL for the children tested in the city of Midlothian and the state are below the 95th percentile of the NHANES data for children 1 to 11 years of age, and are higher than the geometric mean and 50th percentile. This most likely represents differences in testing procedure and participant selection.

Figure 4.4.2 Number of children tested 1-5 years of age residing in Midlothian, Texas with Blood Lead Levels (BLL) above and below 10 µg/dL by year (1997-2009). Data source TXCLPPP.



The TXCLPPP data reported the highest BLL for a child in a given year and included both capillary and venous blood samples. Capillary samples are prone to falsely elevated readings and must be verified by venous blood sampling. Unlike NHANES, the children tested in the city of Midlothian or in the state of Texas do not represent a random sample of all children, rather Texas targets screening efforts at children who have a high risk for lead poisoning. Children may be selected for testing as a requirement for participation in the Texas Medicaid program (Texas Health Steps) and some other federally or state funded programs. Based on recommendations from the CDC [1997], there is some active recruitment for various socio-economic groups and for children residing in older housing. While the Midlothian ZIP code (76065) is not a targeted area based on housing characteristics, some children are tested for Medicaid requirements. Others may have testing performed because of parental or health care provider concerns about the child’s health. Thus, the population of children tested is not representative of all children; the children tested would be anticipated to have higher blood lead levels than the nationwide reference ranges reported in NHANES.

In summary, the analysis of the blood lead data for children tested in Midlothian show that their results were similar to those children tested in the state of Texas. No unusual pattern of elevated blood lead levels was identified. The screening of children based on known risk factors, such as residence in pre-1950 housing, is reasonable and no additional targeted screening based solely on proximity to steel or cement industries in Midlothian appears warranted.

4.5 Chronic Diseases

Midlothian residents have expressed concerns about a range of chronic health conditions (for example, diabetes and fibromyalgia) or acute health outcomes from some underlying disease process (for example, deep vein thrombosis) that they believe may be related to air pollutants emitted from the steel mill and three cement manufacturing facilities in Midlothian. In addition, since the inhalation pathway is one of the primary exposure routes for community members, cardiovascular and pulmonary health conditions can be exacerbated with exposure to concentrations of certain air pollutants, including particulates, ozone, and sulfur dioxide. Based on the air sampling data in the Midlothian health consultation on the criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a], during various time periods when sampling data was available, some of these air pollutants were present at concentrations in Midlothian that may be of health concern for some sensitive individuals.

To address these health concerns, several databases were evaluated to determine their usefulness in obtaining rates of these diseases in Midlothian as compared to Ellis County, Public Health Region 3, or Texas. The major categories of disease examined included diabetes, cardiovascular disease, asthma, other respiratory diseases, and other chronic diseases. To put a perspective on the prevalence of contributing risk factors for some of the conditions, a section on risk factors was also included.

Databases for chronic diseases

Community members requested that alternative databases be examined to evaluate the occurrence of several non-cancer diseases or adverse health outcomes as compared to other areas. Unfortunately, there are only a limited number of databases and surveys specific enough for the Midlothian area to allow for comparison of rates of disease or adverse health outcomes other than the databases for cancer and birth defects. None of the available databases was designed to address a possible cause and effect relationship with environmental pollutants. Instead, these disease databases and surveys are often used by health care researchers, policy analysts, and public health officials to evaluate utilization of health care services and the underlying burden of disease in an area. Public health interventions to improve health care such as additional screening, additional services, and health education campaigns are some of the actions initiated based on the ongoing surveillance.

The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based system of health surveys established by the CDC that collects information on health conditions and health risk behaviors. The DSHS Center for Health Statistics (CHS) administers this federally-funded telephone survey. Texas has participated since 1987. CDC provides a core questionnaire that is standard across all 50 states, and states may choose to supplement with optional standard modules and state-added questions. Data gained from these surveys can be used to generate estimated prevalence rates of a variety of health conditions.

For this health consultation, pertinent Texas BRFSS survey questions were compiled by searching the on-line BRFSS questionnaire database at the following web site: (http://www.dshs.state.tx.us/chs/brfss/query/ques_query.shtm). The questions, variable names,

and years available were then provided to DSHS CHS (see Appendix A, Table A.4.5.a). The questions provided were related to diabetes, cardiovascular disease, adult asthma, childhood asthma, chronic obstructive pulmonary disease, and other chronic conditions including arthritis. CHS was asked to provide percent prevalence data on these conditions for the ten combined years available (2001-2010) for Ellis County, Public Health Region 3, and Texas. Because of the small sample size, data for the Midlothian area (ZIP code 76065) had to be combined with data from the Cedar Hill area (ZIP code 75104) to have sufficient survey responses to analyze. Data at the ZIP code level were only available for the time period 2004-2010. Not all questions were asked in any given year. All reported rates are weighted for Texas demographics and the probability of selection and computed using complex samples in SPSS (Statistical Package for the Social Sciences). CHS also provided data on health outcome risk factors including smoking, exercise, obesity, and high cholesterol. The BRFSS data for the health outcomes are presented in their respective sections.

Another readily available source of information on chronic diseases and other related conditions is the Texas hospital inpatient discharge data. The Texas Health Care Information Council (THCIC) under the DSHS Center for Health Statistics is responsible for collecting hospital discharge data from all state-licensed hospitals except those that are statutorily exempt. Discharges of Texas residents from hospitals outside of the state are not included in these data. CHS provides a Public Use Data File (PUDF) on Texas hospital inpatient discharges. The coding system used is the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). While an admitting diagnosis code, a principal diagnosis code, 10 external cause codes (E-codes), up to 25 surgical procedure codes, and up to 24 other diagnosis codes may be submitted per patient discharge, for the analyses in this health consultation, only the principal (non-surgical) discharge diagnosis code was evaluated. Since we looked at primary diagnosis code, other comorbidities were not studied. As a result, conditions of lesser severity than the primary diagnosis may be under-represented in the reported results. The practice of using the first-listed or principal discharge diagnosis is consistent with the CDC's National Center for Health Statistics (NCHS) reporting.

Unlike BRFSS data, hospital inpatient discharge data cannot be used to estimate the prevalence of a specific chronic disease or health condition in the community. The PUDF hospital discharge database only contains records of individuals who are admitted and discharged from a Texas hospital with all their various diagnosis codes and other information. Patients who have the same diseases or conditions, but are treated on an out-patient basis only, would not be included in the counts from the PUDF database. Also, the PUDF data-set contains no means of identifying individuals who have had multiple admissions for the same condition; therefore, duplicate cases cannot be identified and eliminated. Consequently, the underlying prevalence or incidence rates of the various diseases remain unknown in the various geographic areas studied. The odds ratio for hospitalization for one of the diagnosis codes of interest is based on the numbers of records having that principal diagnosis code in the two geographic areas being compared relative to the total numbers of hospital discharges for the same two geographic areas in a given year. No adjustment was made for age, race or sex.

Hospitalization for any one of the diseases studied would potentially suggest a complication or aggravation of the underlying chronic condition. Many factors, or a combination of factors, may influence the hospital discharge odds ratios, including differences in disease management and

treatment, differences in the demographics of a region, and differences in access to medical or hospital care. Hospital discharge data do not provide any information on causation for discharges related to either chronic diseases or to more acute events, such as a myocardial infarction (heart attack). Also, since the date of discharge is not included in the PUDF data-set and the discharge can only be identified as occurring in the 1st, 2nd, 3rd, or 4th quarter of the year, it is not possible to try to relate hospitalizations to air pollution levels at a particular time or date.

For the data analyses in this health consultation, ICD-9-CM codes to be examined were selected based on community concerns, literature review of the association of disease outcomes with air pollution, and an understanding of disease processes that may result in the need for hospitalization. A list of the ICD-9-CM codes selected for evaluation can be found in Appendix A, Table A.4.5.b.

Statistics for primary hospital discharge data for the selected ICD-9-CM codes were provided by the DSHS Health Assessment and Toxicology Program using Texas hospital inpatient discharge data from the Public Use Data File provided by DSHS Center for Health Statistics. Data and statistics were provided for ZIP code 76065 (Midlothian), Ellis County, Public Health Region 3, and Texas for the individual years from 2000 to 2009 and for the combined ten year period 2000-2009. The primary hospital inpatient discharge data and statistics for the selected ICD-9-CM codes are presented in their respective sections.

Several other databases were evaluated for their use in determining the prevalence of disease or exacerbation of an underlying disease in Midlothian. The National Ambulatory Medical Care Survey (NAMCS) is an annual national survey designed to monitor health care delivery in the physician office setting. Similarly, the National Hospital Ambulatory Medical Care Survey (NHAMCS) is a national survey designed to collect data on the utilization and provision of ambulatory care services in hospital emergency and outpatient departments and in ambulatory surgery centers. These two surveys are conducted by the CDC National Center for Health Statistics (NCHS).

NAMCS randomly surveys 3,000 participating physicians to provide data on approximately 30 patient visits over a one week period. NHAMCS annually collects sample data over a 4-week reporting period from approximately 500 nationally representative hospitals on a sample of patient visits. Because of the limited number of participants, for this health consultation, both NAMCS and NHAMCS were considered not generalizable enough to provide information for either the potential area of impact or the city of Midlothian.

Similarly, the National Health Interview Survey (NHIS) data was evaluated for use in determining disease prevalence in Midlothian. NHIS is a household probability sample survey of the adult population conducted annually by the U.S. Census Bureau for the CDC NCHS. In 2010, data was collected on approximately 27,000 adults in the United States [CDC 2012b] and about 75,000 children under the age of 18 [CDC 2011b]. Age-adjusted and unadjusted estimated percentages of selected chronic health characteristics and health behaviors are available for the entire United States and the Northeast, Midwest, South and West. Texas is included in the U.S. Census Bureau South region. No smaller geographic unit for these health statistics are presented.

Thus, this data was used in this health consultation to present background rates for various health conditions.

Several community members requested the use of school data in an attempt to evaluate certain childhood diseases or the impact of childhood disease on school attendance. The Texas Education Agency (TEA) (<http://www.tea.state.tx.us/>) maintains one of the world's largest education databases. School district profiles are available by school year. In addition to demographic data on schools, attendance rates and percent of students in special education programs for the academic years 1994-95 through 2009-10 were obtained for the Midlothian Independent School District (ISD), Education Service Center (ESC) Region 10 (Richardson—Dallas), and Texas (Appendix B, Figure B.2.1). This data is discussed in the sections on asthma and other chronic diseases.

Asthma

Several Midlothian residents expressed concern about childhood and adult asthma rates in Midlothian. They feel that airborne pollution from the surrounding industries may contribute to acute exacerbations and worsening of asthma. Some residents refer to the Cook Children's Health Care System Community-wide Children's Health Assessment & Planning Survey (CCHAPS) which found rates of childhood asthma in neighboring Tarrant County were higher than Texas statewide rates (www.cchaps.org). Epidemiological studies have shown that both ozone and particulate matter exposure are associated with asthma attacks and increased risk of emergency room visits and hospitalizations for children and adults with asthma [Dales 2009; EPA 2006; Pope 2000]. Air sampling data evaluated in the Midlothian health consultation on the criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a] revealed that during various time periods sulfur dioxide (SO₂), fine particulate matter (PM_{2.5}), and ozone were present at concentrations in Midlothian that may be of health concern for individuals with asthma.

Asthma is a chronic inflammatory disease of the airways characterized by airway constriction and hyper-responsiveness. Common signs and symptoms of asthma include coughing, wheezing, chest tightness, and shortness of breath. Depending upon the individual, various things can worsen or trigger asthma attacks. Some common triggers include allergens, such as dust, animal fur, and pollen; irritants, such as cigarette smoke, air pollution, and household aerosol products; certain medications, such as aspirin; upper respiratory infections; extreme physical activity; and cold or hot weather.

Asthma affects people of all ages, but most often starts during childhood. According to the CDC, data from the National Health Interview Survey (NHIS) in 2010 showed that the current prevalence in the United States was 9.4% in children less than 18 years of age and 8.2% in adults 18 years of age and over. Nearly 7 million children and 19 million adults currently have asthma and about 10 million children and 29 million adults have been told that they have asthma at some time in their life. Blacks had the highest prevalence of any race (10.5%) compared with whites (7.8%) and Hispanics (6.9%). The prevalence among adults below the Federal poverty level was 11.2% compared to 9.0% and 7.6% for adults just above or well above the poverty line, respectively [CDC 2011b; 2012b].

To address the concerns about asthma prevalence in Midlothian, the Behavioral Risk Factor Surveillance System (BRFSS) data were examined. BRFSS data were provided by DSHS Center for Health Statistics for the combined ZIP codes 76065 and 75104 (2004-2010), Ellis County, Public Health Region 3 (PHR 3), and Texas for 2001-2010. There were an insufficient number of responses for the combined ZIP codes 76065 and 75104 to report an estimated prevalence of childhood asthma in the Midlothian area. All reported rates are weighted for Texas demographics and the probability of selection.

There were four BRFSS survey questions that were used to capture these prevalence estimates:

- Have you ever been told by a doctor, nurse or other health professional that you had asthma?
- Do you still have asthma?
- Has a doctor, nurse, or other health professional ever said that the child has asthma?
- Does this child still have asthma?

Data from the survey question for the current and lifetime prevalence of adult and childhood asthma can be found in Table 4.5.1.

Table 4.5.1 Percentage of current and ever diagnosed adults and children with asthma with 95% confidence intervals (CI) based on Behavioral Risk Factor Surveillance System (BRFSS) survey questions for combined ZIP codes 76065 and 75104 (2004-2010), Ellis County, Public Health Region 3 and Texas (2001-2010). Data Source: DSHS Center for Health Statistics.

Doctor Diagnosed Adult Asthma—Lifetime	Sample Size	YES			NO		
		Percent	95% CI	95% CI	Percent	95% CI	95% CI
		%	Lower	Upper	%	Lower	Upper
ZIP codes 76065 & 75104	107	8.7	4.3	16.9	91.3	83.1	95.7
Ellis County	305	12.0	8.4	16.9	88.0	83.1	91.6
Public Health Region 3	15,774	13.1	12.3	13.9	86.9	86.1	87.7
Texas	95,176	11.9	11.6	12.3	88.1	87.7	88.4
Current Adult Asthma	Sample Size	YES			NO		
		Percent	95% CI	95% CI	Percent	95% CI	95% CI
		%	Lower	Upper	%	Lower	Upper
ZIP codes 76065 & 75104	107	8.1	3.9	16.3	91.9	83.7	96.1
Ellis County	305	6.9	4.6	10.4	93.1	89.6	95.4
Public Health Region 3	15,715	7.5	7.0	8.1	92.5	91.9	93.0
Texas	94,815	7.1	6.8	7.4	92.9	92.6	93.2
Doctor Diagnosed Childhood Asthma—Lifetime	Sample Size	YES			NO		
		Percent	95% CI	95% CI	Percent	95% CI	95% CI
		%	Lower	Upper	%	Lower	Upper
Ellis County	51	9.4	3.7	21.7	90.6	78.3	96.3
Public Health Region 3	2,615	14.3	12.6	16.2	85.7	83.8	87.4
Texas	18,982	13.0	12.2	13.7	87.0	86.3	87.8
Current Childhood Asthma	Sample Size	YES			NO		
		Percent	95% CI	95% CI	Percent	95% CI	95% CI
		%	Lower	Upper	%	Lower	Upper
Ellis County	51	6.0	1.8	18.4	94.0	81.6	98.2
Public Health Region 3	2,602	9.4	8.0	10.9	90.6	89.1	92.0
Texas	18,910	8.5	7.8	9.1	90.6	89.1	92.0

Note: All reported rates are weighted for Texas demographics and the probability of selection.

The percentage of individuals reporting doctor-diagnosed current or lifetime asthma in adults was not statistically significantly different in the combined ZIP codes of 76065 (Midlothian) and adjacent 75104 than in Ellis County, PHR 3, or Texas. Similarly, the percentage of individuals reporting their child had been doctor-diagnosed currently or in their lifetime with asthma was not significantly different in Ellis County than in PHR 3 or Texas. The rates in these areas are similar to or slightly lower than the current rates provided above from NHIS data for the United States.

The Community-wide Children’s Health Assessment & Planning Survey (CCHAPS) directed by the Cook Children’s Health Care System in Fort Worth, Texas is a comprehensive review of the health status of children aged 0 to 14 in a six county area, with the goal of identifying children’s health priorities within these communities (www.cchaps.org). CCHAPS has conducted surveys of both lifetime diagnosis of childhood asthma (2008 and 2012 surveys) and current childhood asthma (2012 survey) in Denton, Hood, Johnson, Parker, Tarrant, and Wise counties. Unfortunately, CCHAPS does not include Ellis County. Although the modeled Midlothian potential area of impact includes a small percentage of acreage in Tarrant and Johnson counties (Figure B.3.2), since these areas are sparsely populated and make up only a very small percentage of their respective counties, the CCHAPS countywide data was not included in this health consultation.

To capture the burden of asthma on the Midlothian area as compared to other geographic areas, DSHS Health Assessment and Toxicology Program provided statistical analysis of Texas hospital inpatient discharge data from a Public Use Data File provided by DSHS Center for Health Statistics. The primary hospital discharge data for the ICD-9-CM code for asthma (493) was requested for the time period 2000-2009 for Midlothian ZIP code 76065, Ellis County, Public Health Region 3, and Texas. As discussed in the introductory section on databases used for chronic diseases (Section 4.5), admission and subsequent discharge from a hospital may suggest a complication or aggravation of the underlying chronic condition and cannot be used to determine the prevalence of the disease in the community. Hospital admissions for asthma may reflect issues related to access to care, compliance, appropriate treatment plan, uncontrollable exposure to triggers, or other factors. Summary primary discharge data for the period 2000-2009 is presented in Table 4.5.2. Odds ratio (OR) calculations with 95% confidence intervals (95% CI) for the Midlothian ZIP code 76065 with respect to Ellis County for each of the ten years is presented in Figure 4.5.1 for the asthma ICD-9-CM codes.

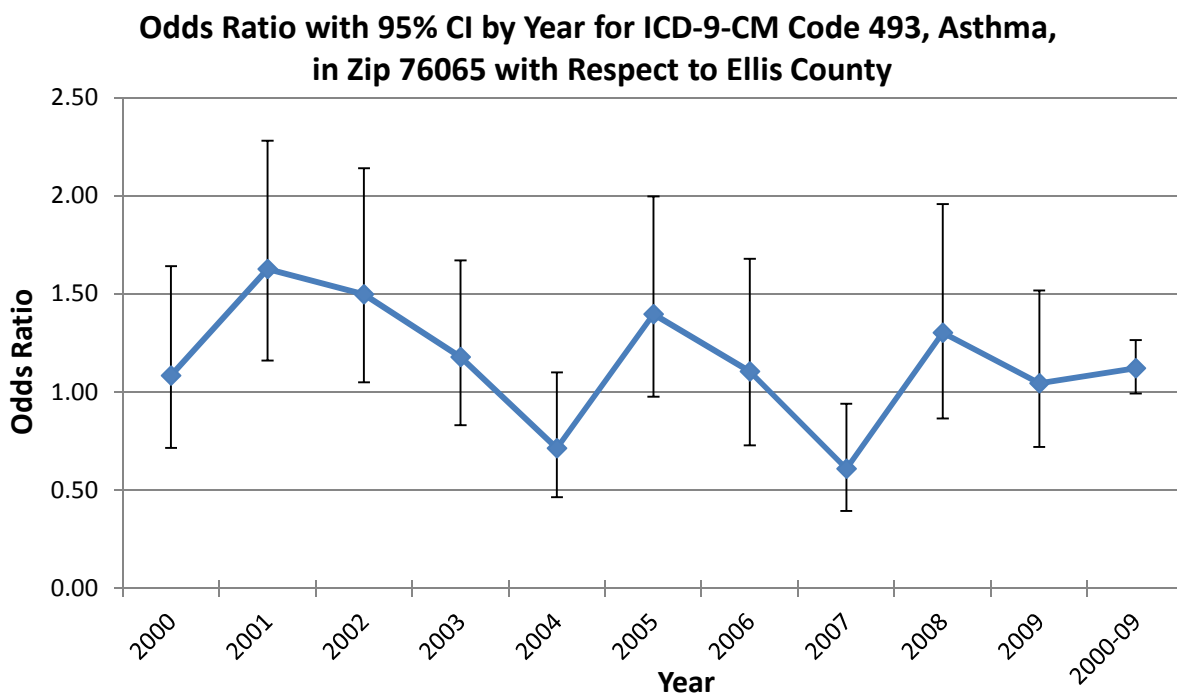
Table 4.5.2 Primary Hospital Discharge Data for Asthma (ICD-9-CM Code 493) including number of asthma discharges, total number of hospital discharges, and percent of primary discharges for asthma for Midlothian ZIP code 76065, Ellis County, Public Health Region 3 and Texas, 2000-2009. Data Source: DSHS Center for Health Statistics, Public Use Data File.

	Number with Primary hospital discharge of asthma	Total number of hospital discharges	Percent of all hospital discharges with for asthma (%)
ZIP code 76065	312	21,552	1.45
Ellis County	2,072	157,512	1.31
Public Health Region 3	72,515	6,993,322	1.04
Texas	265,600	27,542,082	0.96

In 2001 and 2002, the odds of a primary discharge diagnosis of asthma in ZIP code 76065 were statistically greater than for the rest of Ellis County. In 2007, the odds were significantly lower for ZIP code 76065 (OR: 0.61, 95% CI: 0.39-0.94) than for the rest of Ellis County. For the remaining years and for the combined ten year period (OR: 1.12, 95% CI: 0.99-1.26), the odds were not statistically significantly different between ZIP code 76065 and Ellis County. However, odds ratios for the asthma ICD-9-CM codes in ZIP code 76065 were significantly greater for the combined ten year period with respect to both PHR3 (OR: 1.40, 95% CI: 1.26-1.57) and Texas (OR: 1.51, 95% CI: 1.35-1.69).. Odds ratios for asthma discharge codes in Ellis County were also significantly higher for this ten year period with respect to PHR 3 (OR: 1.28, 95% CI: 1.22-1.34) and Texas (OR: 1.37, 95% CI: 1.31-1.43).

These statistical findings cannot be used to prove or determine the cause of the increase in asthma in one area compared to another. Because the discharge data are reported quarterly, the rates cannot be compared to any specific dates of known elevations of air pollutants in the area. This data also do not reflect the prevalence of asthma in the community. Additional odds ratio analyses can be found in Appendix A, Table A.4.5.c.3.

Figure 4.5.1 Odds Ratio with 95% Confidence Intervals by Year for Primary Hospital Discharge Data for Asthma (ICD-9-CM Code 493) for Midlothian ZIP code 76065 with respect to Ellis County, 2000-2009. Data Source: DSHS Center for Health Statistics, Public Use Data File.



Community members requested review of school data to ascertain whether any air emissions from the surrounding industries may contribute to acute exacerbations and worsening of asthma that may be reflected in increased use of rescue inhalers or in increased absenteeism by school children. Information on the use of rescue inhalers was not considered for this health consultation because: 1) these data for Midlothian schools were not readily publicly available, 2) policies on the use and storage of inhalers on school property vary by school and school district

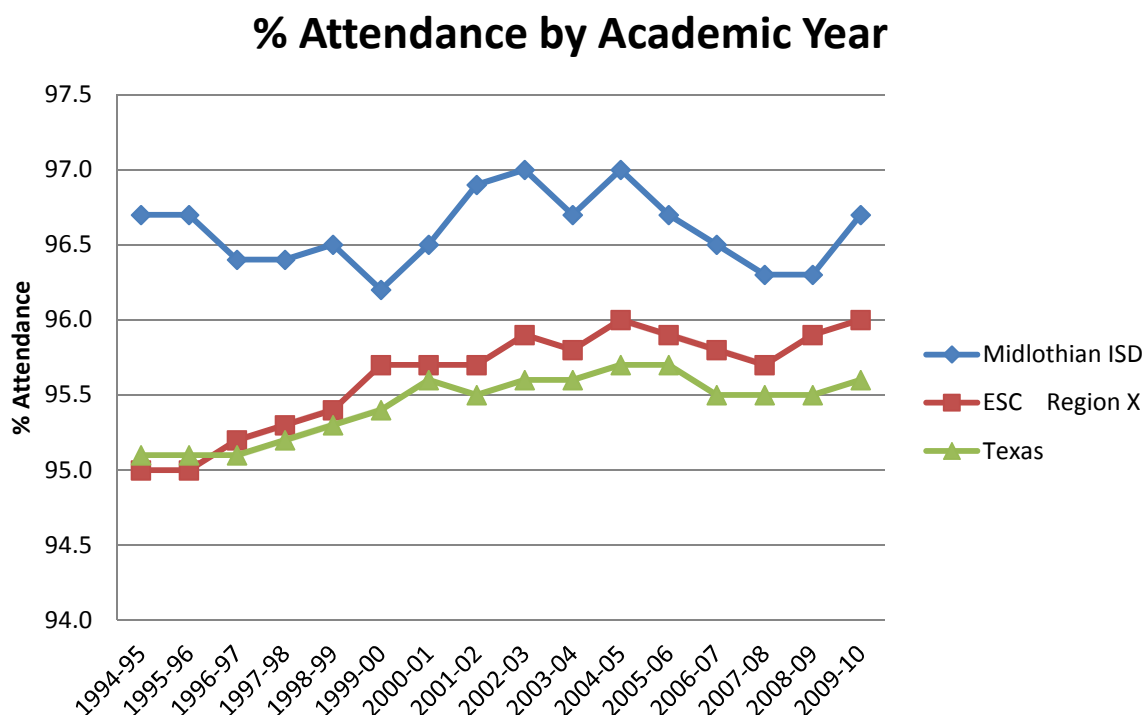
across the country, and 3) adherence and reporting of incidents by students was considered less complete. According to the CDC School Health Policy and Practices Study (SHPPS) most recent national survey in 2006, 76.9% of elementary schools, 83.3% of middle schools, and 92.0% of high schools permitted students to carry and self-administer a prescription quick-relief inhaler (http://www.cdc.gov/healthyyouth/shpps/2006/factsheets/pdf/FS_Asthma_SHPPS2006.pdf).

The Texas Education Agency (TEA) data on percent school attendance was available online and reviewed for the academic years 1994-95 through 2009-10 for the Midlothian Independent School District (ISD), Education Service Center (ESC) Region 10, and Texas. A summary of the number of schools and students for every fifth academic year for each of these geographic areas is found in Table 4.5.3. Yearly attendance data is presented in Figure 4.5.2.

Table 4.5.3. Total number of schools and students for Midlothian ISD, ESC Region 10, and Texas for academic years 1994-95, 1999-2000, 2004-05 and 2009-10. Data source: TEA.

Academic Year	Midlothian ISD		ESC Region 10		Texas	
	Total Number of Schools	Total Students	Total Number of Schools	Total Students	Total Number of Schools	Total Students
2009-10	9	7,298	1,176	734,415	8,435	4,824,778
2004-05	7	5,655	1,048	659,763	7,908	4,383,871
1999-00	6	4,158	945	577,800	7,395	3,991,783
1994-95	5	3,179	789	497,257	6,465	3,670,196

Figure 4.5.2. Yearly percent school attendance for Midlothian ISD, ESC Region 10, and Texas, for academic years 1994-95 through 2009-10. Data source: TEA.



As presented in Figure 4.5.2, the percent school attendance in the Midlothian ISD has remained consistently between 96% and 97% for the time period 1994 to 2010. For the same time period, the attendance rate in ESC Region 10 and Texas ranged between 95% and 96%. There are many limitations to the interpretation one can place in school attendance records. Data from the TEA website included only the percent attendance by academic year. No reasons behind any absences from school were provided. Students may miss school for a variety of reasons that may be medical or non-medical. Medical absenteeism can be from both chronic and acute conditions. The duration of any individual student's absence is not reported. Furthermore, data for attendance was available by year and does not show any daily fluctuations in rates. Thus the attendance data cannot be used to draw any conclusions on asthma or asthma exacerbations in the Midlothian area.

In summary:

- BRFSS data show that the current rate of adult asthma in the Midlothian area was similar to Ellis County, Public Health Region 3, and Texas. Similarly, the current rate of childhood asthma was similar across Ellis County, Public Health Region 3, and Texas. These rates are similar to those in the United States.
- During the ten year period from 2000-2009, there were significantly more asthma primary hospital discharges for people living in ZIP code 76065 and in Ellis County as compared to hospital discharges for people living in Public Health Region 3 and Texas.
- The percent yearly school attendance in the Midlothian ISD did not vary over the time period examined and fell consistently between 96% and 97%.
- Information from the primary hospital discharge data and school attendance data do not allow for correlations to be drawn between any specific time periods of elevated air pollutants in the Midlothian area and asthma exacerbation.

Other Respiratory Illnesses

In addition to asthma, Midlothian residents expressed concern about chronic respiratory conditions and the incidence of respiratory and sinus infections related to long-term exposure to airborne pollution from the surrounding industries. Residents refer to a cross-sectional study by Legator, *et al.* [1998] that compared respiratory health outcomes in Midlothian with those of Waxahachie, Texas, which indicated that residents in Midlothian have a higher rate of respiratory related complaints and symptoms. These symptoms include wheezing, persistent cough, and shortness of breath.

Air pollution is a complex mixture of particulate and gaseous co-pollutants. Air sampling data evaluated in the Midlothian health consultation on criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a] revealed that during various time periods fine particulate matter (PM_{2.5}), ozone, and sulfur dioxide (SO₂) were present at concentrations in Midlothian that may be of health concern for some sensitive individuals. Since the respiratory system is the portal of entry for these pollutants, both short and long term health effects to the lung and respiratory system can result from exposure. A review of epidemiologic studies of short term exposure to particulate matter provided evidence for increases in respiratory symptoms, medication use, airway hyper-

responsiveness, and decrease in lung function [Samet 2007]. Long term exposure to particulate pollution has been associated with increased chronic cough, bronchitis, and chest illness [Pope 2000].

To address questions concerning chronic respiratory conditions, the DSHS Health Assessment and Toxicology Program provided statistical analysis of Texas hospital inpatient discharge data from a Public Use Data File provided by DSHS Center for Health Statistics. The primary discharge ICD-9-CM codes under the category ‘chronic obstructive pulmonary disease and allied conditions’ selected for review were bronchitis (not specified as acute or chronic) (490), chronic bronchitis (491), emphysema (492), and chronic airway obstruction (not elsewhere specified) (496). Primary hospital discharge data were requested for the time period 2000-2009 for Midlothian ZIP code 76065, Ellis County, Public Health Region 3, and Texas. As discussed in the introduction of this section on databases for chronic diseases, admission and subsequent discharge from a hospital may suggest a complication or aggravation of the underlying chronic condition and cannot be used to determine the prevalence of the disease in the community.

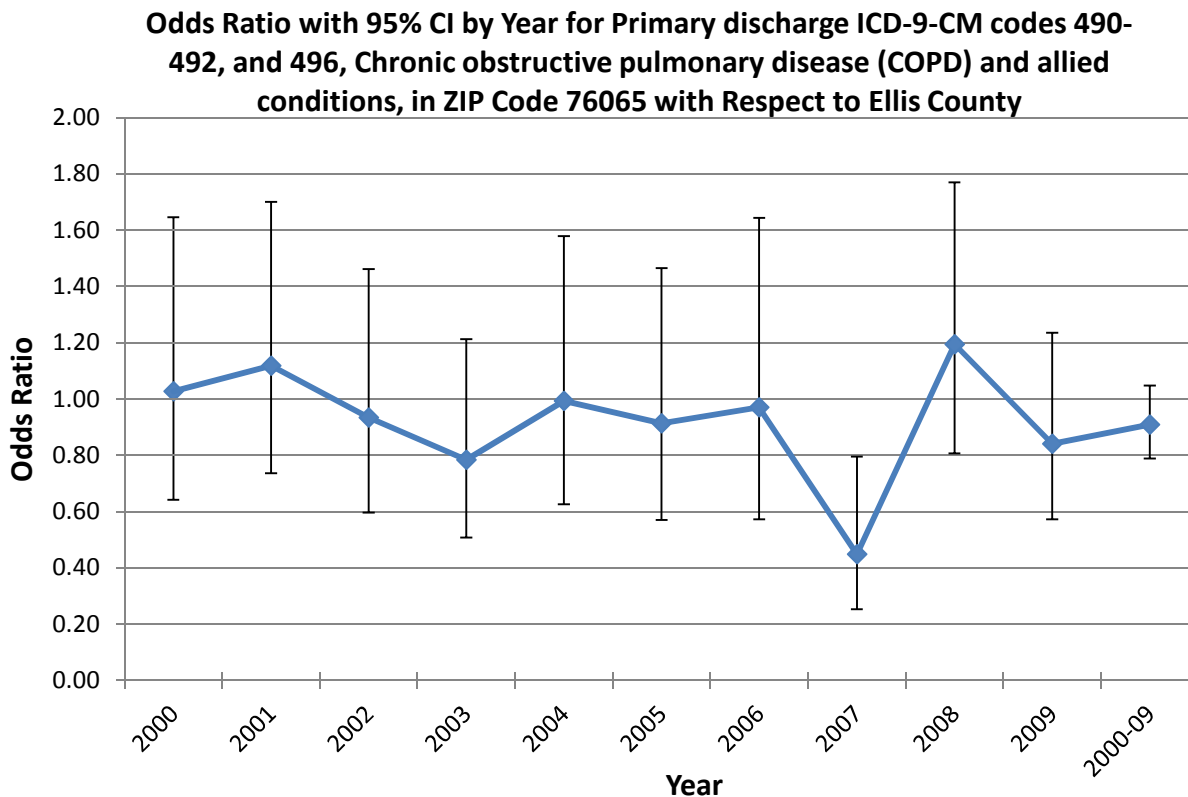
Summary primary discharge data for chronic respiratory conditions for the period 2000-2009 is presented in Table 4.5.4. Odds ratio calculations with 95% confidence intervals (95% CI) for the Midlothian ZIP code 76065 with respect to Ellis County for each of the ten years is presented in Figure 4.5.3 for the COPD and allied conditions (COPD-AC) ICD-9-CM codes.

Table 4.5.4 Primary Hospital Discharge Data for Chronic Obstructive Pulmonary Diseases and Allied Conditions (COPD-AC) (ICD-9-CM Codes 490, 491, 492, and 496) including number of COPD-AC ICD-9-CM Code discharges, total number of hospital discharges, and percent of primary discharges for COPD-AC ICD-9-CM Codes for Midlothian ZIP code 76065, Ellis County, Public Health Region 3 and Texas, 2000-2009. Data Source: DSHS Center for Health Statistics, Public Use Data File.

	Number with Primary hospital discharge of COPD-AC ICD-9-CM codes	Total number of hospital discharges	Percent of all hospital discharges with COPD-AC ICD-9-CM codes (%)
ZIP code 76065	220	21,552	1.02
Ellis County	1,745	157,512	1.11
Public Health Region 3	89,424	6,993,322	1.28
Texas	370,589	27,542,082	1.35

With the exception of the year 2007, the odds of a primary diagnosis of COPD or allied conditions in ZIP code 76065 were not statistically significantly different than for the rest of Ellis County. In 2007, the odds were significantly lower (OR: 0.45, 95% CI: 0.25-0.80). There was no statistically significant difference in the odds of these ICD-9-CM codes between ZIP code 76065 and Ellis County for the combined ten year period. While the yearly patterns were similar when odds ratios were calculated for these ICD-9-CM codes in ZIP code 76065 with respect to either PHR 3 or Texas, the odds ratios for the combined ten year period were statistically significantly lower (PHR 3 OR: 0.80, 95% CI: 0.70-0.91 and the state of Texas OR: 0.76, 95% CI: 0.66-0.86), respectively. No conclusions can be drawn about these statistical findings about causation. These data also do not reflect the prevalence of COPD in the community. Additional odds ratio analyses can be found in Appendix A, Table A.4.5.c.3.

Figure 4.5.3 Odds Ratio with 95% Confidence Intervals by Year for Primary Hospital Discharge Data for Chronic Obstructive Pulmonary Diseases and Allied Conditions (ICD-9-CM Codes 490, 491, 492, and 496) for Midlothian ZIP code 76065 with respect to Ellis County, 2000-2009. Data Source: DSHS Center for Health Statistics, Public Use Data File.



DSHS Center for Health Statistics was asked to provide data for the combined ZIP codes 76065 and 75104, Ellis County, Public Health Region 3 (PHR 3) and Texas for 2001-2010 for prevalence rates of COPD using Behavioral Risk Factor Surveillance System (BRFSS) data. Because the BRFSS question on COPD is not a core question but was only a state added question in 2009, there were an insufficient number of responses for either the combined ZIP codes 76065 and 75104 or Ellis County to report an estimated prevalence. The smallest geographic unit available was Public Health Region 3 (PHR 3). The percent of individuals responding positively to the question “Have you ever been told by a doctor, nurse or another health care professional that you have chronic obstructive pulmonary disease, also called COPD, emphysema or chronic bronchitis?” in PHR 3 was 4.5% (95% CI: 3.0-6.7), which was similar to that of Texas (4.3%, 95% CI: 3.6-5.1). In the United States, data from the National Health Interview Survey (NHIS) show that 4.3% of adults aged 18 years and over have been told by a health professional they have chronic bronchitis and 1.9% have been told they have emphysema [CDC 2012b].

Since the most important risk factor for COPD is smoking, BRFSS data were examined to compare the prevalence rate of smoking among the different areas. The percent of adults reported to have smoked 100 cigarettes or more in their entire life and the percent of current

smokers who also smoke every day or some days were not statistically significantly different in any of the four geographic areas examined (Table 4.5.5).

Table 4.5.5 Behavioral Risk Factor Surveillance System (BRFSS) Prevalence percent responses with 95% confidence intervals for risk factor, “Smoked in their lifetime” and “Current Smoker” for combined ZIP codes 76065 and 75104 (2004-2010), and Ellis County, Public Health Region 3 and Texas (2001-2010). Data Source: DSHS Center for Health Statistics.

Smoked in their lifetime [†]	Sample Size	YES			NO		
		Percent	95% CI	95% CI	Percent	95% CI	95% CI
		%	Lower	Upper	%	Lower	Upper
ZIP codes 76065 & 75104	107	43.1	30.4	56.8	56.9	43.2	69.6
Ellis County	306	44.0	36.5	51.7	56.0	48.3	63.5
Public Health Region 3	15,754	40.2	39.1	41.3	59.8	58.7	60.9
Texas	94,982	40.8	40.3	41.3	59.2	58.7	59.7
Current Smoker [‡]	Sample Size	YES			NO		
		Percent	95% CI	95% CI	Percent	95% CI	95% CI
		%	Lower	Upper	%	Lower	Upper
ZIP codes 76065 & 75104	107	19.5	10.9	32.3	80.5	67.7	89.1
Ellis County	306	22.0	16.2	29.3	78.0	70.7	83.8
Public Health Region 3	15,746	19.0	18.1	19.9	81.0	80.1	81.9
Texas	94,928	19.6	19.2	20.0	80.4	80.0	80.8

[†]Smoked in their lifetime: Adults who report to have smoked 100 cigarettes or more in their entire life.

[‡] Current Smoker: Adults who smoke every day or some days and has smoked 100 cigarettes in their lifetime.

As discussed in the introduction of this section on databases for chronic diseases, data from national surveys such as NHIS, NAMCS, and NHMACS are not able to provide prevalence estimates for smaller geographic areas, such as Midlothian or Ellis County. For a perspective on prevalence rates for sinusitis, data were reviewed for United States regions. In the United States, data from the National Health Interview Survey show that 13.0% of adults aged 18 years and over have been told by a health professional they have sinusitis [CDC 2012b]. The prevalence varies by region, with a higher percent of adults in the South (15.6%) reporting to have been told they have sinusitis than the Northeast (11.7%), Midwest (12.8%), or West (8.9%). For hay fever, a fewer percent of adults in the South (7.0%) report this diagnosis than in the entire United States (7.8%). United States regional differences with more common findings of acute rhinitis, acute sinusitis, and chronic sinusitis in the South have been described [Mattos 2011]. Data from NAMCS and NHMACS from 1995-2007 consistently found a significantly greater number of doctor office visits or emergency room visits for adults in the South for these conditions as compared to other regions.

There is no database to capture self-limited respiratory infections. Most individuals recover from these infections (which are most commonly viral) without seeking medical interventions. Upper respiratory infections, often termed the common cold, are very common. The average child will get 2-6 colds per year with the average adult getting 1-3 colds per year (<http://www.niaid.nih.gov/topics/commoncold/Pages/default.aspx>). As discussed in section 4.5—Asthma, there is a limit to the interpretation one can place in school attendance records for

acute exacerbations of underlying illnesses or acute illnesses. As presented previously in Figure 4.5.2, the attendance in the Midlothian Independent School District has remained between 96% and 97% for the time period 1994 to 2010. For the same time period, the attendance rate in Ellis County ranged between 95% and 96%. Mortality data for more serious respiratory infections, influenza and pneumonia are found in Table 4.5.6 and described below.

Mortality data for several respiratory conditions were reviewed for the twelve year period 1999-2010 for ZIP code 76065, Ellis County, Public Health Region 3, and Texas (Table 4.5.6). These data were compiled by the DSHS Health Assessment and Toxicology Program using data from DSHS Center for Health Statistics, as described in Section 4.3. Standardized mortality ratios (SMR) for COPD/asthma (including chronic bronchitis, emphysema, and pneumoconioses), respiratory disease (respiratory arrest and acute and chronic upper and lower respiratory track disease), and influenza(flu)/pneumonia for ZIP code 76065 in relation to Ellis County, Public Health Region 3, and Texas are presented in Table 4.5.6. No statistically significant differences in rates were seen for any of these respiratory conditions for males, females, or combined males and females in ZIP code 76065 when compared with any of the three comparison populations. The crude mortality rates for all three categories of respiratory conditions for combined males and females for ZIP code 76065 were less than the corresponding crude mortality rates in Ellis County and Texas (Appendix A, Table A.4.3.f).

Table 4.5.6 Standardized Mortality Ratios (SMR) for males, females, and combined males and females for COPD/asthma, respiratory disease, and flu/pneumonia for Midlothian ZIP code 76065 using comparison populations for Ellis County, Public Health Region 3, and Texas with 95% Confidence Intervals (CI), 1999-2010. Data source: DSHS CHS.

ZIP code 76065 as compared to:										
Cause of Death		Ellis County			Public Health Region 3			Texas		
		SMR	95% Confidence Interval		SMR	95% Confidence Interval		SMR	95% Confidence Interval	
			Lower	Upper		Lower	Upper		Lower	Upper
COPD/Asthma	Males	0.82	0.57	1.15	0.87	0.60	1.21	0.85	0.59	1.18
	Females	1.09	0.81	1.44	1.14	0.85	1.51	1.20	0.89	1.59
	Total	0.96	0.77	1.19	1.01	0.81	1.25	1.03	0.82	1.27
Respiratory Disease	Males	1.28	0.59	2.43	1.17	0.54	2.22	1.06	0.48	2.01
	Females	1.22	0.56	2.32	1.22	0.56	2.31	1.13	0.52	2.15
	Total	1.25	0.74	1.98	1.19	0.71	1.89	1.09	0.65	1.73
Flu/Pneumonia	Males	0.74	0.37	1.33	0.87	0.44	1.56	0.86	0.43	1.53
	Females	0.71	0.34	1.31	0.68	0.33	1.26	0.67	0.32	1.23
	Total	0.73	0.45	1.12	0.77	0.48	1.18	0.75	0.47	1.15

In summary, there are a limited number of databases available that capture the burden of non-asthma respiratory illnesses and exacerbations for smaller geographic areas. Primary hospital discharge data for COPD and allied conditions were not statistically significantly different between Midlothian and Ellis County, Public Health Region 3, or Texas. Death rates due to various acute and chronic respiratory conditions were not statistically significantly different in ZIP code 76065 compared to those in Ellis County, Public Health Region 3, and Texas. The

databases reviewed and discussed in this section do not suggest that any non-asthma respiratory diseases are significantly more or less common in the Midlothian area.

Cardiovascular diseases

While the only cardiovascular related disease that was cited as a concern by a Midlothian resident was deep vein thrombosis (DVT), this section on cardiovascular diseases was included because of the association between cardiovascular diseases and air pollution. Numerous epidemiological studies have shown an increase in cardiovascular disease morbidity and mortality from both short term and long term exposures to air pollution [Brook 2004]. Particulate matter and other gaseous co-pollutants that were evaluated in Midlothian health consultation on criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a] have been linked in various epidemiological studies to these cardiovascular outcomes.

Cardiovascular diseases cover a wide range of conditions. Some are associated with more acute onset such as myocardial infarction (heart attack), angina, stroke, and deep vein thrombosis. Other conditions are associated with a more chronic disease progression such as hypertension (high blood pressure), atherosclerosis, and heart failure. While the impact on cardiovascular diseases from air pollution is small relative to the impact from known risk factors such as obesity, high cholesterol, hypertension, family history, and cigarette smoking, given a large enough population, exposure to air pollutants can result in a noticeable increase in cardiovascular deaths and hospital admissions [Brook 2004].

For this health consultation, Behavioral Risk Factor Surveillance System (BRFSS) data were examined to ascertain the self-reported prevalence of several cardiovascular diseases including hypertension, angina or coronary heart disease, heart attack, and stroke. BRFSS data were provided by DSHS Center for Health Statistics for the combined ZIP codes 76065 and 75104, Ellis County, Public Health Region 3 (PHR 3), and Texas for any available years between 2001 and 2010. All reported rates were weighted for Texas demographics and the probability of selection.

There were four BRFSS survey questions that addressed each of the four cardiovascular diseases in the adult population that were examined for this health consultation:

- Have you ever been told by a doctor, nurse or other health professional that you have high blood pressure?
- Have you ever been told by a doctor, nurse, or other health professional that you had angina or coronary heart disease?
- Have you ever been told by a doctor, nurse, or other health professional that you had a heart attack?
- Have you ever been told by a doctor, nurse, or other health professional that you had a stroke?

Not all questions pertaining to these diseases were asked during each survey year. Data for the survey question for hypertension were collected every two years starting in 2001. Responses categorized as ‘No’ included ‘No’, ‘Yes, but female told only during pregnancy’ (2003 survey), and ‘told borderline high or pre-hypertensive’ (2005-2009 surveys). Data for the survey questions on angina, heart attacks and stroke were collected in 2001, 2003, and 2005 through 2010. Data for the combined ZIP codes 76065 and 75104 were only available from 2005 forward for all four cardiovascular diseases. The estimated prevalence of these cardiovascular diseases in adults can be found in Table 4.5.7.

The percentage of adults reporting having been diagnosed with high blood pressure, angina or coronary heart disease, heart attack, and stroke was not statistically significantly different in the combined ZIP codes of 76065 (Midlothian) and adjacent 75104 (Cedar Hill) than in Ellis County, PHR 3, or Texas. The rates in these areas are similar to NHIS data for the United States [CDC 2012b]. In the United States, 24.7% of adults have been told on two or more visits to a healthcare professional that they have hypertension or high blood pressure, 2.6% report having suffered a stroke, and 6.4% of adults report having been told by a health professional that they have angina, coronary heart disease, or have had a heart attack.

Table 4.5.7 Percentage of selected ever diagnosed cardiovascular diseases (high blood pressure, angina or coronary heart disease, heart attack, and stroke) in adults with 95% confidence intervals based on Behavioral Risk Factor Surveillance System (BRFSS) survey questions for combined ZIP codes 76065 and 75104, Ellis County, Public Health Region 3 and Texas, 2001, 2003, and 2005-2010. Data Source: DSHS Center for Health Statistics.

High Blood Pressure	Sample Size	YES			NO		
		Percent %	95% CI Lower	95% CI Upper	Percent %	95% CI Lower	95% CI Upper
ZIP codes 76065 & 75104 [†]	57	27.1	13.0	47.9	72.9	52.1	87.0
Ellis County	181	21.0	15.2	28.3	79.0	71.7	84.8
Public Health Region 3	8,582	25.6	24.4	26.8	74.4	73.2	75.6
Texas	47,217	26.4	25.8	26.9	73.6	73.1	74.2
Angina or Coronary Heart Disease	Sample Size	YES			NO		
		Percent %	95% CI Lower	95% CI Upper	Percent %	95% CI Lower	95% CI Upper
ZIP codes 76065 & 75104 [‡]	99	1.2	0.2	5.7	98.8	94.3	99.8
Ellis County	216	3.1	1.6	5.8	96.9	94.2	98.4
Public Health Region 3	11,209	4.0	3.6	4.4	96.0	95.6	96.4
Texas	75,548	4.3	4.1	4.5	95.7	95.5	95.9
Heart Attack	Sample Size	YES			NO		
		Percent %	95% CI Lower	95% CI Upper	Percent %	95% CI Lower	95% CI Upper
ZIP codes 76065 & 75104 [‡]	101	1.6	0.4	6.3	98.4	93.7	99.6
Ellis County	220	1.5	0.7	3.2	98.5	96.8	99.3
Public Health Region 3	11,263	3.8	3.3	4.2	96.2	95.8	96.7
Texas	75,923	3.9	3.7	4.2	96.1	95.8	96.3
Stroke	Sample Size	YES			NO		
		Percent %	95% CI Lower	95% CI Upper	Percent %	95% CI Lower	95% CI Upper
ZIP codes 76065 & 75104 [‡]	101	2.0	0.8	5.1	98.0	94.9	99.2
Ellis County	221	1.9	0.9	3.8	98.1	96.2	99.1
Public Health Region 3	11,286	2.4	2.1	2.7	97.6	97.3	97.9
Texas	76,083	2.5	2.4	2.7	97.5	97.3	97.6

Note: All reported rates are weighted for Texas demographics and the probability of selection.

[†]Data for ZIP codes 76065 and 75104 include only the years 2005, 2007 and 2009.

[‡]Data for ZIP codes 76065 and 75104 include only the years 2005 through 2010.

DSHS CHS also provided BRFSS data on known risk factors for cardiovascular diseases, including tobacco use, obesity, physical activity, and high cholesterol. Data were provided for the combined ZIP codes 76065 and 75104, Ellis County, Public Health Region 3 (PHR 3), and Texas for all available years between 2001 and 2010. Data for the survey question for high blood cholesterol were collected every two years starting in 2001. Data for the other three cardiovascular risk factors were available for all years.

BRFSS data on current and lifetime tobacco smoking were reported previously in Table 4.5.5. In the combined Midlothian ZIP codes, 19.5% (95% CI: 10.9-32.3) of the adults surveyed reported being a current smoker, while 43.1% (95% CI: 30.4-56.8) reported smoking at some time in their lifetime. Nearly 70% of the adults (69.7; 95% CI: 57.9-79.4) would be defined as either overweight (body mass index (BMI) between 25 and 29.9) or obese (BMI greater than or equal to 30.0). Over 20% of the adults (20.7%; 95% CI: 12.6-32.2) responded ‘No’ to the question, “During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?”. There were an insufficient number of responses for the Midlothian ZIP codes for the question on health care provider diagnosed high blood cholesterol. About half the adults surveyed in Ellis County (47.8%; 95% CI: 36.9-58.9) reported being told they have high cholesterol. There was no statistically significant difference among the geographic areas for prevalence of these known cardiovascular risk factors. BRFSS data on these risk factors do not allow for assessment of any additional disease cases that may result from air pollutants.

DSHS Health Assessment and Toxicology (HAT) Program provided statistical analysis of Texas hospital inpatient discharge data (2000-2009) from a Public Use Data File provided by DSHS CHS for cardiovascular diseases that may have an association with air pollutants. The major categories of cardiovascular diseases with their corresponding ICD-9-CM codes are listed in Table 4.5.8 and an expanded ICD-9-CM table can be found in Appendix A, Table A.4.5.b. ICD-9-CM codes for cardiovascular diseases specifically related to non-air pollutant causes, such as an infectious agent, were omitted from the list. Primary hospital discharge data were provided for Midlothian ZIP code 76065, Ellis County, Public Health Region 3, and Texas. Summary primary discharge data for the period 2000-2009 for the number of discharges and percent of discharges for each ICD-9-CM code are presented in Table 4.5.8. Odds ratio calculations with 95% confidence intervals (95% CI) for each geographic area with respect to the others for the combined ten year period can be found in Appendix A, Table A.4.5.c.2.

Primary hospital discharge data cannot be used to determine the prevalence of the disease in the community. As discussed in the section 4.5 introduction on databases for chronic diseases, admission and subsequent discharge from a hospital may suggest a complication or aggravation of the underlying chronic condition or may suggest less than adequate disease management. For more acute conditions, since the discharge data are reported quarterly, the rates cannot be related to any specific dates of known elevations of air pollutants in the area. No conclusions can be drawn from these data on causation.

Table 4.5.8 Primary Hospital Discharge Data for selected cardiovascular disease ICD-9-CM Codes including number and percent of discharges for each ICD-9-CM code and total number of hospital discharges for Midlothian ZIP code 76065, Ellis County, Public Health Region 3 and Texas, 2000-2009.
Data Source: DSHS Center for Health Statistics, Public Use Data File.

ICD-9-CM Description	ICD-9-CM Code	Number and Percent (%) of Total Primary Discharges with ICD-9-CM Code			
		ZIP 76065	Ellis County	PHR 3	Texas
Essential hypertension	401	29 (0.1)	345 (0.2)	19,226 (0.3)	80,619 (0.3)
Acute myocardial infarction	410	365 (1.7)	2,490 (1.6)	97,210 (1.4)	395,014 (1.4)
Other ischemic heart disease	411-414	650 (3.0)	4,607 (2.9)	163,631 (2.3)	745,115 (2.7)
Acute pulmonary heart disease	415	74 (0.3)	429 (0.3)	20,126 (0.3)	70,148 (0.3)
Cardiac dysrhythmias	427	317 (1.5)	2,151 (1.4)	94,732 (1.4)	390,646 (1.4)
Heart failure	428	406 (1.9)	3,656 (2.3)	150,407 (2.2)	660,981 (2.4)
Cerebrovascular disease	430-438	458 (2.1)	3,444 (2.2)	156,000 (2.2)	624,937 (2.3)
Diseases of arteries, arterioles, and capillaries	440-445, 447-448	142 (0.7)	1,174 (0.8)	45,562 (0.7)	211,655 (0.8)
Venous embolism and thrombosis of deep vessels of lower extremity (deep vein thrombosis, DVT)	453.4	36 (0.2)	259 (0.2)	12,477 (0.2)	43,986 (0.2)
Total number of hospital discharges		21,552	157,512	6,993,322	27,542,082

For the nine cardiovascular disease primary hospital discharge categories evaluated from 2000-2009, odds ratios for the Midlothian ZIP code 76065 with respect to Ellis County were significantly higher for acute pulmonary heart disease (ICD-9-CM code 415: 1.32; 95% CI: 1.03-1.69) and significantly lower for hypertension (ICD-9-CM code 401: 0.58; 95% CI: 0.40-0.84) and heart failure (ICD-9-CM code 428: 0.78; 95% CI: 0.71-0.87). Odds ratios for the other six categories were not statistically significantly different for ZIP code 76065 with respect to Ellis County. Similarly, odds ratios for the Midlothian ZIP code 76065 with respect to Texas were significantly higher for acute pulmonary heart disease (ICD-9-CM code 415: 1.35; 95% CI: 1.08-1.69) and significantly lower for hypertension (ICD-9-CM code 401: 0.46; 95% CI: 0.32-0.65) and heart failure (ICD-9-CM code 428: 0.78; 95% CI: 0.71-0.86).

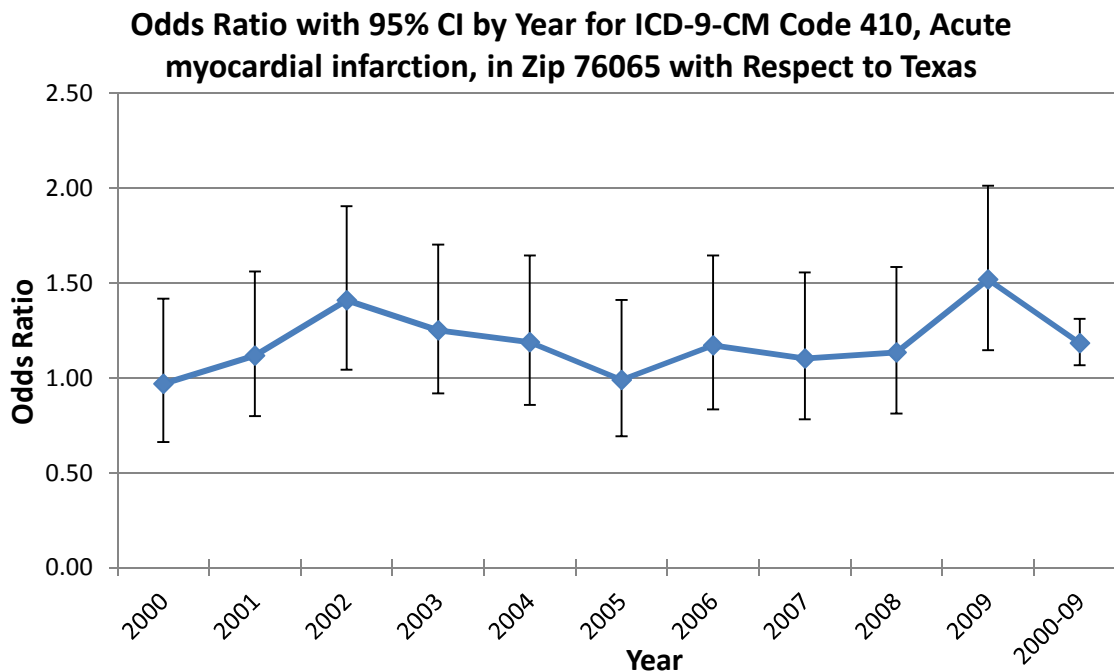
Discharges for acute myocardial infarction (ICD-9-CM code 410) and other ischemic heart disease (ICD-9-CM codes 411-414) were significantly higher in Midlothian with respect to both PHR 3 and Texas (Table 4.5.9). This was also the case for Ellis County with respect to PHR 3 and Texas (Table 4.5.9). Odds ratios with 95% confidence intervals for each of the ten years are

presented in Figure 4.5.4 for acute myocardial infarction (ICD-9-CM code 410) in Midlothian with respect to Texas. As shown in this figure, in both 2002 and 2009, the odds of hospitalization for acute myocardial infarction were significantly higher while the remaining years were not statistically significantly different.

Table 4.5.9 Odds Ratio with 95% Confidence Intervals for Primary Hospital Discharge Data for Acute Myocardial Infarction (ICD-9-CM Code 410) and other Ischemic Disease (ICD-9-CM Codes 411-414) for Midlothian ZIP code 76065 and Ellis County with respect to Public Health Region 3 and Texas for the combined ten year period 2000-2009. Data Source: DSHS Center for Health Statistics, PUDF.

ICD-9-CM Description	ICD-9-CM Code	Area	Reference Area					
			Public Health Region 3 (PHR 3)			Texas		
			OR	Lower 95% CI	Upper 95% CI	OR	Lower 95% CI	Upper 95% CI
Acute myocardial infarction	410	ZIP 76065	1.22	1.10	1.36	1.18	1.07	1.31
		Ellis County	1.14	1.10	1.19	1.11	1.06	1.15
Other ischemic heart disease	411-414	ZIP 76065	1.30	1.20	1.41	1.12	1.03	1.21
		Ellis County	1.27	1.23	1.30	1.08	1.05	1.12

Figure 4.5.4 Odds Ratio with 95% Confidence Intervals by Year for Primary Hospital Discharge Data for Acute Myocardial Infarction (ICD-9-CM Code 410) for Midlothian ZIP code 76065 with respect to Texas, 2000-2009. Data Source: DSHS Center for Health Statistics, Public Use Data File.



For deep vein thrombosis (ICD-9-CM code 453.4), the one cardiovascular disease concern cited by Midlothian residents, there was no statistically significant difference in odds for primary

hospital discharge data for Midlothian ZIP code 76065 with respect to Ellis County (1.02; 95% CI: 0.72-1.45), PHR 3 (0.94; 95% CI: 0.68-1.30), or Texas (1.05; 95% CI: 0.75-1.45) for the time period 2004-2009. Data for this ICD-9-CM code were not available in the 2001-2003 Public Use Data File.

As described in Section 4.3, mortality data for the leading causes of death, which included several cardiovascular diseases, were obtained from the DSHS Center for Health Statistics for the Midlothian ZIP code 76065, Ellis County, Public Health Region 3, and Texas for the twelve year period 1999-2010. Standardized mortality ratios (SMR) for heart disease, hypertension, vascular disease (atherosclerosis, aneurysm, phlebitis, thrombosis, and varices), and stroke (cerebrovascular diseases) for ZIP code 76065 in relation to Ellis County, Public Health Region 3, and Texas are presented in Table 4.5.10. There were no statistically significant differences for any SMR for these cardiovascular conditions for males, females, or combined males and females for ZIP code 76065 in relation to any of these three comparison populations.

Table 4.5.10 Standardized Mortality Ratios (SMR) for males, females, and combined males and females for heart disease, hypertension, vascular disease, and stroke for Midlothian ZIP code 76065 using comparison populations for Ellis County, Public Health Region 3, and Texas with 95% Confidence Intervals (CI), 1999-2010. Data source: DSHS CHS.

Cause of Death		ZIP code 76065 as compared to:								
		Ellis County			Public Health Region 3			Texas		
		SMR	95% Confidence Interval		SMR	95% Confidence Interval		SMR	95% Confidence Interval	
Lower	Upper		Lower	Upper		Lower	Upper			
Heart Disease	Males	0.90	0.77	1.04	0.93	0.81	1.08	0.93	0.80	1.07
	Females	0.98	0.83	1.14	1.02	0.87	1.18	1.03	0.88	1.20
	Total	0.93	0.84	1.04	0.97	0.87	1.08	0.97	0.87	1.08
Hypertension	Males	0.55	0.07	1.99	0.48	0.06	1.73	0.49	0.06	1.76
	Females	1.09	0.47	2.14	1.33	0.57	2.61	1.39	0.60	2.74
	Total	0.91	0.44	1.68	0.98	0.47	1.80	1.02	0.49	1.87
Vascular Disease	Males	0.59	0.22	1.29	0.60	0.22	1.31	0.60	0.22	1.30
	Females	0.96	0.44	1.82	0.99	0.45	1.88	1.00	0.46	1.89
	Total	0.77	0.43	1.27	0.79	0.44	1.30	0.79	0.44	1.30
Stroke	Males	1.09	0.79	1.48	1.14	0.82	1.55	1.29	0.93	1.75
	Females	1.11	0.82	1.45	0.98	0.73	1.29	1.13	0.84	1.49
	Total	1.10	0.89	1.35	1.05	0.85	1.29	1.20	0.97	1.47

In summary, BRFSS data available on adult cardiovascular diseases and risk factors show that the estimated prevalence in the Midlothian area was similar to Ellis County, Public Health Region 3, and Texas. The rates of hypertension, coronary heart diseases, and stroke were similar to those in the United States. During the ten year period from 2000-2009, there were statistically significantly more hospital discharges for people living in ZIP code 76065 than in Public Health Region 3 and Texas for myocardial infarction and other acute ischemic heart disease and a significantly lower rate of primary hospital discharges for hypertension and heart failure. Standardized mortality ratios (SMR) for heart disease, hypertension, vascular disease, and stroke

for ZIP code 76065 in relation to Ellis County, Public Health Region 3, and Texas were not found to be significantly higher or lower for the period 1999-2010. These data do not allow for determination of disease causation or for correlations to be drawn between any specific time periods of elevated air pollutants in the Midlothian area and cardiovascular disease events.

Diabetes

A few citizens raised concerns about the prevalence of juvenile diabetes (insulin dependent, Type 1 diabetes) and of Type 2 (non-insulin dependent) diabetes due to possible dioxin exposure from the facilities. Soil dioxin data is discussed in the Midlothian health consultation on sampling media other than air [ATSDR 2016b].

Diabetes mellitus, commonly referred to simply as diabetes, refers to a group of chronic diseases noted for an elevated blood glucose, or sugar, level. An estimated 7.8% of the United States population has diabetes. Type 1 diabetes is an auto-immune disease in which the body does not make insulin. Individuals with Type 1 diabetes require insulin injections to live. Type 2 diabetes is more common. About 90-95% of people with diabetes have Type 2. With Type 2 diabetes, the body does not make or use the insulin well. Individuals with Type 2 diabetes often use medications to help their bodies process the glucose more effectively [NIH 2008a].

Without enough or effective use of insulin, the glucose stays in the blood and cannot be converted by the body to energy. Diabetes can lead to serious health complications. Over time, the high levels of glucose can lead to kidney failure, nerve damage, heart and blood vessel disease, and blindness. Birth defects are more common in babies born to women with diabetes.

Although the cause for Type 1 diabetes is unknown, it is believed to involve genetic and environmental factors. Epidemiological evidence most strongly supports the role of viral infections in diabetes development. Other potential environmental triggers include bacterial infections, cow's milk, wheat proteins, and vitamin D [Van Belle 2011]. Type 1 diabetes develops most often in children and young adults. It is more common in whites than non-whites.

Type 2 diabetes is most often associated with older age, obesity, family history of diabetes, previous history of gestational diabetes, physical inactivity, and certain ethnicities. It is more common in African Americans and Hispanics/Latinos than non-Hispanic whites. About 80% of the individuals with Type 2 diabetes are obese. A review of epidemiological studies in populations with substantial dioxin exposure suggested a possible weak association between serum lipid dioxin concentrations and diabetes [Remillard 2002].

Behavioral Risk Factor Surveillance System (BRFSS) data were examined to explore the estimated prevalence of diabetes in adults in the Midlothian area. BRFSS data were provided by DSHS Center for Health Statistics for the combined ZIP codes 76065 and 75104, Ellis County, Public Health Region 3 (PHR 3) and Texas for 2001-2010. Data from the survey question for diabetes, "Have you ever been told by a doctor that you have diabetes?" can be found in Table 4.5.11. In 2001-2003, there was a three part answer, "Yes", "Yes, but only during pregnancy", and "No". Starting in 2004 a fourth category was added, "No, but pre-diabetes or borderline diabetes".

Table 4.5.11 Behavioral Risk Factor Surveillance System (BRFSS) prevalence percent responses with 95% confidence intervals for survey question, “Have you ever been told by a doctor that you have diabetes?” for combined ZIP codes 76065 and 75104 (2004-2010), Ellis County, Public Health Region 3 and Texas (2001-2010). Data Source: DSHS Center for Health Statistics.

Doctor Diagnosed Diabetes	Sample Size	YES			NO		
		Percent %	95% CI Lower	95% CI Upper	Percent %	95% CI Lower	95% CI Upper
ZIP codes 76065 & 75104	107	6.7	2.7	15.6	93.3	84.4	97.3
Ellis County	306	5.6	3.5	9.0	94.4	91.0	96.5
Public Health Region 3	15780	7.5	7.0	8.1	92.5	91.9	93.0
Texas	95272	8.5	8.3	8.8	91.5	91.2	91.7

Note: All reported rates are weighted for Texas demographics and the probability of selection.

The percentage of individuals reporting doctor-diagnosed diabetes was not statistically significantly different in the combined ZIP codes of 76065 (Midlothian) and adjacent 75104 than in Ellis County, PHR 3, or Texas. The crude rate for adults with diabetes in the Midlothian area is 6.7%. In the United States, data from the National Health Interview Survey show that 9% of adults aged 18 years and over have been told they have diabetes [CDC 2012b]. The BRFSS survey data does not distinguish between Type 1 and Type 2 diabetes.

Since Type 2 diabetes is associated with obesity and physical inactivity, BRFSS data on these two risk factors were examined. About 32% of the adults in the combined ZIP codes 76065 and 75104 (32.1; 95% CI: 19.8-47.6) would be defined as obese (body mass index (BMI) greater than or equal to 30.0). An additional 37.6% of the adults (CI: 25.9-51.0) would be defined as overweight (BMI between 25 and 29.9). Over 20% of the adults (20.7%; 95% CI: 12.6-32.2) responded ‘No’ to the question, “During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?”. There was no statistically significant difference among the geographic areas for prevalence of these two diabetes risk factors.

Statistics for primary hospital discharge data for diabetes mellitus, ICD-9-CM code 250 (which includes ICD-9-CM codes 250.00 through 250.93), were provided by the DSHS Health Assessment and Toxicology Program using Texas hospital inpatient discharge data from a Public Use Data File provided by DSHS Center for Health Statistics. As discussed in the introduction to this section on databases for chronic diseases, admission and subsequent discharge from a hospital would suggest a complication or aggravation of the underlying chronic condition. Thus, the number of hospital discharges does not directly reflect the prevalence of diabetes in the community. Summary primary discharge data for the period 2000-2009 is presented in Table 4.5.12

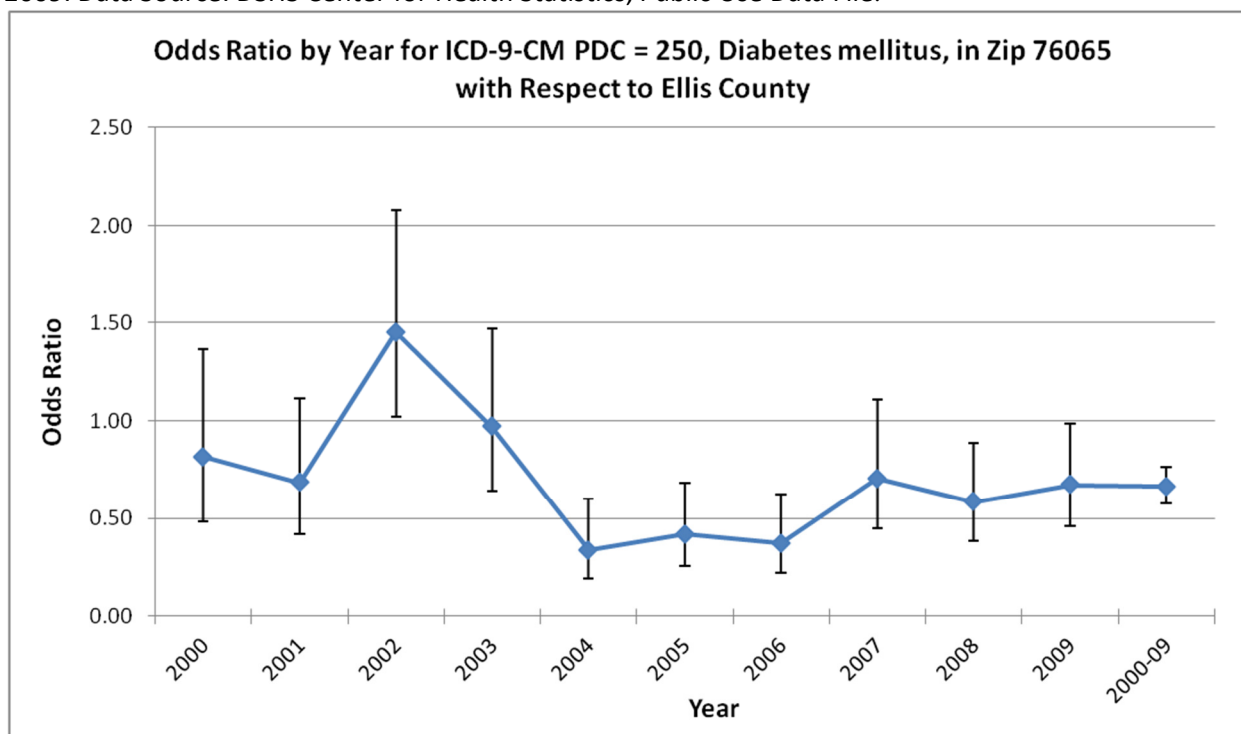
Table 4.5.12 Primary Hospital Discharge Data for Diabetes Mellitus (ICD-9-CM Code 250), including number of ICD-9-CM Code 250 discharges, total number of hospital discharges, and percent of primary discharges for ICD-9-CM Code 250 for Midlothian ZIP code 76065, Ellis County, Public Health Region 3 and Texas, 2000-2009. Data Source: DSHS Center for Health Statistics, Public Use Data File.

	Number with Primary hospital discharge of ICD-9-CM code 250	Total number of hospital discharges	Percent of all hospital discharges with ICD-9-CM code 250 (%)
ZIP code 76065	212	21,552	0.98
Ellis County	2,216	157,512	1.41
Public Health Region 3	88,810	6,993,322	1.27
Texas	377,792	27,542,082	1.37

Odds ratios (OR) were calculated for the number of primary discharges for diabetes (ICD-9-CM code 250) relative to the total number of hospital discharges for the different geographic areas of interest with respect to each of the other larger comparison areas. Odds ratio calculations with 95% confidence intervals (CI) for the Midlothian ZIP code 76065 with respect to Ellis County for each of the ten years is presented in Figure 4.5.5. While only OR statistics for diabetes mellitus in ZIP code 76065 with respect to Ellis County is shown, the pattern was similar when odds ratios were calculated for diabetes mellitus in ZIP code 76065 with respect to either PHR 3 (OR: 0.77, 95% CI: 0.67-0.88) or Texas (OR: 0.71, 95% CI: 0.62-0.82) for this ten year period. Additional OR analyses can be found in Appendix A, Table A.4.5.c.1.

As shown in Figure 4.5.5, the odds of hospitalization for a primary diagnosis of diabetes in Midlothian ZIP code 76065 in 2002 was significantly higher than in the rest of Ellis County (OR: 1.45, 95% CI: 1.02-2.08). In contrast, the odds of diabetes hospitalization in ZIP code 76065 in five more recent years (2004, 2005, 2006, 2008, and 2009) were significantly lower than the rest of Ellis County at the $\alpha < 0.05$ level (95% confidence intervals of these ORs did not encompass 1.0). From the data available, no conclusions can be drawn as to why the odds of diabetes hospitalization in ZIP code 76065 were higher than Ellis County in 2002 and then lower than Ellis County in five out of seven years studied since 2002. For all years taken together (2000-2009), the odds of diabetes hospitalization in ZIP code 76065 was significantly lower than in Ellis County (OR: 0.66, 95% CI: 0.58-0.76). This could possibly be due to better disease management with subsequently fewer complications, differences in the demographics for these regions, differences in access to medical or hospital care, or some other combination of factors.

Figure 4.5.5 Odds Ratio with 95% Confidence Intervals by Year for Primary Hospital Discharge Data for Diabetes Mellitus (ICD-9-CM Code 250) for Midlothian ZIP code 76065 with respect to Ellis County, 2000-2009. Data Source: DSHS Center for Health Statistics, Public Use Data File.



Mortality data for diabetes was reviewed for the twelve year period 1999-2010 for Midlothian ZIP code 76065, Ellis County, Public Health Region 3, and Texas (Table 4.5.13). These data were compiled by the DSHS Health Assessment and Toxicology Program using data from DSHS Center for Health Statistics, as described in Section 4.3. Crude mortality rates for diabetes for males, females, and combined males and females for ZIP code 76065 were lower than corresponding crude mortality rates in Ellis County and Texas. A review of the standardized mortality ratios (SMRs) for ZIP code 76065 with respect to the other three geographic areas revealed that there were no statistically significant differences for deaths from diabetes after adjusting for age, race, and sex (Appendix A, Tables A.4.3.g to A.4.3.i).

Table 4.5.13 Death frequency and crude mortality rates per 100,000 for males, females, and combined males and females for diabetes for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3), and Texas, 1999-2010. Data source: DSHS CHS.

Region	Deaths Frequency, 1999-2010			Crude Mortality per 100,000		
	Male	Female	Total	Male	Female	Total
ZIP 76065	26	13	39	19.10	9.50	14.28
Ellis County	186	157	343	23.50	19.84	21.67
PHR3	6,130	6,352	12,482	16.66	17.31	16.98
Texas	30,048	32,888	62,936	22.02	24.03	23.02

In summary, based on BRFSS data, the prevalence of adult diabetes and the prevalence of the risk factors of obesity and physical inactivity in the Midlothian area was similar to the rest of Ellis County, Public Health Region 3, Texas, and the United States. No data were available to

distinguish between the prevalence of Type 1 or Type 2 diabetes. Over the last ten years, primary hospital discharge data for diabetes for the Midlothian ZIP code 76065 generally indicated a lower likelihood of hospitalization for diabetes than that for Ellis County, Public Health Region 3, and Texas. Death rates due to diabetes were not statistically significantly different in ZIP code 76065 than in Ellis County, Public Health Region 3, and Texas. These data do not allow for assessment of environmental contributions to the diabetes prevalence rate or to possible medical complications of diabetes requiring hospitalization.

4.6 Other Health Concerns

Several individuals residing in the Midlothian area expressed concerns about various other health conditions and diseases for which there are no readily available surveillance systems that capture the incidence or prevalence of these conditions in this community. Some of these concerns were related to acute symptoms they felt were associated with specific air pollution events, such as headaches and burning eyes, while others had concerns related to more chronic conditions such as immune related diseases or the prevalence of childhood learning disorders. This section addresses these concerns by summarizing known causes of these illnesses and any relationship to exposure to air pollutants, providing a context of the prevalence of the condition on a state or national level, and/or providing related data from other surveillance systems.

Acute Symptoms

There were several irritant related health complaints reported by residents of Midlothian. Their concerns included headache, odor complaints, burning eyes and throat, rash, and nosebleeds. Concerns about respiratory issues such as asthma attacks, rhinitis, and sinusitis are discussed in section 4.5. Some of these acute symptoms may co-occur with these respiratory conditions. There is no public health reporting system available that captured the prevalence of acute irritant symptoms.

At high enough concentrations, air pollutants, such as sulfur dioxide, ozone, and particulate matter, which were evaluated in the Midlothian health consultation on criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a], can result in short term irritant effects to the eyes, nose, and throat. Modeled air data on sulfuric acid aerosols described in the Midlothian health consultation on other air pollutants found concentrations that can be acutely irritating to the eyes, nose, and skin [ATSDR 2015b]. These irritant effects typically occur immediately after exposure and resolve after the exposure has passed. Some individuals, including infants, elderly, and those with underlying health conditions, may be more susceptible to health effects from exposure to air pollutants. Additionally, cement kiln dust, which is alkaline, can be an irritant to the eyes, nose, throat, and skin. While the respirable size dust fraction would be accounted for in ambient air monitoring for particulates, the concentration of larger particles may not have been measured. Residents who live close to the cement facilities have reported periodic deposition of dust on the surface of cars and windows. Other weather and air quality issues, such as low-humidity and high pollen counts, may contribute or be the cause of these signs and symptoms.

A few Midlothian residents reported allergic reactions, such as hives and swelling of the lips and face, which they believe were attributable to air pollutants from the steel and cement facilities.

The air pollutants evaluated are irritants and not known to be sensitizers. The immune response in allergic reactions is different from that of an irritant response. According to 2010 data from the CDC National Health Interview Survey (NHIS), children living in the South had a higher rate of respiratory allergies (14.4%) and skin allergies (13.6%) than children in the Northeast, Midwest or West [CDC 2011b].

Immune-related Chronic Diseases

There were several chronic diseases or groups of diseases that Midlothian residents raised as a site concern. Most of the diseases were related to immune system dysfunction, such as immune deficiency diseases and autoimmune diseases, including lupus and Graves disease. Sarcoidosis, which also involves some immune system dysfunction, was also mentioned as a health concern. Fibromyalgia, although not an immune disorder, is also included in this section because of some common issues related to other joint-related diseases. There is no public health reporting system to evaluate the prevalence of any of these diseases in the Midlothian area or elsewhere in Texas.

While the strength of a person's immune system tends to vary somewhat with age (with infants and the elderly having the lowest disease immunity) there are many specific immune deficiency diseases in which resistance to diseases can become extremely low. There are over 200 identified primary immunodeficiencies which a child may inherit from parents. The deficiencies impact various immune system cell lines, so susceptibility to other diseases vary with the type of deficiency. There are severe as well as milder forms of immunodeficiency diseases. The more severe forms are more commonly recognized in infancy or early childhood. The number of persons living in the United States with a primary immunodeficiency is estimated to be between 25,000 and 50,000 [NIH 1999].

Acquired immunodeficiencies are more common than the primary immunodeficiencies, with acquired immune deficiency syndrome (AIDS) from HIV infection being the most common [Merck 2008]. There are several disorders associated with immune deficiencies, including infection, some cancers, Down syndrome, diabetes, hepatitis, lupus, rheumatoid arthritis, splenectomy, severe burns, alcoholism, and under nutrition. The prevalence of some of these health conditions are reported in other parts of Section 4 on health outcome data. Some acquired immune deficiencies are unintended side effects from radiation or medications used to treat certain diseases.

Autoimmune disorders are diseases in which the body's own immune system attacks healthy cells and tissues. This leads to inflammation and damage of the tissues. With a few exceptions, the prevalence of autoimmune diseases is more common in women than men. There are more than 80 types of autoimmune diseases. The causes of autoimmune diseases are unknown, but are believed to result from a combination of genetic tendency and environmental factors. Environmental triggers cover a wide range of factors including bacterial and viral infections, sunlight, hormones, certain medications, and some chemicals. Some demographic information for two autoimmune diseases, lupus and Graves disease, are described below.

Lupus is an autoimmune disease which impacts many parts of the body including the joints, skin, kidney, lungs, brain, heart, and blood vessels. Systemic lupus erythematosus (SLE) is the form of the disease that people commonly call lupus. Lupus is a complex disease of unknown cause.

Most likely the cause is a combination of genetic predisposition, estrogen, and environmental triggers. Recent research has shown that the Epstein-Barr virus (EBV), which causes mononucleosis, is one of the causes of SLE in genetically susceptible people. Usually, SLE first affects people when they are between the ages of 15 and 45 and is more common in women than men. Lupus is more common in African American, Asian, Native American and Hispanic women than in Caucasian women [NIH 2011c]. A recent epidemiologic study of lupus patients matched to controls, conducted through the Canadian Network for Improved Outcomes in SLE, found some association of the development of the disease with occupational silica exposure, artists working with paints, dyes, or developing film, and workers applying nail polish or nail applications [Cooper 2010].

Graves disease, or toxic diffuse goiter, is an autoimmune disease that affects the thyroid gland. In Graves disease, the immune system makes an antibody that causes the thyroid to make too much thyroid hormone. In the United States, Graves disease is the most common form of hyperthyroidism; about 1% of the people in the United States have some form of hyperthyroidism. Factors such as age, sex, heredity, and emotional and environmental stress are believed to contribute to the development of the disease. People with a family history of the disease are more likely to develop it. It typically develops in people younger than 40 and is five to ten times more common in women than men [NIH 2008b].

Sarcoidosis, or sarcoid, is an inflammatory disease of unknown origin. Sarcoidosis affects many organs, but primarily the lung, lymph nodes, skin, eyes, and liver. In sarcoidosis, the immune system cells cluster and form lumps called granulomas, which can affect the organ's function. Genetics and environmental triggers such as bacteria, viruses, dust or chemicals are believed to play a role in the development of the disease. While sarcoidosis affects people of all races, it is more common and often more severe in African Americans. Individuals of European descent more often will have a sarcoid syndrome that includes arthritis. People with a family history of sarcoidosis are at higher risk for developing the disease. The disease usually develops between the ages of 20 and 50, and is slightly more common in women than men [NIH 2011a].

Fibromyalgia is a common, chronic disorder characterized by fatigue and achy pain, tenderness, and stiffness of muscles, ligaments and tendons. The cause of fibromyalgia is unclear, but is probably due to contributions from several factors. Some people with fibromyalgia appear to have alterations in the way the central nervous system processes pain. Thus, fibromyalgia is not considered an immune disorder. Some of the triggers in the development of fibromyalgia include physical injury and psychological stress. So far, there is no evidence that supports a chemical cause of fibromyalgia. Some genes have been identified that more commonly occur in patients with fibromyalgia. Eighty to 90% of the people with fibromyalgia are women and it most often is diagnosed in middle age. It is estimated that 5 million people in the United States are affected by this condition [NIH 2011b].

DSHS Center for Health Statistics provided data for the combined ZIP codes 76065 and 75104, Ellis County, Public Health Region 3 (PHR 3) and Texas for prevalence rates of several combined joint related conditions using Behavioral Risk Factor Surveillance System (BRFSS) data (see section 4.5). Data for the survey question, "Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus,

or fibromyalgia?”, were collected every two years starting in 2001. Data for the combined ZIP codes 76065 and 75104 were not available prior to 2005. The estimated prevalence of these combined health conditions in adults can be found in Table 4.6.1.

Table 4.6.1 Behavioral Risk Factor Surveillance System (BRFSS) prevalence percent responses with 95% confidence intervals for survey question, “Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?” for combined ZIP codes 76065 and 75104 (2005, 2007, and 2009), and Ellis County, Public Health Region 3 and Texas (2001, 2003, 2005, 2007, and 2009). Data Source: DSHS Center for Health Statistics.

Doctor Diagnosed Arthritis, Gout, Lupus, Rheumatoid Arthritis or Fibromyalgia	Sample Size	YES			NO		
		Percent	95% CI	95% CI	Percent	95% CI	95% CI
		%	Lower	Upper	%	Lower	Upper
ZIP codes 76065 & 75104†	57	13.1	6.6	24.3	86.9	75.7	93.4
Ellis County	180	22.6	16.5	30.2	77.4	69.8	83.5
Public Health Region 3	8,463	21.8	20.7	22.9	78.2	77.1	79.3
Texas	46,280	22.5	22.0	23.0	77.5	77.0	78.0

Note: All reported rates are weighted for Texas demographics and the probability of selection.

†Data for ZIP codes 76065 and 75104 include only the years 2005, 2007 and 2009.

The percent of these reported health conditions was not statistically significantly different in the combined Midlothian area ZIP codes than in Ellis County, PHR 3 or Texas. Similarly, in the United States, data from the 2010 National Health Interview Survey (NHIS) show that 21.6% of adults aged 18 years and over have been told by a health professional they have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia [CDC 2012b]. Nationally, these diseases were slightly more common in females (24.1%) than males (18.8%). These diseases also increased with age. About 7% of adults between 18 and 44 years of age reported these conditions as compared to about 54% of adults aged 75 years and older.

DSHS Health Assessment and Toxicology (HAT) Program reviewed the Texas hospital inpatient discharge data from the Public Use Data File provided by DSHS Center for Health Statistics to determine if there were enough cases of fibromyalgia, sarcoidosis, lupus, and Graves disease listed as a primary hospital discharge diagnosis in ZIP code 76065 or Ellis County from 2000-2009 to provide statistical analyses. For each of these diseases, there were an insufficient number of cases even in the combined ten year period to allow for the analysis. As stated previously, especially for chronic diseases, prevalence cannot be determined from discharge data. Individuals who have these chronic diseases may have been treated at the hospital for other conditions and symptoms, but fibromyalgia, sarcoidosis, lupus, or Graves disease was not listed as the primary hospital discharge diagnosis.

Mortality data for autoimmune diseases were reviewed for the twelve year period 1999-2010 for ZIP code 76065, Ellis County, Public Health Region 3, and Texas (Table 4.6.2). This data was compiled by DSHS HAT Program using data from DSHS Center for Health Statistics, as described in Section 4.3. The category of autoimmune disease includes rheumatoid arthritis, lupus, systemic sclerosis, and other joint and connective tissue disorders. The crude mortality rates for autoimmune diseases for males, females, and combined males and females for ZIP code 76065 was less than the crude mortality rates in Ellis County, Public Health Region 3, and

Texas. A review of the standardized mortality ratios (SMRs) for ZIP code 76065 with respect to the other three geographic areas revealed that there were no statistically significant differences for deaths related to autoimmune diseases (Appendix A, Tables A.4.3.g to A.4.3.i). As is found in the United States, deaths related to these autoimmune diseases were more common in females than males for all of the geographic areas examined.

Table 4.6.2 Death frequency and crude mortality rates per 100,000 for males, females, and combined males and females for autoimmune diseases for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3), and Texas, 1999-2010. Data source: DSHS CHS.

Region	Deaths Frequency, 1999-2010			Crude Mortality per 100,000		
	Male	Female	Total	Male	Female	Total
ZIP 76065	0	<5	<5	0.00	NS	NS
Ellis County	9	32	41	1.14	4.04	2.59
PHR 3	361	1,196	1,557	0.98	3.26	2.12
Texas	1,632	5,380	7,012	1.20	3.93	2.57

NS—For confidentiality, number of deaths and related statistics are suppressed when there are 1-4 deaths.

Amyotrophic Lateral Sclerosis (ALS)

The occurrence of amyotrophic lateral sclerosis (ALS), sometimes referred to as Lou Gehrig's disease, in Midlothian was a concern raised by one citizen. ALS is a neurologic disease where the nerves that control voluntary muscle movement are gradually damaged and die. People with ALS have weakness in some muscle groups and later paralysis. The disease spreads to other parts of the body and the person may become unable to move, speak, eat, and breathe. Currently, the disease has no cure and is fatal. The average time a person lives after being diagnosed with ALS is 3 to 5 years.

ALS is the most common form of motor neuron disease. In the United States, about 5,000 people are diagnosed with ALS each year and currently, 20,000 to 30,000 people in the United States have the disease. ALS usually affects people between the ages of 40 and 60. Non-Hispanic white people develop ALS more than other racial groups. Men have a slightly higher risk of getting the disease than women. About 5 to 10 percent of the ALS cases are inherited. For the remainder, the disease occurs randomly with no apparent risk factors. The cause of ALS is not known [NIH 2012].

ATSDR maintains the National ALS Registry (<http://wwwn.cdc.gov/als/>). People with ALS can voluntarily register at this site. The registry is designed to collect information about ALS so that more can be learned about the disease. The registry does not allow for determination of the number of cases in a given area because the registration is not mandatory so it is not considered complete. To get a better idea of how well represented different ethnic, race, and age groups were in the registry, ATSDR funded three states, including Texas, and some metropolitan areas to assist the agency in getting more extensive demographic information on people with ALS. DSHS received funding for a pilot project for ALS surveillance in the Lubbock area and El Paso and Bexar Counties (<http://www.dshs.state.tx.us/epitox/healthstudies.shtm>). The time period for the surveillance was from 1998-2003. The project did not include looking for ALS cases in Midlothian or Ellis County, Texas.

In addition to the mortality data on neurological diseases that can be found in Appendix A, Tables A.4.3.a to A.4.3.m, DSHS Health Assessment and Toxicology Program was asked to provide separate mortality data for ALS and other motor neuron diseases (ICD-10 Code G12.2) for the twelve year period 1999-2010 for ZIP code 76065, Ellis County, Public Health Region 3, and Texas. These statistics were compiled from death certificate data provided by DSHS Center for Health Statistics, as described in Section 4.3. The rates would reflect the cases where this code was used to describe the underlying or contributing cause of death and might not capture all cases of individuals who have ALS but died of other causes. The standardized mortality ratios (SMRs) indicate that mortality from ALS and other motor neuron disease in ZIP code 76065 was slightly higher than expected when compared to Ellis County, Public Health Region 3, and Texas, but the results were not statistically significant (Table 4.6.3).

Table 4.6.3 Standardized mortality rates (SMR) with lower and upper 95% confidence intervals for males, females, and combined males and females for ALS and other motor neuron diseases for Midlothian ZIP code 76065 with respect to Ellis County, and Public Health Region 3 (PHR 3), and Texas, 1999-2010. Data source: DSHS CHS.

ZIP code 76065 with respect to:									
Region	Males			Females			Total		
	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL
Ellis County	1.62	0.53	3.79	1.93	0.53	4.95	1.75	0.80	3.32
PHR 3	2.01	0.65	4.70	1.97	0.54	5.05	1.99	0.91	3.79
Texas	2.06	0.67	4.82	2.10	0.57	5.39	2.08	0.95	3.95

Mortality data for the category of neurologic disease as the cause of death includes a wide range of nervous system diseases. The crude mortality rates for neurologic diseases for males, females, and combined males and females for ZIP code 76065 was less than the crude mortality rates in Ellis County, Public Health Region 3, and Texas (Table 4.6.4).

Table 4.6.4 Death frequency and crude mortality rates per 100,000 for males, females, and combined males and females for neurologic diseases for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3), and Texas, 1999-2010. Data source: DSHS CHS.

Region	Death Frequency, 1999-2010			Crude Mortality per 100,000		
	Male	Female	Total	Male	Female	Total
ZIP 76065	11	9	20	8.08	6.57	7.32
Ellis County	86	71	157	10.87	8.97	9.92
PHR 3	3,015	2,845	5,860	8.20	7.75	7.97
Texas	12,329	11,492	23,821	9.03	8.40	8.71

Special Education

A few individuals had questions relating to the number of children with attention deficit hyperactivity disorder (ADHD) and the number in special education programs attending Midlothian schools. There were no readily available data to determine the number of children with ADHD. Nationwide, 2010 data from the CDC National Health Interview Survey [CDC 2011b] show that 8.0% of children ages 5-11 years and 9.3% of the children ages 12-17 have been told of having a learning disorder (LD). These data show that 7.6% of children ages 5-11 years and 11.6% of the children ages 12-17 have been told of having attention deficit hyperactivity disorder (ADHD). These percentages represent about 5 million children nationwide

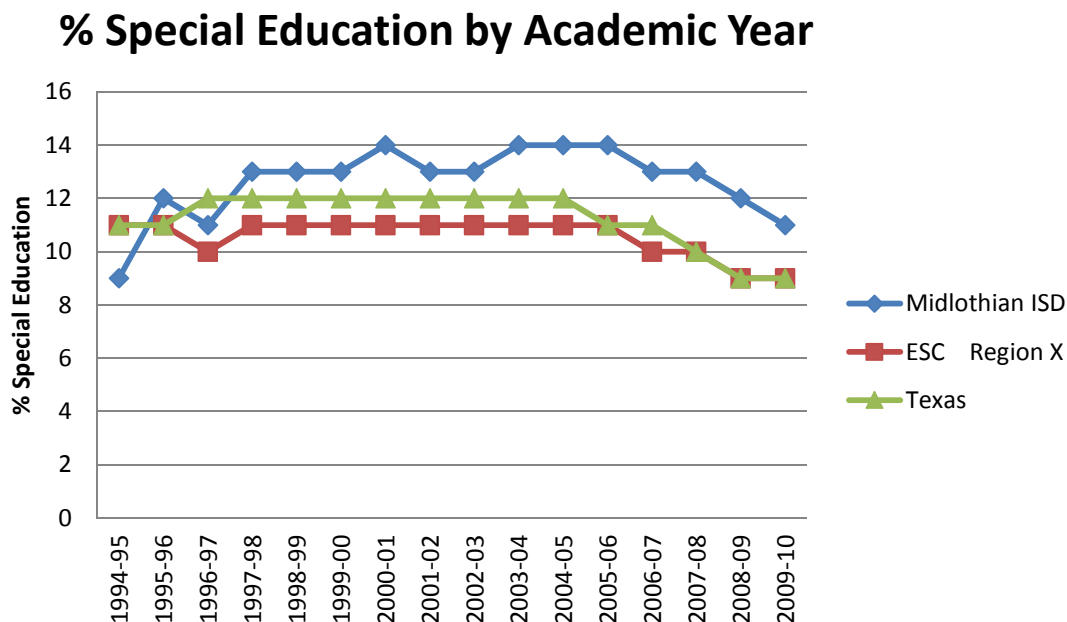
having each of these conditions. Both LD and ADHD were more common in males (9.3% and 11.6%, respectively) than females (8.0% and 7.6%, respectively). Both conditions were more commonly reported in non-Hispanic black and non-Hispanic white children than in Hispanic children.

Similarly, some Midlothian community members were concerned about the prevalence of autism in Midlothian school children. There were no readily available data to determine the number of children with autism spectrum disorders (ASD) for Midlothian. ASD is a group of disorders characterized by difficulties in communication and social interaction and repetitive behaviors. The symptoms are typically apparent by 3 years of age. The Children’s Health Act of 2000 authorized CDC to create an Autism and Developmental Disabilities Monitoring Network (ADDM) to estimate the prevalence of ASD in the United States [CDC 2012c]. CDC funds 14 states to perform surveillance. Texas is not one of the funded grantees. From the 2008 surveillance year, ADDM network found that 1 in 88 children aged 8 years had an ASD. The rate in non-Hispanic white children (12.0 per 1,000) was higher than non-Hispanic black children (10.2 per 1,000) and Hispanic children (7.9 per 1,000). The prevalence of ASD was statistically significantly higher in boys than girls in all 14 ADDM sites. The ADDM network has also found that the prevalence of ASD has increased over their three surveillance years (2002, 2006, and 2008).

The Texas Education Agency (TEA) requires mandatory reporting during the first quarter of the school year for the number of students participating in a special education instructional and related services program or a general educational program using special education support services, supplementary aids, or other special arrangements. These data were available on the TEA website ‘Snapshot School District Profiles’ and reviewed for the academic years 1994-95 through 2009-10 for the Midlothian Independent School District (ISD), Education Service Center (ESC) Region 10, and Texas. The percent of students participating in programs for students with disabilities expressed as a percent of total students for each respective education grouping by academic year is presented in Figure 4.6.1.

As shown in Figure 4.6.1, starting from the 1997-1998 school year, the percent of children in special education programs in the Midlothian ISD had consistently been about one to three percent higher than the percent in ESC Region 10 and Texas. The percent of children in Midlothian ISD participating in special education programs ranged from 9% to 14% for the time period 1994 to 2010. In the 2009-2010 school year, the percent of children participating in special education programs in the Midlothian ISD was 11%. Nationwide, data for the 2009-2010 academic school year from the U.S. Department of Education, National Center for Education Statistics [USDOE 2012] show that the average percent of public school enrollment of children served under the Individuals with Disabilities Education Act (IDEA), Part B was 13.1%. Of the 50 states, Rhode Island had the highest percent enrollment at 18.1% and Texas had the lowest percent enrollment at 9.2%.

Figure 4.6.1. Students participating in special education programs expressed as a percent of total students for Midlothian ISD, ESC Region 10, and Texas, for academic years 1994-95 through 2009-10. Data source: TEA.



There are many disabilities and conditions that adversely affect educational performance that are covered by the IDEA. IDEA is the special education law which mandates free and appropriate public school education for children between the ages of 3 and 21. The major categories of disabilities include autism, deaf-blindness, deafness, developmental delay, emotional disturbance, hearing impairment, intellectual disability, multiple disabilities, orthopedic impairment, other health impairment, specific learning disability, speech or language impairment, and traumatic brain injury. The TEA on-line data do not allow for a determination of the distribution of special education services being provided for in the school district. No conclusions can be drawn from the enrollment of children in special education programs and air pollutant concerns in the Midlothian area.

In summary, residents of Midlothian reported several concerns about health conditions and diseases for which there was insufficient information available from public health reporting systems to determine the incidence or prevalence of these conditions in the community. Despite the lack of a reporting system, the findings in the health consultations on Midlothian air quality suggest that periodically, exposed individuals in Midlothian may have potentially experienced some acute symptoms. School attendance for the Midlothian Independent School District did not reflect high rates of absenteeism. BRFSS prevalence rates for adults diagnosed with arthritis, gout, lupus, or fibromyalgia was not statistically significantly different among the different geographic regions examined. Standardized mortality ratios for the period 1999-2010 for Midlothian ZIP code 76065 with respect to Ellis County, Public Health Region 3, and Texas found no statistically significant differences for deaths related to influenza, pneumonia, autoimmune diseases, and ALS and other motor neuron diseases. TEA publicly available school data did not allow for conclusions to be made on attention deficit hyperactivity disorder (ADHD), autism, or special education participation by Midlothian school children.

5.0 Child Health Considerations

In communities faced with air pollution issues, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than are adults from certain kinds of exposure to hazardous substances. Children frequently play outdoors, especially during the summertime, gym class, recess or after school, which can increase their exposure potential. Further, a child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If contaminant exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus adults need as much information as possible to make informed decisions regarding their children's health.

When preparing this health consultation on health outcome data, ATSDR incorporated available epidemiological data for children to address issues and concerns related to children's health. Some sections within this health consultation dealt specifically with childhood diseases, health outcomes, and exposures. Other sections included cases of children with the disease within the calculation of rates. When possible, data on health outcomes were adjusted for age to account for the difference in the prevalence of a disease in children versus adults.

Information presented in Section 4.1 dealt with birth defects and adverse birth outcomes such as pre-term births, low birth weight and very low birth weight births, and fetal and infant mortality. In Section 4.2, standardized incidence ratios were determined for both total childhood cancer (age 0-19) and total childhood leukemia (0-19). Section 4.4 focused on children's blood lead levels. Current and lifetime childhood asthma rates were presented in Section 4.5. Section 4.5 also included some data on school attendance. Similarly, Section 4.6 presented school information on percent of children in special education programs.

As discussed previously in this document, numerous epidemiologic studies have found both chronic and acute adverse health outcomes with childhood exposures to air pollutants. For children, exposure has been tied to asthma exacerbation and missed school days as well as some adverse birth outcomes such as low birth weight. For the latter health outcome, there is concern about subsequent increased risk of some adult diseases. Although the data presented in this health consultation cannot be used to show cause and effect, the sections listed above combine to provide a comprehensive view of the health status of children in the Midlothian area.

6.0 Community Concerns Evaluation

Since 2005, ATSDR and DSHS have been collecting and documenting community concerns regarding the Midlothian facilities. The agencies have learned of these concerns through various means, including a door-to-door survey of residents, a community survey, and multiple public meetings and availability sessions held in Midlothian. The concerns expressed by community members have covered many topics, including human health, animal health, and the adequacy and reliability of ambient air monitoring data collected in the Midlothian area.

The following are responses to community concerns related to health issues evaluated in this document using health outcome data.

1. Persistence of emissions, the effects of continuous low level exposure to individual chemicals and/or mixtures.

Response: Air pollution is a complex mixture of particulates and gaseous co-pollutants. When evaluating the health outcome data for this health consultation, it was not possible to evaluate the association between a health outcome and an individual or combination of pollutants. These evaluations use geographic areas to determine the rates for specific time periods. An underlying assumption is that all the individuals in each geographic area have shared the same exposure to chemicals or mixtures of chemicals. While using existing epidemiological data sources can address whether there is a higher or lower rate of disease in an area than expected, they cannot establish cause and effect.

Continuous, low level exposures are more likely to result in a chronic condition rather than an acute or short-term health effect. Health outcome data reviewed in this health consultation covered a wide range of diseases and conditions including those that are more chronic in nature, such as cardiovascular and some respiratory diseases (Section 4.5). The prevalence of these health conditions and numbers of primary hospital discharges related to these diseases are some of the main information provided in this document.

2. Impact on pregnant women, infants, children, the elderly, the immune-suppressed.

Response: There are many groups who are considered to be more sensitive to exposure to air pollutants. These groups include pregnant women and their developing fetus, infants, young children, individuals with certain chronic diseases, immune-suppressed individuals, and the elderly. In this health consultation, the potential impact from the site on these sensitive populations was addressed in several ways. Epidemiological data were used in this health consultation to determine the prevalence of health outcomes in Midlothian and to compare these rates to other areas. When possible, rates of diseases were adjusted for age, sex, and race to account for known differences in prevalence among these different categories. Supporting information from other national surveys or non-health related databases was included to put health outcomes in context. Rates for some chronic diseases that impact the elderly such as cardiovascular diseases, COPD, and diabetes were presented. A discussion on immune system diseases can be found in Section 4.6. The prevalence of birth related health outcomes including birth defects and pre-term and low birth weight births can be found in section 4.1. Section 4.4

provided information on blood lead testing in children. The specific concerns of children are also discussed Section 5.0, Child Health Considerations.

3. A higher incidence of respiratory problems has been identified in Midlothian, as stated in a symptom survey conducted by Legator, et al. [1998]

Response: The Legator, *et al.* research [1998] was a cross-sectional study that compared respiratory health outcomes in Midlothian with those of neighboring Waxahachie, Texas. Both cities are located in Ellis County. The authors found that Midlothian participants reported respiratory symptoms more than the Waxahachie participants. The number of participants in their study was too small to detect differences in the proportions for individual respiratory symptoms. Some of the respiratory symptoms evaluated included wheezing, persistent cough, persistent bronchitis, and shortness of breath. Some of these respiratory concerns were later voiced by Midlothian residents during public meetings and community surveys.

To address these respiratory health concerns, in Section 4.5 of this health consultation, primary hospital discharge data for COPD, chronic bronchitis, and emphysema are provided. Prevalence rates and hospital discharge data are provided for asthma. No statistically significant difference in rates was found between Midlothian and Ellis County. Section 4.5 contains a discussion on sinusitis, rhinitis, and respiratory infections. No formal critique of the Legator paper or the response to the paper by the Texas Natural Resources Conservation Commission [Pichette 2000] was included in this health consultation.

4. Rates of health problems and birth defects are higher in Ellis County when compared to state-wide values.

Response: Multiple databases and registries were used to examine the rates of health concerns, diseases, cancer, birth defects, and health risk factors. Depending upon the data source, different geographic units were used to compare rates of the health outcomes. The geographic units included the potential area of impact (as modeled in the first health consultation that addressed Midlothian air quality [ATSDR 2015a]), Midlothian ISD, Midlothian ZIP code 76065, combined Midlothian and Cedar Hill ZIP codes 76065 and 75104, Ellis County, Educational Service Center X, Public Health Region 3, Texas, and the United States. The health outcome evaluation data is provided in Section 4.0. For the vast majority of conditions evaluated, there were no statistically significant differences in the rate of these diseases in the Midlothian area and Ellis County than for the state. The Summary section in the front material for this document highlights the findings for major community health concerns.

5. Concern for specific health effects.

Response: ATSDR learned of numerous health concerns that the Midlothian residents believed may be attributable to exposure to air pollutants from the surrounding steel and cement industries. Some of the concerns pertained to self-reported specific diseases, such as deep vein thrombosis, while others pertained to a group of diseases, such as childhood cancers. This health consultation used health outcome data from state wide registries and other validated surveillance and data collection systems to attempt to address these concerns. Table 6.1 lists the diseases and health concerns reported and the corresponding section, sub-section, tables, and figures where

the reader may find a discussion about each specific health concern. Additional, expanded data tables are found in Appendix A.

Table 6.1 Health concerns raised by Midlothian residents with corresponding reference to section, sub-section, tables, and figures in this Health Outcome Data health consultation.

Health Concern	Section	Sub-section	Table(s)	Figure(s)
Birth Defects	4.1	Birth defects	4.1.1-13	
Hypospadias/epispadias	4.1	Update on birth defects	4.1.8-10	
Down syndrome	4.1	Update on birth defects	4.1.11-13	
Fertility	4.1	Fertility and birth rates	4.1.17	4.1
Cancer	4.2	Update incidence/mortality	4.2.2-11	
Leukemia	4.2	Leukemia	4.2.8-9	
Childhood total cancer	4.2	Childhood cancer	4.2.10-11	
Mycosis fungoides†	4.2	Update incidence	4.2.3-4.2.5	
Childhood lead poisoning	4.4		4.4.1	4.4.1
Asthma	4.5	Asthma	4.5.1-2	4.5.1
Respiratory problems	4.5	Other respiratory illnesses	4.5.4-6	4.5.3
Sinus problems	4.5	Other respiratory illnesses		
Respiratory infections	4.5	Other respiratory illnesses	4.5.6	
Deep vein thrombosis (DVT)	4.5	Cardiovascular diseases	4.5.8	
Diabetes	4.5	Diabetes	4.5.11-13	4.5.5
Allergies	4.6	Acute symptoms		
Headache	4.6	Acute symptoms		
Burning eyes and throat	4.6	Acute symptoms		
Rash	4.6	Acute symptoms		
Immune deficiencies	4.6	Immune-related chronic diseases		
Autoimmune diseases	4.6	Immune-related chronic diseases	4.6.1-2	
Graves disease	4.6	Immune-related chronic diseases		
Lupus	4.6	Immune-related chronic diseases	4.6.1	
Sarcoidosis	4.6	Immune-related chronic diseases		
Fibromyalgia	4.6	Immune-related chronic diseases	4.6.1	
ALS	4.6	Amyotrophic lateral sclerosis	4.6.3-4	
Special Education	4.6	Special education		4.6.1
Autism	4.6	Special education		
ADHD	4.6	Special education		
Disabled children	4.6	Special education		

†Cases of Mycosis fungoides, a cutaneous T-cell lymphoma, are included in the non-Hodgkin’s lymphoma category.

6. Use of anecdotal information and alternative data.

Response: As described in the introduction to this section on community concerns evaluation, ATSDR has learned of health concerns and reports of individuals who have cancer, birth defects, and other illnesses during door to door surveys, public meetings, and other means, such as e-mail

correspondence. This information is regarded as anecdotal because it is based on personal experience or opinion and cannot be checked for facts. As such, ATSDR does not attempt to verify disease information by checking personal medical records. The information is accepted as stated and becomes part of the issues being addressed for a site. Thus, anecdotal information is crucial to ATSDR engagement at a site.

To address the health concerns captured by the anecdotal information, the rates of occurrence in the area, perspective on national or state-wide rates, and known causes and risk factors of the health concern may be provided in the health consultation. In this health consult, when possible, we addressed some health concerns by statistical and epidemiological evaluations using some standard public health databases. Included in this group would be the analyses from the birth defect registry, cancer registry, and mortality database. This ATSDR health consultation was unique in including analyses from some other, less traditionally incorporated or alternative databases. We relied on validated well maintained databases such as BRFSS and primary hospital discharge data to present information on some chronic diseases and disease risk factors. In response to community requests, we included some supporting information from the Texas Education Agency.

All health outcome data used in this consultation relied on existing databases. No research study was performed to obtain data. Regardless of the type of database used, while the analyses may be used to demonstrate higher or lower rates of disease in an area as compared to another area, they cannot be used to establish cause and effect.

7.0 Conclusions and Recommendations

Main Conclusion

As part of this health consultation, ATSDR evaluated health outcome data from multiple public health databases that included hundreds of different health outcomes. The data used primarily spanned the years 1998 to 2010 for Midlothian, Ellis County, Public Health Region 3, and Texas. Overall, there were few statistically significant findings that suggest the burden of disease was different in Midlothian as compared to other populations evaluated. Given the hundreds of comparisons made, some statistically significant higher or lower estimates would be expected based on chance alone. Since this health consultation was exploratory, no statistical correction was made to control for the evaluation of numerous health outcomes. Many of the conditions evaluated in this report are rare and the number of cases reported was small making the ability to detect statistically significant findings difficult. The conclusions corresponding to specific health outcome data follows.

The health outcome data review presented in this health consultation cannot be used to demonstrate a cause and effect evaluation related to the chemicals of concern identified at the site. The data do not allow for the assessment of environmental contributions from air pollutants or other factors to disease causation.

Recommendation

At this time, ATSDR does not foresee the need to request additional health outcome data from DSHS. Based on the health outcome data presented, currently ATSDR and DSHS have no recommendations for any specific additional epidemiologic studies. Because the epidemiological concepts and some of the health outcome databases used in this health consultation are less familiar to community members, ATSDR and DSHS will be available to answer technical epidemiological questions if they arise. .

Birth Defects

Conclusion

With a few exceptions, birth defects in the Midlothian potential area of impact and the city of Midlothian were comparable to the rates in Ellis County, Public Health Region 3, and Texas. DSHS Birth Defects Epidemiology and Surveillance Branch (TBDES) provided data from the Texas Birth Defects Registry for 185 birth defects and any monitored birth defect for the potential area of impact, city of Midlothian, Ellis County, Public Health Region 3, and Texas for 1999-2008. The vast majority of the 185 birth defects examined had either zero cases reported or had prevalence rates that were not statistically significantly different in the potential area of impact and Midlothian as compared to Ellis County, Public Health Region 3, or Texas.

For the total cases found with any monitored birth defect, crude prevalence estimates for the potential area of impact, city of Midlothian, Ellis County and Public Health Region 3 were all significantly higher than Texas. Prevalence rates for these areas compared to the rest of Texas were about 30% higher. Maternal age and race/ethnicity adjusted prevalence rates for the potential area of impact and Midlothian were not statistically significantly different than the Texas prevalence for total cases.

There were 17 birth defect categories that had 5 or more cases reported in the area or impact over the ten year period. Five of these categories had crude prevalence rates, but not maternal age and race/ethnicity adjusted prevalence rates, that were significantly higher in the potential area of impact than Texas. This was similar to the Midlothian crude and adjusted rates for these same 5 birth defects except that the maternal age and race/ethnicity adjusted prevalence for other specified anomalies of the ear remained statistically significantly higher than Texas prevalence. However, for other specified anomalies of the ear any loss of statistical significance should be interpreted with caution because the crude and adjusted rates were similar. Crude prevalence ratios for other specified anomalies of the ear were statistically significant for Midlothian and Ellis County with respect to the remainder of Public Health Region 3, indicating higher rates in these two areas relative to Public Health Region 3. The crude prevalence ratio was not significant for Midlothian with respect to the remainder of Ellis County. The adjusted prevalence ratio was not statistically significant in the potential area of impact or Midlothian with respect to the remainder of Public Health Region 3 for this birth defect.

Similarly, crude prevalence for congenital hypertrophic pyloric stenosis was statistically significantly higher and the adjusted prevalence was not statistically significant in the potential area of impact and Midlothian when compared to the prevalence in Texas. This loss of statistical significance should be interpreted with caution because the crude and adjusted rates were similar for congenital hypertrophic pyloric stenosis.

Two of the 17 birth defect categories that had 5 or more cases reported in the potential area of impact, ostium secundum type septal defect and patent ductus arteriosus (PDA), had maternal age and race/ethnicity adjusted prevalence rates that were statistically significantly lower in Midlothian than Texas and Public Health Region 3. The adjusted prevalence for PDA was also statistically significantly lower in the potential area of impact than in Texas, Public Health Region 3, and Ellis County. Crude and adjusted prevalence ratios calculated for these conditions were not statistically significant.

Hypospadias, epispadias, and congenital chordee crude prevalence estimates for the potential area of impact, city of Midlothian, Ellis County, and Public Health Region 3 were all significantly higher than Texas estimates. After adjusting for maternal age and race/ethnicity, hypospadias prevalence was no longer statistically significantly higher in the potential area of impact and Midlothian compared to Texas. Adjusted prevalence ratios for hypospadias for the potential area of impact and Midlothian as compared to the remainder of Public Health Region 3 were not statistically significant, indicating that the prevalence estimates were statistically similar. The adjusted prevalence ratio for hypospadias for Ellis County compared to the remainder of Public Health Region 3 was also not statistically significant.

Down syndrome crude and maternal age and race/ethnicity adjusted prevalence rates were not significantly higher for the potential area of impact, Midlothian, and Ellis County, as compared to Texas for the ten year period 1999-2008. This was a similar finding to the 2005 TBDES cluster investigation (Number 2005.04) for Midlothian Down syndrome prevalence for 1997-2001 registry data. The 1995 TBDES cluster investigation (Number 1995.04), which found an elevated rate of Down syndrome in children born between 1992 and 1994 to mothers living in Ellis County, did not use Texas birth defects registry data. For the ten year period 1999-2008,

there were 6 cases of Down syndrome found in the potential area of impact and 7 cases found in Midlothian. However, the adjusted prevalence ratios for the potential area of impact and Ellis County, but not for Midlothian, as compared to the remainder of Public Health Region 3, were statistically significantly higher.

Recommendation

The prevalence of birth defects found in Public Health Region 3, which includes Ellis County and 18 other counties, was approximately 30% higher than the remainder of Texas. ATSDR recommends that TBDES consider evaluating potential reasons behind this difference. ATSDR also recommends that TBDES consider including both Public Health Region 3 and Texas as reference populations when providing data to the public on birth defects prevalence estimates in communities within Public Health Region 3.

In their cluster investigation report 2005.04, TBDES stated that they will continue to monitor the prevalence of the birth defect hypospadias in the Midlothian area. ATSDR recommends that TBDES consider including Ellis County and Public Health Region 3 in their future evaluations of the prevalence of the birth defect hypospadias.

Adverse Birth Outcomes

Conclusion

Data from the DSHS Center for Health Statistics showed that rates for preterm births, low birth weight births, very low birth weight births, fetal deaths, and infant mortality were similar in the potential area of impact or Midlothian and Ellis County, Public Health Region 3, and Texas for the period 1999-2008. There were no statistically significant differences found in the unadjusted rates for preterm births, low birth weight births, and very low birth weight births in the potential area of impact or Midlothian compared to Ellis County, Public Health Region 3 or Texas.

Maternal age and race/ethnicity adjusted rate ratios for the Midlothian potential area of impact compared to the remainder of Ellis County were not statistically significant for preterm births, low birth weight births, and very low birth weight births, indicating that the rates of these adverse birth outcomes were similar between the potential area of impact and the rest of Ellis County.

Crude fetal death rates were significantly lower in Midlothian compared to Texas, while there was no statistically significant difference in the fetal death rates in the potential area of impact with respect to Texas. There were no statistically significant differences in unadjusted infant mortality rates among the potential area of impact, Midlothian, Ellis County, and Texas.

While the unadjusted fertility rate and birth rate in Midlothian appeared to be significantly higher than the corresponding Texas unadjusted rates based on non-overlapping confidence intervals, results should be interpreted with caution since the populations are not directly comparable. Over the last ten years (1999-2008), the unadjusted birth rate for Midlothian appeared to be becoming similar to the state rate.

Cancer

Conclusion

The occurrence of new cancer cases and the death rate from cancer in the Midlothian ZIP code 76065 was similar to the rates in Texas, based on Texas Cancer Registry data from 1999-2008. Data for all cancer sites combined, total childhood cancers (age 0-19), total childhood leukemia, 5 leukemia sub-types, and 25 additional cancers grouped by site were obtained for Midlothian ZIP code 76065, Ellis County, Public Health Region 3, and Texas.

The standardized incidence ratios (SIR) of cancer for males and females for the ten year period 1999-2008 for ZIP code 76065 did not show a significantly higher incidence than expected for any of the cancer groupings or sites, including leukemia and childhood cancers. The standardized mortality ratios (SMR) for males and females for the ten year period 2000-2009 for ZIP code 76065 did not show a significantly higher mortality than expected for any of the cancer groupings or sites, including leukemia and childhood cancers. These data were comparable to previous cancer cluster investigations on cancer incidence and cancer mortality by the Texas Cancer Registry that found the SIRs and SMRs were within expected ranges for men and women in the Midlothian ZIP code.

Mortality

Conclusion

Data obtained from the DSHS Center for Health Statistics found that in general, mortality rates in the Midlothian ZIP code 76065 were similar to or lower than the rates in Texas for the 12-year period 1999-2010. Standardized mortality ratios for combined males and females indicated that for the 33 leading causes of death for ZIP code 76065, mortality due to accidents, suicide, liver disease, and ‘all other causes of death’ were significantly lower compared to Texas, and Alzheimer’s disease mortality was significantly higher compared to Texas. In the Midlothian ZIP code, the crude mortality rate for all deaths was lower than the rate in Ellis County, Public Health Region 3, and Texas. Crude mortality rates for the top 5 leading causes of death were similar for these geographic areas, with heart disease deaths and cancer deaths accounting for about half of the mortality.

Childhood Lead Exposure

Conclusion

Blood lead data provided by the DSHS Childhood Lead Poisoning Prevention Program for children less than 15 years of age residing in the city of Midlothian were comparable to Texas statewide data on children’s blood lead levels for the years 1997 to 2009. A two-tailed t-test was performed on the data to determine if there was a difference between the mean blood lead level found in the children tested living in Midlothian as compared to those tested in the state for each surveillance year. The means for the two groups were similar.

Not all children receive blood lead testing. Children are tested for lead based on risk factors associated with lead exposure. About 2% of the children less than 15 years of age who are tested in both Midlothian and statewide have a blood lead result greater than 10 micrograms lead/deciliter ($\mu\text{g}/\text{dL}$). The percentage is about 3% in the subset of these children between the ages of 1 and 5. Over this thirteen year time period, the mean blood lead levels for children

residing in Midlothian or statewide have followed a similar downward trend. The mean blood lead level in tested children for both groups in 2009 was 2.0 µg/dL.

Asthma and Other Chronic Respiratory Diseases

Conclusion

The occurrence of asthma and other chronic respiratory diseases was comparable in Midlothian ZIP code 76065, Ellis County, Public Health Region 3, and Texas, based on Behavior Risk Factor and Surveillance Survey (BRFSS) data provided by DSHS for the years 2001 to 2010. BRFSS data show that the current rate of adult asthma in the Midlothian area was not statistically significantly different from the rate in Ellis County, Public Health Region 3, and Texas. Similarly, the current rate of childhood asthma was similar across Ellis County, Public Health Region 3, and Texas. These rates were similar to those in the United States.

Primary hospital discharge data obtained from DSHS Center for Health Statistics revealed that although there was some variation by year, over the ten year period 2000 to 2009, the odds of being discharged from a hospital with the primary diagnosis of asthma was not statistically significantly different between ZIP code 76065 and Ellis County. However, for both of these areas, odds ratios for the asthma discharge code were higher for this ten year period compared to hospital discharges for people living in Public Health Region 3 and Texas. Odds of a primary hospital discharge for COPD and allied conditions were not statistically significantly different between Midlothian ZIP code 76065 and the remainder of Ellis County for the period 2000 to 2009. The odds of a having a primary hospital discharge of COPD and allied conditions was significantly lower in ZIP code 76065 and Ellis County than in the remainder of Public Health Region 3 or Texas during this same time period.

Standardized mortality ratios were calculated using data obtained from DSHS Center for Health Statistics for 1999-2010 for males, females, and combined males and females. The SMRs for this twelve year period indicated that the death rates due to COPD and asthma and to other respiratory diseases were not statistically significantly different in the Midlothian ZIP code than in Ellis County, Public Health Region 3, and Texas.

Cardiovascular Diseases

Conclusion

The prevalence, odds of hospital discharge, and mortality related to the adult cardiovascular conditions examined were similar in Midlothian ZIP code 76065, Ellis County, Public Health Region 3, and Texas. DSHS provided BRFSS data for combined ZIP codes 76065 (Midlothian) and 75104 (Cedar Hill), Ellis County, Public Health Region 3, and Texas on adults with high blood pressure, angina or coronary heart disease, heart attacks, and stroke for surveillance performed sometime between 2001 and 2010. DSHS also provided BRFSS data on risk factors for these conditions. The data available on adult cardiovascular diseases and risk factors showed that the estimated prevalence in the Midlothian area is similar to Ellis County, Public Health Region 3, and Texas. The rates of hypertension, coronary heart diseases, and stroke were similar to those in the United States.

Primary hospital discharge data were obtained from DSHS Center for Health Statistics for acute myocardial infarction, acute pulmonary heart disease, hypertension, and heart failure for the ten

year period 2000 to 2009. Analysis of these data showed that the odds of being discharged from a hospital with the diagnosis of acute myocardial infarction or other ischemic heart disease was significantly higher for people living in ZIP code 76065 or Ellis County than those hospitalized in the remainder of Public Health Region 3 and Texas. The odds of a discharge diagnosis of acute pulmonary heart disease were significantly higher for people who were hospitalized that were living in ZIP code 76065 than in the remainder of Ellis County or Texas. There were significantly lower odds of primary hospital discharge for hypertension and heart failure for people living in the Midlothian ZIP code than the remainder of the other three areas.

During the ten year period from 2000-2009, standardized mortality ratios (SMR) for heart disease, hypertension, vascular disease, and stroke for males, females, and total population for ZIP code 76065 in relation to Ellis County, Public Health Region 3, and Texas were not found to be significantly higher or lower for the period 1999-2010.

Diabetes

Conclusion

The prevalence of diabetes was similar in Midlothian ZIP code 76065, Ellis County, Public Health Region 3, and Texas. Behavior Risk Factor and Surveillance Survey (BRFSS) data provided by DSHS for combined ZIP codes 76065 (Midlothian) and 75104 (Cedar Hill), Ellis County, Public Health Region 3, and Texas on adults with diabetes for surveillance performed sometime between 2001 and 2010 found that the prevalence of adult diabetes in the Midlothian area was not statistically significantly different than the prevalence of adult diabetes in Ellis County, Public Health Region 3, Texas, and the United States. The prevalence of two risk factors for diabetes, obesity and physical inactivity, were also similar in these populations.

Over the ten year period 2000-2009, the primary hospital discharge data for diabetes obtained from DSHS Center for Health Statistics for the Midlothian ZIP code 76065 generally indicated a lower likelihood of being discharged with a diabetes diagnosis than for individuals residing in the remainder of Ellis County, Public Health Region 3, and Texas. The standardized mortality ratios for the period 1999 to 2010 for ZIP code 76065 with respect to the other three geographic areas revealed that there were no statistically significant differences for deaths from diabetes in ZIP code 76065 than in Ellis County, Public Health Region 3, and Texas for males, females, and combined population.

Other Health Concerns

Conclusion

The information available from public health reporting systems was insufficient to allow for a definitive epidemiological evaluation of the occurrence of acute symptoms, autoimmune diseases, amyotrophic lateral sclerosis (ALS), and some other community health concerns in the Midlothian area.

There is no reporting system that captures the prevalence of acute irritant signs and symptoms such as headache, burning eyes and throat, rash, and nosebleeds. Despite the lack of a reporting system, the findings in the previous health consultations on Midlothian air quality of periods of time when irritants such as sulfur oxides, ozone, and particulates were present suggest that exposed individuals in Midlothian may experience these acute symptoms.

There are no databases that comprehensively capture respiratory infections. Residents expressed concern that the air pollutants may make them more susceptible to respiratory infections. Standardized mortality ratios for the period 1999-2010 for ZIP code 76065 with respect to Ellis County, Public Health Region 3, and Texas found no statistically significant differences for deaths from influenza or pneumonia. Using school attendance available from the Texas Education Association (TEA) website as a surrogate, the percent yearly school attendance in the Midlothian Independent School District (ISD) fell consistently between 96% and 97% between 1994 and 2010. The Midlothian ISD attendance rate was slightly higher than that of Education Service Center (ESC) Region 10 and Texas.

BRFSS prevalence rates for combined ZIP codes 76065 (Midlothian) and 75104 (Cedar Hill), Ellis County, Public Health Region 3, and Texas on adults diagnosed with arthritis, gout, lupus, or fibromyalgia were not statistically significantly different during the surveillance performed sometime between 2001 and 2010. There were an insufficient number of cases of fibromyalgia, sarcoidosis, lupus, and Graves disease listed as a primary hospital discharge diagnosis in ZIP code 76065 or Ellis County for the combined ten year period 2000 to 2009 to provide statistical analyses. Standardized mortality ratios for the period 1999-2010 for males, females, and total population for ZIP code 76065 with respect to Ellis County, Public Health Region 3, and Texas found no statistically significant differences for deaths related to autoimmune diseases.

ATSDR's National ALS Registry is not considered complete and ATSDR's funds for Texas ALS surveillance did not include Ellis County. Standardized mortality ratios for the period 1999-2010 for males, females, and total population for the Midlothian ZIP code with respect to Ellis County, Public Health Region 3, and Texas found no statistically significant differences for deaths related to ALS and other motor neuron diseases.

Recommendation

Although there are no reporting systems available to capture the prevalence of acute irritant effects, based on our understanding of the irritant properties of some of the air pollutants, these pollutants are a potential health concern. As explained in the Midlothian health consultation on criteria (NAAQS) air pollutants and hydrogen sulfide [ATSDR 2016a], ATSDR and DSHS intend to work with TCEQ to insure levels of air pollutants remain below health levels of concern.

Special Education

Conclusion

The information available from publicly available school reporting systems did not allow for conclusions to be made on attention deficit hyperactivity disorder (ADHD), autism, or special education participation by Midlothian school children. Publicly available data was obtained from the Texas Education Agency (TEA) website for the academic years 1994-95 through 2009-10 for the Midlothian ISD, ESC Region 10, and Texas. There are more than a dozen major categories of disabilities that fall into the special education category. The TEA website data did not distinguish among percent of students with ADHD, autism, or other disabilities. The percent of students participating in special education programs in the Midlothian ISD was consistently one to three percent higher than the percent in ESC Region 10 and Texas. The percent participation in the

Midlothian ISD was lower than the U.S. Department of Education reported national average percent participation.

8.0 Public Health Action Plan

This health consultation is one of the several evaluations being conducted by ATSDR under the overall Public Health Response Plan developed to address community concerns. The following are public health actions planned specifically related to the findings from this health consultation:

ATSDR or DSHS will:

- ATSDR and DSHS will provide community health education for residents of Midlothian to better understand the findings and implications of this health outcome data evaluation.
- As part of its mission and commitment to monitor health status and to inform, educate, and empower people about health issues, DSHS will continue to respond to citizen inquiries concerning databases maintained by the DSHS, including the cancer registry and birth defect registry.

Primary Author and Technical Advisors

Primary Author:

Michelle Watters, MD, PhD, MPH
Division Medical Officer, ATSDR Division of Community Health Investigations

Technical Advisors:

Natalie Archer, MS
Senior Epidemiologist, DSHS Environmental and Injury Epidemiology and Toxicology Unit

Richard A. Beauchamp, MD
Senior Medical Toxicologist, DSHS Health Assessment & Toxicology Program

Mary Ethen, MPH
Epidemiologist, DSHS Birth Defects Epidemiology and Surveillance Branch

Brenda Mokry, M.Ed. (retired)
Epidemiologist, DSHS Environmental and Injury Epidemiology and Toxicology Unit

Data Contributors:

Birth Defects Registry

Mary Ethen, MPH
Epidemiologist, DSHS Birth Defects Epidemiology and Surveillance Branch

Other Adverse Birth Outcomes data

Natalie Archer, MS
Senior Epidemiologist, DSHS Environmental and Injury Epidemiology and Toxicology Unit

Cancer Registry

Brenda Mokry, M.Ed. (retired)
Epidemiologist, DSHS Environmental and Injury Epidemiology and Toxicology Unit

Mortality data; Chronic Health Conditions—Primary Hospital Discharge data

Richard Beauchamp, MD
Senior Medical Toxicologist, DSHS Health Assessment & Toxicology Program

Childhood Lead Exposure data

L.J. Smith, MS
Epidemiologist, DSHS Childhood Lead Poisoning Prevention Program

Chronic Health Conditions—BRFSS data

Anna Vincent
Research Specialist, DSHS Center for Health Statistics

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Glossary

Sources: <http://www.cdc.gov/excite/library/glossary.htm>
<http://www.dshs.state.tx.us/birthdefects/glossary.shtm>
<http://www.nlm.nih.gov/medlineplus/mplusdictionary.html>

- Adjusted rate:** a rate that has been statistically modified to eliminate the effect of different age, race, sex, or other characteristic distributions among different populations.
- Anencephaly:** congenital absence of the skull, with cerebral hemispheres completely missing or reduced to small masses attached to the base of the skull. Anencephaly is not compatible with life.
- Atresia:** absence or closure of a normal opening.
- Cluster:** an aggregation of cases of a disease, injury, or other health condition (particularly cancer and birth defects) in a circumscribed area during a particular period without regard to whether the number of cases is more than expected (often the expected number is not known).
- Confidence interval:** a range of values for a measure (e.g., rate or odds ratio) constructed so that the range has a specified probability (often, but not necessarily, 95%) of including the true value of the measure.
- Congenital chordee:** a condition in which there is a curvature or bowing of the penis, usually in a downward direction. Congenital chordee often occurs with hypospadias.
- Crude rate:** when referring to a rate, an overall or summary rate for a population, without adjustment.
- Cryptorchidism:** a condition in which one or both testes fail to descend normally.
- Cumulative incidence:** see incidence rate.
- Down syndrome (Trisomy 21):** the chromosomal abnormality characterized by an extra copy of chromosome 21. In rare cases this syndrome is caused by translocation. The extra copy can be free-lying, or can be attached to some other chromosome, most frequently number 14. Down syndrome can occur in mosaic. So that there is a population of normal cells and a population of trisomy 21 cells. Down syndrome is characterized by moderate to severe mental retardation, sloping forehead, small ear canals, flat bridged nose and short fingers and toes. One third of infants have congenital heart disease, and one third have duodenal atresia. (Both can be present in the same infant.) Affected people can survive to middle or old age. There is an increased incidence of Alzheimer disease in adults with Down syndrome.
- Epispadias:** A congenital defect in which the urinary meatus (urinary outlet) opens above (dorsal to) the normal position. The urinary sphincters are defective, so incontinence does occur. Surgical correction is aimed at correcting incontinence and permitting sexual functioning. The corresponding defect in females is rare. See also hypospadias.
- Fecundity:** refers to the capability of producing offspring.
- Fetal alcohol syndrome:** a constellation of physical abnormalities (including characteristic abnormal facial features and growth retardation), and problems of behavior and cognition in children born to mothers who drank alcohol during pregnancy.
- Gastroschisis:** a congenital opening of the abdominal wall with protrusion of the intestines. This condition is surgically treated. Contrast with omphalocele, below.
- Geocoded:** refers to data in which the street address is matched to geographic coordinates (latitude and longitude).

Hirschsprung's disease: the congenital absence of autonomic ganglia (nerves controlling involuntary and reflexive movement) in the muscles of the colon. This results in immobility of the intestines and may cause obstruction or stretching of the intestines. The condition is sometimes referred to as megacolon. This condition is repaired surgically in early childhood by the removal of the affected portion of the intestine.

Hypospadias: a congenital defect in which the urinary meatus (urinary outlet) is on the underside of the penis or on the perineum (area between the genitals and the anus). The urinary sphincters are not defective so incontinence does not occur. The condition may be surgically corrected if needed for cosmetic, urologic, or reproductive reasons. The corresponding defect in women is rare. See also epispadias.

Incidence: a measure of the frequency with which new cases of illness, injury, or other health condition occurs among a population during a specified period.

Incidence rate: a measure of the frequency with which new cases of illness, injury, or other health condition occur, expressed explicitly per a time frame. Incidence rate is calculated as the number of new cases over a specified period divided either by the average population (usually mid-period) or by the cumulative person-time the population was at risk.

Latency: the time from exposure to a causal agent to onset of symptoms of a (usually noninfectious) disease.

Microcephaly: the congenital smallness of the head, with corresponding smallness of the brain.

Microtia: a small or maldeveloped external ear and atretic or stenotic external auditory canal.

Omphalocele: the protrusion of an organ into the umbilicus. The defect is usually closed surgically soon after birth. Contrast with gastroschisis.

Ostium secundum defect: a congenital cardiac malformation in which there are one or several openings in the atrial septum (muscular and fibrous wall between the right and left atria) allowing a mixing of oxygenated and unoxygenated blood. The openings vary in size and may resolve without treatment or may require surgical treatment.

P-value: the probability of observing an association between two variables or a difference between two or more groups as large or larger than that observed, if the null hypothesis were true. Used in statistical testing to evaluate the plausibility of the null hypothesis (i.e., whether the observed association or difference plausibly might have occurred by chance).

Patent ductus arteriosus (PDA): a blood vessel between the pulmonary artery and the aorta. This is normal in fetal life, but can cause problems after birth, particularly in premature infants. This condition causes abnormal cardiac circulation and pressure in the heart during contractions. The vast majority close spontaneously and cause no problems. Medical or surgical correction may be done. This is only an abnormality if it causes significant medical problems.

Poisson regression: a type of statistical analysis based on the Poisson distribution used to compare rates of rare occurrences such as birth defects between different population groups, different areas, or different times.

Plagiocephaly: a malformation of the head marked by an oblique slant to the main axis of the skull.

Prevalence: the number or proportion of cases or events or attributes among a given population.

Prevalence ratio: indicates how large the prevalence of an outcome is in one group relative to another group.

Rate: an expression of the relative frequency with which an event occurs among a defined population per unit of time, calculated as the number of new cases or deaths during a specified period divided by either person-time or the average (mid-interval) population.

Rate ratio: a measure of association that quantifies the relation between an exposure and a health outcome from an epidemiologic study.

Ratio: the relative size of two quantities, calculated by dividing one quantity by the other.

Spina bifida: a neural tube defect resulting from failure of the spinal neural tube to close. The spinal cord and/or meninges may or may not protrude. This usually results in damage to the spinal cord with paralysis of the involved limbs. Includes myelomeningocele (involving both spinal cord and meninges) and meningocele (involving just the meninges).

Standardized incidence ratio (SIR): is the observed number of new cases of a condition relative to the number of new cases of that condition that would be expected based on what is observed in a standard, comparison population. The SIR is frequently used for cancer incidence studies.

Standardized mortality ratio (SMR): is the observed number of deaths from a condition relative to the number of deaths from that condition that would be expected based on what is observed in a standard, comparison population.

Standardized rate: See adjusted rate.

Trisomy: a chromosomal abnormality characterized by one more than the normal number of chromosomes. Normally, cells contain two of each chromosome. In trisomy, cells contain three copies of a specific chromosome.

Trisomy 23: an abnormal condition characterized by the 23rd chromosome (the sex chromosome) containing three copies. In a male (Klinefelter's syndrome) there are two X chromosomes and one Y chromosome. In a female (Triple X), there are three X chromosomes.

Unadjusted rate: See crude rate.

Appendices

Appendix A – Tables

Appendix B – Figures

Appendix C – ATSDR Response to Public Comments

Appendix D – ATSDR Response to Peer Review Comments

APPENDIX A
TABLES

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.a. Birth defects cases by BPA4 code and crude prevalence of birth defects per 10,000 live births with 95% confidence intervals (CI) for Midlothian potential area of impact, Texas, 1999-2008. Data Source: TDSHS TBDES

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
216.9 Hairy nevus	0	0.00	0.00-17.47
228.0 Hemangioma	<5	NS	NS
228.1 Cystic hygroma, lymphangioma any site	0	0.00	0.00-17.47
237.7 Neurofibromatosis	<5	NS	NS
238.0 Teratoma	0	0.00	0.00-17.47
239.2 Neck cyst	0	0.00	0.00-17.47
243.9 Hypothyroidism, congenital	<5	NS	NS
253.8 Diencephalic syndrome	0	0.00	0.00-17.47
257.8 Testicular feminization/Androgen insensitivity syndrome	0	0.00	0.00-17.47
277.5 Hurler syndrome	0	0.00	0.00-17.47
279.1 DiGeorge syndrome (279.11)	0	0.00	0.00-17.47
335.0 Infantile spinal muscular atrophy	0	0.00	0.00-17.47
345.6 Infantile spasms, congenital	0	0.00	0.00-17.47
352.6 Moebius syndrome	0	0.00	0.00-17.47
362.6 Retinal degeneration, peripheral	0	0.00	0.00-17.47
362.7 Retinitis pigmentosa	0	0.00	0.00-17.47
425.3 Endocardial fibroelastosis, myocardial fibrosis	0	0.00	0.00-17.47
426.7 Congenital Wolfe-Parkinson-White syndrome	0	0.00	0.00-17.47
427.9 Cardiac arrhythmias, not elsewhere classified	0	0.00	0.00-17.47
524.0 Abnormalities of jaw size - micro/macrogathia	<5	NS	NS
550.0 Inguinal hernia with mention of gangrene	0	0.00	0.00-17.47
550.1 Inguinal hernia with obstruction, no gangrene	0	0.00	0.00-17.47
550.9 Inguinal hernia with no obstruction, no gangrene	<5	NS	NS
740.0 Anencephalus	0	0.00	0.00-17.47
740.1 Craniorachischisis	0	0.00	0.00-17.47
740.2 Iniencephaly	0	0.00	0.00-17.47
741 Spina bifida	0	0.00	0.00-17.47
742.0 Encephalocele	0	0.00	0.00-17.47
742.1 Microcephalus	<5	NS	NS
742.2 Reduction deformities of brain	0	0.00	0.00-17.47
742.3 Congenital hydrocephalus	0	0.00	0.00-17.47
742.4 Other specified anomalies of brain	<5	NS	NS
742.5 Other specified anomalies of spinal cord	<5	NS	NS
742.8 Other specified anomalies of nervous system	0	0.00	0.00-17.47
742.9 Unspecified anomalies of central nervous system	0	0.00	0.00-17.47
743.0 Anophthalmos	0	0.00	0.00-17.47
743.1 Microphthalmos	<5	NS	NS
743.2 Buphthalmos	0	0.00	0.00-17.47
743.3 Congenital cataract and lens anomalies	<5	NS	NS
743.4 Coloboma, other anomalies of anterior segments	0	0.00	0.00-17.47
743.5 Congenital anomalies of posterior segment	<5	NS	NS
743.6 Congenital anomalies of eyelids, lacrimal system, and orbit	<5	NS	NS
743.8 Other specified anomalies of eye	0	0.00	0.00-17.47
743.9 Unspecified anomalies of eye	0	0.00	0.00-17.47
744.0 Anomalies of ear causing impairment of hearing	0	0.00	0.00-17.47
744.2 Other specified anomalies of ear	12	56.82*	29.36-99.25
744.3 Unspecified anomalies of ear	0	0.00	0.00-17.47
744.4 Branchial cleft, cyst, or fistula	0	0.00	0.00-17.47
744.8 Other specified anomalies of face and neck	0	0.00	0.00-17.47
744.9 Congenital anomalies of face, NOS	<5	NS	NS
745.0 Common truncus	0	0.00	0.00-17.47
745.1 Transposition of great vessels	<5	NS	NS
745.2 Tetralogy of Fallot	0	0.00	0.00-17.47
745.3 Single ventricle	0	0.00	0.00-17.47
745.4 Ventricular septal defect	9	42.61	19.49-80.89
745.5 Ostium secundum type atrial septal defect	18	85.23	50.51-134.70
745.6 Endocardial cushion defects	<5	NS	NS
745.8 Other specified defects of septal closure	0	0.00	0.00-17.47
745.9 Unspecified defect of septal closure	<5	NS	NS
746.0 Anomalies of pulmonary valve	5	23.67	7.69-55.25

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
746.1 Anomalies of tricuspid valve	<5	NS	NS
746.2 Ebsteins anomaly	0	0.00	0.00-17.47
746.3 Congenital stenosis of aortic valve	<5	NS	NS
746.4 Other anomalies of aortic valve	<5	NS	NS
746.5 Congenital mitral stenosis	<5	NS	NS
746.7 Hypoplastic left heart syndrome	<5	NS	NS
746.8 Other specified anomalies of the heart	9	42.61	19.49-80.89
746.9 Unspecified anomalies of heart	0	0.00	0.00-17.47
747.0 Patent ductus arteriosus (PDA)	10	47.35	22.71-87.08
747.1 Coarctation of aorta	<5	NS	NS
747.2 Other anomalies of aorta	<5	NS	NS
747.3 Anomalies of pulmonary artery	<5	NS	NS
747.4 Anomalies of great veins	0	0.00	0.00-17.47
747.6 Other anomalies of peripheral vascular system	<5	NS	NS
747.8 Other specified anomalies of circulatory system	0	0.00	0.00-17.47
747.9 Unspecified anomalies of circulatory system	0	0.00	0.00-17.47
748.0 Choanal atresia	0	0.00	0.00-17.47
748.1 Other anomalies of nose	0	0.00	0.00-17.47
748.2 Web of larynx	0	0.00	0.00-17.47
748.3 Other anomalies of larynx, trachea, and bronchus	0	0.00	0.00-17.47
748.4 Congenital cystic lung	0	0.00	0.00-17.47
748.5 Agenesis, aplasia, hypoplasia, or dysplasia of lung	0	0.00	0.00-17.47
748.6 Other anomalies of lung	0	0.00	0.00-17.47
748.8 Other specified anomalies of respiratory system	0	0.00	0.00-17.47
748.9 Unspecified anomalies of respiratory system	0	0.00	0.00-17.47
749.0 Cleft palate alone	<5	NS	NS
749.1 Cleft lip with/without cleft palate	0	0.00	0.00-17.47
750.1 Other anomalies of tongue	0	0.00	0.00-17.47
750.2 Other specified anomalies of mouth and pharynx	0	0.00	0.00-17.47
750.3 T-E fistula, esophageal atresia and stenosis	<5	NS	NS
750.4 Other specified anomalies of esophagus	0	0.00	0.00-17.47
750.5 Congenital hypertrophic pyloric stenosis	11	52.08*	26.00-93.19
750.6 Congenital hiatus hernia	0	0.00	0.00-17.47
750.7 Other specified anomalies of stomach	0	0.00	0.00-17.47
750.8 Other specified anomalies of upper alimentary tract	0	0.00	0.00-17.47
750.9 Unspecified anomalies of upper alimentary tract	0	0.00	0.00-17.47
751.0 Persistent omphalomesenteric/vitelline duct	0	0.00	0.00-17.47
751.1 Atresia and stenosis of small intestine	<5	NS	NS
751.2 Atresia/stenosis of large intestine, rectum and anal canal	<5	NS	NS
751.3 Hirschsprungs disease, other anomalies of the colon	<5	NS	NS
751.4 Anomalies of intestinal fixation	0	0.00	0.00-17.47
751.5 Other anomalies of intestine	0	0.00	0.00-17.47
751.6 Anomalies of gallbladder, bile ducts, and liver	0	0.00	0.00-17.47
751.7 Anomalies of pancreas	0	0.00	0.00-17.47
751.8 Other specified anomalies of digestive system	0	0.00	0.00-17.47
751.9 Unspecified anomalies of digestive system	0	0.00	0.00-17.47
752.0 Anomalies of ovaries	0	0.00	0.00-17.47
752.1 Anomalies of fallopian tubes and broad ligaments	0	0.00	0.00-17.47
752.2 Doubling of uterus	0	0.00	0.00-17.47
752.3 Other anomalies of uterus	0	0.00	0.00-17.47
752.4 Anomalies of cervix, vagina, external female genitalia	0	0.00	0.00-17.47
752.5 Undescended testicle	6	28.41	10.43-61.83
752.6 Hypospadias, epispadias, and congenital chordee	15	71.02*	39.75-117.14
752.7 Indeterminate sex and pseudohermaphroditism	0	0.00	0.00-17.47
752.8 Other specified anomalies of male genital organs	6	28.41	10.43-61.83
752.9 Unspecified anomalies of genital organs	0	0.00	0.00-17.47
753.0 Renal agenesis and dysgenesis	0	0.00	0.00-17.47
753.1 Cystic kidney disease	<5	NS	NS
753.2 Obstructive defects of renal pelvis and ureter	10	47.35	22.71-87.08
753.3 Other specified anomalies of kidney	<5	NS	NS
753.4 Other specified anomalies of ureter	5	23.67	7.69-55.25
753.5 Exstrophy of urinary bladder	0	0.00	0.00-17.47

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
753.6 Atresia and stenosis of urethra and bladder neck	0	0.00	0.00-17.47
753.7 Anomalies of urachus	0	0.00	0.00-17.47
753.8 Other specified anomalies of bladder and urethra	0	0.00	0.00-17.47
753.9 Unspecified anomalies of urinary system	0	0.00	0.00-17.47
754.0 Certain anomalies of skull, face, and jaw	20	94.70*	57.84-146.25
754.1 Anomalies of sternocleidomastoid muscle	0	0.00	0.00-17.47
754.2 Certain congenital musculoskeletal deformities of spine	0	0.00	0.00-17.47
754.3 Congenital dislocation of hip	<5	NS	NS
754.4 Congenital genu recurvatum, bowing of leg bones	0	0.00	0.00-17.47
754.5 Varus (inward) deformities of feet	<5	NS	NS
754.6 Valgus (outward) deformities of feet	0	0.00	0.00-17.47
754.7 Other deformities of feet	<5	NS	NS
754.8 Other specified congenital musculoskeletal deformities	<5	NS	NS
755.0 Polydactyly	<5	NS	NS
755.1 Syndactyly	0	0.00	0.00-17.47
755.2 Reduction defects of upper limb	0	0.00	0.00-17.47
755.3 Reduction defects of lower limb	<5	NS	NS
755.4 Reduction defects, unspecified limb	0	0.00	0.00-17.47
755.5 Other anomalies of upper limb, including shoulder girdle	<5	NS	NS
755.6 Other anomalies of lower limb, including pelvic girdle	<5	NS	NS
755.8 Other specified anomalies of unspecified limb	<5	NS	NS
755.9 Unspecified anomalies of unspecified limb	0	0.00	0.00-17.47
756.0 Anomalies of skull and face bones	7	33.14	13.33-68.29
756.1 Anomalies of spine	<5	NS	NS
756.3 Other anomalies of ribs and sternum	<5	NS	NS
756.4 Chondrodystrophy	0	0.00	0.00-17.47
756.5 Osteodystrophies	0	0.00	0.00-17.47
756.6 Anomalies of diaphragm	<5	NS	NS
756.7 Anomalies of abdominal wall	0	0.00	0.00-17.47
756.70 Omphalocele	0	0.00	0.00-17.47
756.71 Gastroschisis	<5	NS	NS
756.8 Other spec anomalies of muscle, tendon, connective tissue	10	47.35*	22.71-87.08
756.9 Unspecified anomalies of musculoskeletal system	<5	NS	NS
757.0 Hereditary edema of legs	0	0.00	0.00-17.47
757.1 Ichthyosis congenita	0	0.00	0.00-17.47
757.3 Other specified anomalies of skin	5	23.67	7.69-55.25
757.4 Specified anomalies of hair	<5	NS	NS
757.5 Specified anomalies of nails	0	0.00	0.00-17.47
757.6 Specified anomalies of breast	0	0.00	0.00-17.47
757.8 Other specified anomalies of the integument	0	0.00	0.00-17.47
757.9 Unspecified anomalies of the integument	0	0.00	0.00-17.47
758.0 Down syndrome	6	28.41	10.43-61.83
758.1 Patau syndrome	<5	NS	NS
758.2 Edwards syndrome	0	0.00	0.00-17.47
758.3 Autosomal deletion syndromes	0	0.00	0.00-17.47
758.4 Balanced autosomal translocation in normal individual	0	0.00	0.00-17.47
758.5 Other conditions due to autosomal anomalies	0	0.00	0.00-17.47
758.6 Gonadal dysgenesis	0	0.00	0.00-17.47
758.7 Klinefelter syndrome	0	0.00	0.00-17.47
758.8 Other conditions due to sex chromosome anomalies	0	0.00	0.00-17.47
758.9 Conditions due to anomalies of unspecified chromosomes	0	0.00	0.00-17.47
759.0 Anomalies of spleen	0	0.00	0.00-17.47
759.1 Anomalies of adrenal gland	0	0.00	0.00-17.47
759.2 Anomalies of other endocrine glands	0	0.00	0.00-17.47
759.3 Situs inversus	0	0.00	0.00-17.47
759.4 Conjoined twins	0	0.00	0.00-17.47
759.5 Tuberous sclerosis	0	0.00	0.00-17.47
759.6 Other hamartoses, not elsewhere classified	0	0.00	0.00-17.47
759.7 Multiple congenital anomalies	0	0.00	0.00-17.47
759.8 Other specified anomalies and syndromes	<5	NS	NS
759.9 Congenital anomalies, unspecified	0	0.00	0.00-17.47
760.7 Fetal alcohol, hydrantoin, or Accutane syndrome	0	0.00	0.00-17.47

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
771.0 Rubella, congenital	0	0.00	0.00-17.47
888.8 Any monitored congenital anomalies	120	568.18*	466.52-669.84

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals. -

NS—Not shown. For confidentiality, prevalence and confidence intervals are suppressed when there are 1-4 reported cases. -

NOS—Not otherwise specified. -

Table A.4.1.b. Birth defects cases by BPA4 code and crude prevalence of birth defects per 10,000 live births with 95% confidence intervals (CI) for Midlothian, Texas, 1999-2008. Data Source: TDSHS TBDES

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
216.9 Hairy nevus	0	0.00	0.00-12.11
228.0 Hemangioma	<5	NS	NS
228.1 Cystic hygroma, lymphangioma any site	0	0.00	0.00-12.11
237.7 Neurofibromatosis	<5	NS	NS
238.0 Teratoma	0	0.00	0.00-12.11
239.2 Neck cyst	0	0.00	0.00-12.11
243.9 Hypothyroidism, congenital	<5	NS	NS
253.8 Diencephalic syndrome	0	0.00	0.00-12.11
257.8 Testicular feminization/Androgen insensitivity syndrome	0	0.00	0.00-12.11
277.5 Hurler syndrome	0	0.00	0.00-12.11
279.1 DiGeorge syndrome (279.11)	0	0.00	0.00-12.11
335.0 Infantile spinal muscular atrophy	0	0.00	0.00-12.11
345.6 Infantile spasms, congenital	0	0.00	0.00-12.11
352.6 Moebius syndrome	0	0.00	0.00-12.11
362.6 Retinal degeneration, peripheral	0	0.00	0.00-12.11
362.7 Retinitis pigmentosa	0	0.00	0.00-12.11
425.3 Endocardial fibroelastosis, myocardial fibrosis	0	0.00	0.00-12.11
426.7 Congenital Wolfe-Parkinson-White syndrome	0	0.00	0.00-12.11
427.9 Cardiac arrhythmias, not elsewhere classified	0	0.00	0.00-12.11
524.0 Abnormalities of jaw size - micro/macrogathia	<5	NS	NS
550.0 Inguinal hernia with mention of gangrene	<5	NS	NS
550.1 Inguinal hernia with obstruction, no gangrene	0	0.00	0.00-12.11
550.9 Inguinal hernia with no obstruction, no gangrene	<5	NS	NS
740.0 Anencephalus	0	0.00	0.00-12.11
740.1 Craniorachischisis	0	0.00	0.00-12.11
740.2 Iniencephaly	0	0.00	0.00-12.11
741 Spina bifida	<5	NS	NS
742.0 Encephalocele	0	0.00	0.00-12.11
742.1 Microcephalus	<5	NS	NS
742.2 Reduction deformities of brain	0	0.00	0.00-12.11
742.3 Congenital hydrocephalus	0	0.00	0.00-12.11
742.4 Other specified anomalies of brain	<5	NS	NS
742.5 Other specified anomalies of spinal cord	<5	NS	NS
742.8 Other specified anomalies of nervous system	0	0.00	0.00-12.11
742.9 Unspecified anomalies of central nervous system	0	0.00	0.00-12.11
743.0 Anophthalmos	0	0.00	0.00-12.11
743.1 Microphthalmos	<5	NS	NS
743.2 Buphthalmos	0	0.00	0.00-12.11
743.3 Congenital cataract and lens anomalies	<5	NS	NS
743.4 Coloboma, other anomalies of anterior segments	<5	NS	NS
743.5 Congenital anomalies of posterior segment	<5	NS	NS
743.6 Congenital anomalies of eyelids, lacrimal system, and orbit	<5	NS	NS
743.8 Other specified anomalies of eye	0	0.00	0.00-12.11
743.9 Unspecified anomalies of eye	0	0.00	0.00-12.11
744.0 Anomalies of ear causing impairment of hearing	0	0.00	0.00-12.11
744.2 Other specified anomalies of ear	18	59.11*	35.03-93.42
744.3 Unspecified anomalies of ear	0	0.00	0.00-12.11
744.4 Branchial cleft, cyst, or fistula	0	0.00	0.00-12.11
744.8 Other specified anomalies of face and neck	<5	NS	NS
744.9 Congenital anomalies of face, NOS	5	16.42	5.33-38.32

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
745.0 Common truncus	0	0.00	0.00-12.11
745.1 Transposition of great vessels	<5	NS	NS
745.2 Tetralogy of Fallot	0	0.00	0.00-12.11
745.3 Single ventricle	0	0.00	0.00-12.11
745.4 Ventricular septal defect	14	45.98	25.14-77.14
745.5 Ostium secundum type atrial septal defect	25	82.10	53.13-121.20
745.6 Endocardial cushion defects	<5	NS	NS
745.8 Other specified defects of septal closure	0	0.00	0.00-12.11
745.9 Unspecified defect of septal closure	<5	NS	NS
746.0 Anomalies of pulmonary valve	6	19.70	7.23-42.89
746.1 Anomalies of tricuspid valve	<5	NS	NS
746.2 Ebsteins anomaly	0	0.00	0.00-12.11
746.3 Congenital stenosis of aortic valve	<5	NS	NS
746.4 Other anomalies of aortic valve	<5	NS	NS
746.5 Congenital mitral stenosis	<5	NS	NS
746.7 Hypoplastic left heart syndrome	<5	NS	NS
746.8 Other specified anomalies of the heart	10	32.84	15.75-60.40
746.9 Unspecified anomalies of heart	0	0.00	0.00-12.11
747.0 Patent ductus arteriosus (PDA)	12	39.41	20.36-68.84
747.1 Coarctation of aorta	<5	NS	NS
747.2 Other anomalies of aorta	<5	NS	NS
747.3 Anomalies of pulmonary artery	<5	NS	NS
747.4 Anomalies of great veins	0	0.00	0.00-12.11
747.6 Other anomalies of peripheral vascular system	<5	NS	NS
747.8 Other specified anomalies of circulatory system	0	0.00	0.00-12.11
747.9 Unspecified anomalies of circulatory system	0	0.00	0.00-12.11
748.0 Choanal atresia	0	0.00	0.00-12.11
748.1 Other anomalies of nose	0	0.00	0.00-12.11
748.2 Web of larynx	0	0.00	0.00-12.11
748.3 Other anomalies of larynx, trachea, and bronchus	0	0.00	0.00-12.11
748.4 Congenital cystic lung	0	0.00	0.00-12.11
748.5 Agenesis, aplasia, hypoplasia, or dysplasia of lung	0	0.00	0.00-12.11
748.6 Other anomalies of lung	0	0.00	0.00-12.11
748.8 Other specified anomalies of respiratory system	0	0.00	0.00-12.11
748.9 Unspecified anomalies of respiratory system	0	0.00	0.00-12.11
749.0 Cleft palate alone	<5	NS	NS
749.1 Cleft lip with/without cleft palate	<5	NS	NS
750.1 Other anomalies of tongue	0	0.00	0.00-12.11
750.2 Other specified anomalies of mouth and pharynx	<5	NS	NS
750.3 T-E fistula, esophageal atresia and stenosis	<5	NS	NS
750.4 Other specified anomalies of esophagus	0	0.00	0.00-12.11
750.5 Congenital hypertrophic pyloric stenosis	12	39.41*	20.36-68.84
750.6 Congenital hiatus hernia	0	0.00	0.00-12.11
750.7 Other specified anomalies of stomach	0	0.00	0.00-12.11
750.8 Other specified anomalies of upper alimentary tract	0	0.00	0.00-12.11
750.9 Unspecified anomalies of upper alimentary tract	0	0.00	0.00-12.11
751.0 Persistent omphalomesenteric/vitelline duct	0	0.00	0.00-12.11
751.1 Atresia and stenosis of small intestine	<5	NS	NS
751.2 Atresia/stenosis of large intestine, rectum and anal canal	<5	NS	NS
751.3 Hirschsprungs disease, other anomalies of the colon	<5	NS	NS
751.4 Anomalies of intestinal fixation	0	0.00	0.00-12.11
751.5 Other anomalies of intestine	0	0.00	0.00-12.11
751.6 Anomalies of gallbladder, bile ducts, and liver	0	0.00	0.00-12.11
751.7 Anomalies of pancreas	0	0.00	0.00-12.11
751.8 Other specified anomalies of digestive system	0	0.00	0.00-12.11
751.9 Unspecified anomalies of digestive system	0	0.00	0.00-12.11
752.0 Anomalies of ovaries	0	0.00	0.00-12.11
752.1 Anomalies of fallopian tubes and broad ligaments	0	0.00	0.00-12.11
752.2 Doubling of uterus	0	0.00	0.00-12.11
752.3 Other anomalies of uterus	0	0.00	0.00-12.11
752.4 Anomalies of cervix, vagina, external female genitalia	0	0.00	0.00-12.11
752.5 Undescended testicle	7	22.99	9.24-47.37

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
752.6 Hypospadias, epispadias, and congenital chordee	24	78.82*	50.50-117.27
752.7 Indeterminate sex and pseudohermaphroditism	<5	NS	NS
752.8 Other specified anomalies of male genital organs	6	19.70	7.23-42.89
752.9 Unspecified anomalies of genital organs	0	0.00	0.00-12.11
753.0 Renal agenesis and dysgenesis	0	0.00	0.00-12.11
753.1 Cystic kidney disease	<5	NS	NS
753.2 Obstructive defects of renal pelvis and ureter	15	49.26	27.57-81.25
753.3 Other specified anomalies of kidney	<5	NS	NS
753.4 Other specified anomalies of ureter	6	19.70	7.23-42.89
753.5 Exstrophy of urinary bladder	0	0.00	0.00-12.11
753.6 Atresia and stenosis of urethra and bladder neck	0	0.00	0.00-12.11
753.7 Anomalies of urachus	0	0.00	0.00-12.11
753.8 Other specified anomalies of bladder and urethra	<5	NS	NS
753.9 Unspecified anomalies of urinary system	0	0.00	0.00-12.11
754.0 Certain anomalies of skull, face, and jaw	27	88.67*	58.43-129.01
754.1 Anomalies of sternocleidomastoid muscle	0	0.00	0.00-12.11
754.2 Certain congenital musculoskeletal deformities of spine	<5	NS	NS
754.3 Congenital dislocation of hip	<5	NS	NS
754.4 Congenital genu recurvatum, bowing of leg bones	<5	NS	NS
754.5 Varus (inward) deformities of feet	<5	NS	NS
754.6 Valgus (outward) deformities of feet	0	0.00	0.00-12.11
754.7 Other deformities of feet	5	16.42	5.33-38.32
754.8 Other specified congenital musculoskeletal deformities	<5	NS	NS
755.0 Polydactyly	<5	NS	NS
755.1 Syndactyly	<5	NS	NS
755.2 Reduction defects of upper limb	0	0.00	0.00-12.11
755.3 Reduction defects of lower limb	<5	NS	NS
755.4 Reduction defects, unspecified limb	0	0.00	0.00-12.11
755.5 Other anomalies of upper limb, including shoulder girdle	<5	NS	NS
755.6 Other anomalies of lower limb, including pelvic girdle	8	26.27	11.34-51.77
755.8 Other specified anomalies of unspecified limb	<5	NS	NS
755.9 Unspecified anomalies of unspecified limb	0	0.00	0.00-12.11
756.0 Anomalies of skull and face bones	9	29.56	13.52-56.11
756.1 Anomalies of spine	<5	NS	NS
756.3 Other anomalies of ribs and sternum	<5	NS	NS
756.4 Chondrodystrophy	<5	NS	NS
756.5 Osteodystrophies	0	0.00	0.00-12.11
756.6 Anomalies of diaphragm	<5	NS	NS
756.7 Anomalies of abdominal wall	0	0.00	0.00-12.11
756.70 Omphalocele	0	0.00	0.00-12.11
756.71 Gastroschisis	<5	NS	NS
756.8 Other spec anomalies of muscle, tendon, connective tissue	11	36.12*	18.03-64.64
756.9 Unspecified anomalies of musculoskeletal system	<5	NS	NS
757.0 Hereditary edema of legs	0	0.00	0.00-12.11
757.1 Ichthyosis congenita	0	0.00	0.00-12.11
757.3 Other specified anomalies of skin	5	16.42	5.33-38.32
757.4 Specified anomalies of hair	<5	NS	NS
757.5 Specified anomalies of nails	<5	NS	NS
757.6 Specified anomalies of breast	0	0.00	0.00-12.11
757.8 Other specified anomalies of the integument	0	0.00	0.00-12.11
757.9 Unspecified anomalies of the integument	0	0.00	0.00-12.11
758.0 Down syndrome	7	22.99	9.24-47.37
758.1 Patau syndrome	<5	NS	NS
758.2 Edwards syndrome	0	0.00	0.00-12.11
758.3 Autosomal deletion syndromes	<5	NS	NS
758.4 Balanced autosomal translocation in normal individual	0	0.00	0.00-12.11
758.5 Other conditions due to autosomal anomalies	<5	NS	NS
758.6 Gonadal dysgenesis	0	0.00	0.00-12.11
758.7 Klinefelter syndrome	0	0.00	0.00-12.11
758.8 Other conditions due to sex chromosome anomalies	0	0.00	0.00-12.11
758.9 Conditions due to anomalies of unspecified chromosomes	0	0.00	0.00-12.11
759.0 Anomalies of spleen	0	0.00	0.00-12.11

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
759.1 Anomalies of adrenal gland	0	0.00	0.00-12.11
759.2 Anomalies of other endocrine glands	0	0.00	0.00-12.11
759.3 Situs inversus	0	0.00	0.00-12.11
759.4 Conjoined twins	0	0.00	0.00-12.11
759.5 Tuberosus sclerosis	0	0.00	0.00-12.11
759.6 Other hamartoses, not elsewhere classified	0	0.00	0.00-12.11
759.7 Multiple congenital anomalies	0	0.00	0.00-12.11
759.8 Other specified anomalies and syndromes	<5	NS	NS
759.9 Congenital anomalies, unspecified	0	0.00	0.00-12.11
760.7 Fetal alcohol, hydrantoin, or Accutane syndrome	0	0.00	0.00-12.11
771.0 Rubella, congenital	0	0.00	0.00-12.11
888.8 Any monitored congenital anomalies	163	535.30*	453.12-617.48

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals. -

NS—Not shown. For confidentiality, prevalence and confidence intervals are suppressed when there are 1-4 reported cases. -

NOS—Not otherwise specified. -

Table A.4.1.c. Birth defects cases by BPA4 code and crude prevalence of birth defects per 10,000 live births with 95% confidence intervals (CI) for Ellis County, Texas, 1999-2008. Data Source: TDSHS TBDES.

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
216.9 Hairy nevus	0	0.00	0.00-1.87
228.0 Hemangioma	32	16.23*	11.10-22.91
228.1 Cystic hygroma, lymphangioma any site	<5	NS	NS
237.7 Neurofibromatosis	<5	NS	NS
238.0 Teratoma	<5	NS	NS
239.2 Neck cyst	0	0.00	0.00-1.87
243.9 Hypothyroidism, congenital	7	3.55*	1.43-7.32
253.8 Diencephalic syndrome	0	0.00	0.00-1.87
257.8 Testicular feminization/Androgen insensitivity syndrome	0	0.00	0.00-1.87
277.5 Hurler syndrome	0	0.00	0.00-1.87
279.1 DiGeorge syndrome (279.11)	0	0.00	0.00-1.87
335.0 Infantile spinal muscular atrophy	0	0.00	0.00-1.87
345.6 Infantile spasms, congenital	0	0.00	0.00-1.87
352.6 Moebius syndrome	0	0.00	0.00-1.87
362.6 Retinal degeneration, peripheral	0	0.00	0.00-1.87
362.7 Retinitis pigmentosa	0	0.00	0.00-1.87
425.3 Endocardial fibroelastosis, myocardial fibrosis	0	0.00	0.00-1.87
426.7 Congenital Wolfe-Parkinson-White syndrome	<5	NS	NS
427.9 Cardiac arrhythmias, not elsewhere classified	<5	NS	NS
524.0 Abnormalities of jaw size - micro/macrogathia	27	13.70	9.03-19.93
550.0 Inguinal hernia with mention of gangrene	<5	NS	NS
550.1 Inguinal hernia with obstruction, no gangrene	<5	NS	NS
550.9 Inguinal hernia with no obstruction, no gangrene	9	4.57	2.09-8.67
740.0 Anencephalus	6	3.04	1.12-6.62
740.1 Craniorachischisis	0	0.00	0.00-1.87
740.2 Iniencephaly	0	0.00	0.00-1.87
741 Spina bifida	<5	NS	NS
742.0 Encephalocele	<5	NS	NS
742.1 Microcephalus	27	13.70	9.03-19.93
742.2 Reduction deformities of brain	13	6.59	3.51-11.28
742.3 Congenital hydrocephalus	13	6.59	3.51-11.28
742.4 Other specified anomalies of brain	27	13.70	9.03-19.93
742.5 Other specified anomalies of spinal cord	5	2.54	0.82-5.92
742.8 Other specified anomalies of nervous system	0	0.00	0.00-1.87
742.9 Unspecified anomalies of central nervous system	0	0.00	0.00-1.87
743.0 Anophthalmos	0	0.00	0.00-1.87
743.1 Microphthalmos	<5	NS	NS
743.2 Buphthalmos	<5	NS	NS
743.3 Congenital cataract and lens anomalies	9	4.57*	2.09-8.67
743.4 Coloboma, other anomalies of anterior segments	10	5.07	2.43-9.33

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
743.5 Congenital anomalies of posterior segment	9	4.57*	2.09-8.67
743.6 Congenital anomalies of eyelids, lacrimal system, and orbit	19	9.64	5.80-15.05
743.8 Other specified anomalies of eye	<5	NS	NS
743.9 Unspecified anomalies of eye	<5	NS	NS
744.0 Anomalies of ear causing impairment of hearing	12	6.09*	3.15-10.63
744.2 Other specified anomalies of ear	89	45.14*	36.25-55.55
744.3 Unspecified anomalies of ear	<5	NS	NS
744.4 Branchial cleft, cyst, or fistula	<5	NS	NS
744.8 Other specified anomalies of face and neck	7	3.55	1.43-7.32
744.9 Congenital anomalies of face, NOS	19	9.64	5.80-15.05
745.0 Common truncus	<5	NS	NS
745.1 Transposition of great vessels	14	7.10	3.88-11.91
745.2 Tetralogy of Fallot	8	4.06	1.75-8.00
745.3 Single ventricle	<5	NS	NS
745.4 Ventricular septal defect	90	45.65	36.71-56.11
745.5 Ostium secundum type atrial septal defect	172	87.24	74.20-100.28
745.6 Endocardial cushion defects	10	5.07	2.43-9.33
745.8 Other specified defects of septal closure	0	0.00	0.00-1.87
745.9 Unspecified defect of septal closure	<5	NS	NS
746.0 Anomalies of pulmonary valve	26	13.19	8.61-19.32
746.1 Anomalies of tricuspid valve	6	3.04	1.12-6.62
746.2 Ebsteins anomaly	<5	NS	NS
746.3 Congenital stenosis of aortic valve	5	2.54	0.82-5.92
746.4 Other anomalies of aortic valve	5	2.54	0.82-5.92
746.5 Congenital mitral stenosis	7	3.55	1.43-7.32
746.7 Hypoplastic left heart syndrome	6	3.04	1.12-6.62
746.8 Other specified anomalies of the heart	56	28.40	21.46-36.89
746.9 Unspecified anomalies of heart	<5	NS	NS
747.0 Patent ductus arteriosus (PDA)	103	52.24	42.15-62.33
747.1 Coarctation of aorta	7	3.55	1.43-7.32
747.2 Other anomalies of aorta	21	10.65	6.59-16.28
747.3 Anomalies of pulmonary artery	16	8.12**	4.64-13.18
747.4 Anomalies of great veins	14	7.10	3.88-11.91
747.6 Other anomalies of peripheral vascular system	5	2.54	0.82-5.92
747.8 Other specified anomalies of circulatory system	<5	NS	NS
747.9 Unspecified anomalies of circulatory system	0	0.00	0.00-1.87
748.0 Choanal atresia	<5	NS	NS
748.1 Other anomalies of nose	<5	NS	NS
748.2 Web of larynx	0	0.00	0.00-1.87
748.3 Other anomalies of larynx, trachea, and bronchus	5	2.54	0.82-5.92
748.4 Congenital cystic lung	<5	NS	NS
748.5 Agenesis, aplasia, hypoplasia, or dysplasia of lung	<5	NS	NS
748.6 Other anomalies of lung	<5	NS	NS
748.8 Other specified anomalies of respiratory system	0	0.00	0.00-1.87
748.9 Unspecified anomalies of respiratory system	0	0.00	0.00-1.87
749.0 Cleft palate alone	12	6.09	3.15-10.63
749.1 Cleft lip with/without cleft palate	18	9.13	5.41-14.43
750.1 Other anomalies of tongue	6	3.04	1.12-6.62
750.2 Other specified anomalies of mouth and pharynx	10	5.07	2.43-9.33
750.3 T-E fistula, esophageal atresia and stenosis	6	3.04	1.12-6.62
750.4 Other specified anomalies of esophagus	0	0.00	0.00-1.87
750.5 Congenital hypertrophic pyloric stenosis	45	22.83	16.65-30.54
750.6 Congenital hiatus hernia	0	0.00	0.00-1.87
750.7 Other specified anomalies of stomach	<5	NS	NS
750.8 Other specified anomalies of upper alimentary tract	0	0.00	0.00-1.87
750.9 Unspecified anomalies of upper alimentary tract	0	0.00	0.00-1.87
751.0 Persistent omphalomesenteric/vitelline duct	<5	NS	NS
751.1 Atresia and stenosis of small intestine	9	4.57	2.09-8.67
751.2 Atresia/stenosis of large intestine, rectum and anal canal	12	6.09	3.15-10.63
751.3 Hirschsprungs disease, other anomalies of the colon	7	3.55	1.43-7.32
751.4 Anomalies of intestinal fixation	10	5.07	2.43-9.33
751.5 Other anomalies of intestine	13	6.59	3.51-11.28

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
751.6 Anomalies of gallbladder, bile ducts, and liver	6	3.04	1.12-6.62
751.7 Anomalies of pancreas	<5	NS	NS
751.8 Other specified anomalies of digestive system	0	0.00	0.00-1.87
751.9 Unspecified anomalies of digestive system	0	0.00	0.00-1.87
752.0 Anomalies of ovaries	<5	NS	NS
752.1 Anomalies of fallopian tubes and broad ligaments	0	0.00	0.00-1.87
752.2 Doubling of uterus	0	0.00	0.00-1.87
752.3 Other anomalies of uterus	<5	NS	0.00-1.87
752.4 Anomalies of cervix, vagina, external female genitalia	16	8.12	4.64-13.18
752.5 Undescended testicle	56	28.40*	21.46-36.89
752.6 Hypospadias, epispadias, and congenital chordee	104	52.75*	42.61-62.89
752.7 Indeterminate sex and pseudohermaphroditism	<5	NS	NS
752.8 Other specified anomalies of male genital organs	49	24.85*	18.39-32.86
752.9 Unspecified anomalies of genital organs	0	0.00	0.00-1.87
753.0 Renal agenesis and dysgenesis	9	4.57	2.09-8.67
753.1 Cystic kidney disease	21	10.65*	6.59-16.28
753.2 Obstructive defects of renal pelvis and ureter	64	32.46	25.00-41.45
753.3 Other specified anomalies of kidney	8	4.06	1.75-8.00
753.4 Other specified anomalies of ureter	20	10.14	6.20-15.67
753.5 Exstrophy of urinary bladder	0	0.00	0.00-1.87
753.6 Atresia and stenosis of urethra and bladder neck	6	3.04	1.12-6.62
753.7 Anomalies of urachus	0	0.00	0.00-1.87
753.8 Other specified anomalies of bladder and urethra	6	3.04	1.12-6.62
753.9 Unspecified anomalies of urinary system	0	0.00	0.00-1.87
754.0 Certain anomalies of skull, face, and jaw	162	82.17*	69.52-94.82
754.1 Anomalies of sternocleidomastoid muscle	<5	NS	NS
754.2 Certain congenital musculoskeletal deformities of spine	<5	NS	NS
754.3 Congenital dislocation of hip	6	3.04	1.12-6.62
754.4 Congenital genu recurvatum, bowing of leg bones	5	2.54	0.82-5.92
754.5 Varus (inward) deformities of feet	16	8.12	4.64-13.18
754.6 Valgus (outward) deformities of feet	10	5.07	2.43-9.33
754.7 Other deformities of feet	32	16.23	11.10-22.91
754.8 Other specified congenital musculoskeletal deformities	18	9.13	5.41-14.43
755.0 Polydactyly	31	15.72	10.68-22.32
755.1 Syndactyly	16	8.12	4.64-13.18
755.2 Reduction defects of upper limb	9	4.57	2.09-8.67
755.3 Reduction defects of lower limb	7	3.55	1.43-7.32
755.4 Reduction defects, unspecified limb	<5	NS	NS
755.5 Other anomalies of upper limb, including shoulder girdle	15	7.61	4.26-12.55
755.6 Other anomalies of lower limb, including pelvic girdle	52	26.38*	19.70-34.59
755.8 Other specified anomalies of unspecified limb	13	6.59	3.51-11.28
755.9 Unspecified anomalies of unspecified limb	<5	NS	NS
756.0 Anomalies of skull and face bones	72	36.52*	28.57-45.99
756.1 Anomalies of spine	16	8.12	4.64-13.18
756.3 Other anomalies of ribs and sternum	11	5.58	2.79-9.98
756.4 Chondrodystrophy	<5	NS	NS
756.5 Osteodystrophies	0	0.00	0.00-1.87
756.6 Anomalies of diaphragm	5	2.54	0.82-5.92
756.7 Anomalies of abdominal wall	<5	NS	NS
756.70 Omphalocele	<5	NS	NS
756.71 Gastroschisis	12	6.09	3.15-10.63
756.8 Other spec anomalies of muscle, tendon, connective tissue	72	36.52*	28.57-45.99
756.9 Unspecified anomalies of musculoskeletal system	<5	NS	NS
757.0 Hereditary edema of legs	0	0.00	0.00-1.87
757.1 Ichthyosis congenita	0	0.00	0.00-1.87
757.3 Other specified anomalies of skin	26	13.19	8.61-19.32
757.4 Specified anomalies of hair	<5	NS	NS
757.5 Specified anomalies of nails	<5	NS	NS
757.6 Specified anomalies of breast	<5	NS	NS
757.8 Other specified anomalies of the integument	0	0.00	0.00-1.87
757.9 Unspecified anomalies of the integument	0	0.00	0.00-1.87
758.0 Down syndrome	36	18.26	12.79-25.28

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
758.1 Patau syndrome	<5	NS	NS
758.2 Edwards syndrome	<5	NS	NS
758.3 Autosomal deletion syndromes	<5	NS	NS
758.4 Balanced autosomal translocation in normal individual	<5	NS	NS
758.5 Other conditions due to autosomal anomalies	6	3.04	1.12-6.62
758.6 Gonadal dysgenesis	<5	NS	NS
758.7 Klinefelter syndrome	<5	NS	NS
758.8 Other conditions due to sex chromosome anomalies	<5	NS	NS
758.9 Conditions due to anomalies of unspecified chromosomes	<5	NS	NS
759.0 Anomalies of spleen	<5	NS	NS
759.1 Anomalies of adrenal gland	<5	NS	NS
759.2 Anomalies of other endocrine glands	<5	NS	NS
759.3 Situs inversus	<5	NS	NS
759.4 Conjoined twins	0	0.00	0.00-1.87
759.5 Tuberosus sclerosis	0	0.00	0.00-1.87
759.6 Other hamartoses, not elsewhere classified	0	0.00	0.00-1.87
759.7 Multiple congenital anomalies	0	0.00	0.00-1.87
759.8 Other specified anomalies and syndromes	10	5.07	2.43-9.33
759.9 Congenital anomalies, unspecified	<5	NS	NS
760.7 Fetal alcohol, hydrantoin, or Accutane syndrome	0	0.00	0.00-1.87
771.0 Rubella, congenital	0	0.00	0.00-1.87
888.8 Any monitored congenital anomalies	1003	508.75*	477.26-540.24

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals. -

** Significantly lower than Texas prevalence based on non-overlapping confidence intervals. -

NS—Not shown. For confidentiality, prevalence and confidence intervals are suppressed when there are 1-4 reported cases. -

NOS—Not otherwise specified. -

Table A.4.1.d. Birth defects cases by BPA4 code and crude prevalence of birth defects per 10,000 live births with 95% confidence intervals (CI) for Public Health Region 3, Texas, 1999-2008. Data Source: TDSHS TBDES.

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
216.9 Hairy nevus	21	0.20	0.13-0.31
228.0 Hemangioma	1,641	16.02*	15.24-16.79
228.1 Cystic hygroma, lymphangioma any site	324	3.16*	2.82-3.51
237.7 Neurofibromatosis	36	0.35	0.25-0.49
238.0 Teratoma	38	0.37	0.26-0.51
239.2 Neck cyst	<5	NS	NS
243.9 Hypothyroidism, congenital	200	1.95*	1.68-2.22
253.8 Diencephalic syndrome	<5	NS	NS
257.8 Testicular feminization/Androgen insensitivity syndrome	<5	NS	NS
277.5 Hurler syndrome	0	0.00	0.00-0.04
279.1 DiGeorge syndrome (279.11)	65	0.63	0.49-0.81
335.0 Infantile spinal muscular atrophy	13	0.13	0.07-0.22
345.6 Infantile spasms, congenital	10	0.10	0.05-0.18
352.6 Moebius syndrome	11	0.11	0.05-0.19
362.6 Retinal degeneration, peripheral	0	0.00	0.00-0.04
362.7 Retinitis pigmentosa	<5	NS	NS
425.3 Endocardial fibroelastosis, myocardial fibrosis	11	0.11	0.05-0.19
426.7 Congenital Wolfe-Parkinson-White syndrome	60	0.59	0.45-0.75
427.9 Cardiac arrhythmias, not elsewhere classified	157	1.53*	1.29-1.77
524.0 Abnormalities of jaw size - micro/macrogathia	1,378	13.45	12.74-14.16
550.0 Inguinal hernia with mention of gangrene	7	0.07	0.03-0.14
550.1 Inguinal hernia with obstruction, no gangrene	41	0.40	0.29-0.54
550.9 Inguinal hernia with no obstruction, no gangrene	569	5.55*	5.10-6.01
740.0 Anencephalus	311	3.04	2.70-3.37
740.1 Craniorachischisis	7	0.07	0.03-0.14
740.2 Iniencephaly	<5	NS	NS
741 Spina bifida	405	3.95	3.57-4.34
742.0 Encephalocele	112	1.09	0.89-1.30

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
742.1 Microcephalus	1,240	12.10*	11.43-12.78
742.2 Reduction deformities of brain	811	7.92*	7.37-8.46
742.3 Congenital hydrocephalus	745	7.27	6.75-7.79
742.4 Other specified anomalies of brain	1,787	17.44*	16.63-18.25
742.5 Other specified anomalies of spinal cord	250	2.44	2.14-2.74
742.8 Other specified anomalies of nervous system	71	0.69	0.54-0.87
742.9 Unspecified anomalies of central nervous system	8	0.08	0.03-0.15
743.0 Anophthalmos	39	0.38	0.27-0.52
743.1 Microphthalmos	312	3.05	2.71-3.38
743.2 Buphthalmos	77	0.75	0.59-0.94
743.3 Congenital cataract and lens anomalies	284	2.77*	2.45-3.09
743.4 Coloboma, other anomalies of anterior segments	325	3.17*	2.83-3.52
743.5 Congenital anomalies of posterior segment	217	2.12	1.84-2.40
743.6 Congenital anomalies of eyelids, lacrimal system, and orbit	911	8.89*	8.31-9.47
743.8 Other specified anomalies of eye	16	0.16	0.09-0.25
743.9 Unspecified anomalies of eye	25	0.24	0.16-0.36
744.0 Anomalies of ear causing impairment of hearing	436	4.26*	3.86-4.66
744.2 Other specified anomalies of ear	3,444	33.62*	32.49-34.74
744.3 Unspecified anomalies of ear	82	0.80	0.64-0.99
744.4 Branchial cleft, cyst, or fistula	232	2.26*	1.97-2.56
744.8 Other specified anomalies of face and neck	553	5.40	4.95-5.85
744.9 Congenital anomalies of face, NOS	1,109	10.82*	10.19-11.46
745.0 Common truncus	69	0.67	0.52-0.85
745.1 Transposition of great vessels	564	5.51	5.05-5.96
745.2 Tetralogy of Fallot	386	3.77	3.39-4.14
745.3 Single ventricle	86	0.84	0.67-1.04
745.4 Ventricular septal defect	5,354	52.26	50.86-53.66
745.5 Ostium secundum type atrial septal defect	10,073	98.32	96.40-100.24
745.6 Endocardial cushion defects	482	4.70	4.28-5.12
745.8 Other specified defects of septal closure	<5	NS	NS
745.9 Unspecified defect of septal closure	<5	NS	NS
746.0 Anomalies of pulmonary valve	1,169	11.41*	10.76-12.06
746.1 Anomalies of tricuspid valve	306	2.99	2.65-3.32
746.2 Ebsteins anomaly	58	0.57	0.43-0.73
746.3 Congenital stenosis of aortic valve	250	2.44	2.14-2.74
746.4 Other anomalies of aortic valve	262	2.56	2.25-2.87
746.5 Congenital mitral stenosis	359	3.50	3.14-3.87
746.7 Hypoplastic left heart syndrome	217	2.12	1.84-2.40
746.8 Other specified anomalies of the heart	2,799	27.32	26.31-28.33
746.9 Unspecified anomalies of heart	412	4.02	3.63-4.41
747.0 Patent ductus arteriosus (PDA)	5,188	50.64	49.26-52.02
747.1 Coarctation of aorta	503	4.91	4.48-5.34
747.2 Other anomalies of aorta	1,067	10.41**	9.79-11.04
747.3 Anomalies of pulmonary artery	1,327	12.95**	12.26-13.65
747.4 Anomalies of great veins	612	5.97	5.50-6.45
747.6 Other anomalies of peripheral vascular system	216	2.11	1.83-2.39
747.8 Other specified anomalies of circulatory system	30	0.29	0.20-0.42
747.9 Unspecified anomalies of circulatory system	<5	NS	NS
748.0 Choanal atresia	137	1.34	1.11-1.56
748.1 Other anomalies of nose	111	1.08	0.88-1.28
748.2 Web of larynx	9	0.09	0.04-0.17
748.3 Other anomalies of larynx, trachea, and bronchus	297	2.90*	2.57-3.23
748.4 Congenital cystic lung	73	0.71	0.56-0.90
748.5 Agenesis, aplasia, hypoplasia, or dysplasia of lung	360	3.51	3.15-3.88
748.6 Other anomalies of lung	33	0.32	0.22-0.45
748.8 Other specified anomalies of respiratory system	22	0.21	0.13-0.33
748.9 Unspecified anomalies of respiratory system	0	0.00	0.00-0.04
749.0 Cleft palate alone	657	6.41	5.92-6.90
749.1 Cleft lip with/without cleft palate	1,156	11.28	10.63-11.93
750.1 Other anomalies of tongue	366	3.57	3.21-3.94
750.2 Other specified anomalies of mouth and pharynx	609	5.94*	5.47-6.42
750.3 T-E fistula, esophageal atresia and stenosis	262	2.56*	2.25-2.87

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
750.4 Other specified anomalies of esophagus	14	0.14	0.07-0.23
750.5 Congenital hypertrophic pyloric stenosis	1,867	18.22**	17.40-19.05
750.6 Congenital hiatus hernia	34	0.33	0.23-0.46
750.7 Other specified anomalies of stomach	72	0.70	0.55-0.89
750.8 Other specified anomalies of upper alimentary tract	<5	NS	NS
750.9 Unspecified anomalies of upper alimentary tract	<5	NS	NS
751.0 Persistent omphalomesenteric/vitelline duct	19	0.19	0.11-0.29
751.1 Atresia and stenosis of small intestine	348	3.40	3.04-3.75
751.2 Atresia/stenosis of large intestine, rectum and anal canal	511	4.99	4.56-5.42
751.3 Hirschsprungs disease, other anomalies of the colon	165	1.61	1.36-1.86
751.4 Anomalies of intestinal fixation	448	4.37*	3.97-4.78
751.5 Other anomalies of intestine	414	4.04	3.65-4.43
751.6 Anomalies of gallbladder, bile ducts, and liver	176	1.72	1.46-1.97
751.7 Anomalies of pancreas	54	0.53	0.40-0.69
751.8 Other specified anomalies of digestive system	<5	NS	NS
751.9 Unspecified anomalies of digestive system	<5	NS	NS
752.0 Anomalies of ovaries	119	1.16	0.95-1.37
752.1 Anomalies of fallopian tubes and broad ligaments	7	0.07	0.03-0.14
752.2 Doubling of uterus	7	0.07	0.03-0.14
752.3 Other anomalies of uterus	39	0.38	0.27-0.52
752.4 Anomalies of cervix, vagina, external female genitalia	1,036	10.11*	9.50-10.73
752.5 Undescended testicle	2,167	21.15*	20.26-22.04
752.6 Hypospadias, epispadias, and congenital chordee	4,279	41.77*	40.51-43.02
752.7 Indeterminate sex and pseudohermaphroditism	97	0.95	0.77-1.15
752.8 Other specified anomalies of male genital organs	2,035	19.86*	19.00-20.73
752.9 Unspecified anomalies of genital organs	5	0.05	0.02-0.11
753.0 Renal agenesis and dysgenesis	641	6.26*	5.77-6.74
753.1 Cystic kidney disease	668	6.52	6.03-7.01
753.2 Obstructive defects of renal pelvis and ureter	3,855	37.63*	36.44-38.82
753.3 Other specified anomalies of kidney	770	7.52*	6.98-8.05
753.4 Other specified anomalies of ureter	1,268	12.38*	11.70-13.06
753.5 Exstrophy of urinary bladder	23	0.22	0.14-0.34
753.6 Atresia and stenosis of urethra and bladder neck	169	1.65	1.40-1.90
753.7 Anomalies of urachus	39	0.38	0.27-0.52
753.8 Other specified anomalies of bladder and urethra	301	2.94	2.61-3.27
753.9 Unspecified anomalies of urinary system	11	0.11	0.05-0.19
754.0 Certain anomalies of skull, face, and jaw	7,086	69.16*	67.55-70.77
754.1 Anomalies of sternocleidomastoid muscle	48	0.47	0.35-0.62
754.2 Certain congenital musculoskeletal deformities of spine	138	1.35	1.12-1.57
754.3 Congenital dislocation of hip	564	5.51*	5.05-5.96
754.4 Congenital genu recurvatum, bowing of leg bones	319	3.11*	2.77-3.46
754.5 Varus (inward) deformities of feet	1,046	10.21	9.59-10.83
754.6 Valgus (outward) deformities of feet	496	4.84	4.42-5.27
754.7 Other deformities of feet	1,639	16.00*	15.22-16.77
754.8 Other specified congenital musculoskeletal deformities	1,136	11.09*	10.44-11.73
755.0 Polydactyly	2,025	19.77*	18.90-20.63
755.1 Syndactyly	898	8.77*	8.19-9.34
755.2 Reduction defects of upper limb	494	4.82*	4.40-5.25
755.3 Reduction defects of lower limb	224	2.19	1.90-2.47
755.4 Reduction defects, unspecified limb	<5	NS	NS
755.5 Other anomalies of upper limb, including shoulder girdle	784	7.65*	7.12-8.19
755.6 Other anomalies of lower limb, including pelvic girdle	2,365	23.08*	22.15-24.01
755.8 Other specified anomalies of unspecified limb	694	6.77*	6.27-7.28
755.9 Unspecified anomalies of unspecified limb	13	0.13	0.07-0.22
756.0 Anomalies of skull and face bones	2,927	28.57*	27.53-29.60
756.1 Anomalies of spine	648	6.32*	5.84-6.81
756.3 Other anomalies of ribs and sternum	434	4.24	3.84-4.63
756.4 Chondrodystrophy	137	1.34	1.11-1.56
756.5 Osteodystrophies	67	0.65	0.51-0.83
756.6 Anomalies of diaphragm	374	3.65	3.28-4.02
756.7 Anomalies of abdominal wall	98	0.96	0.78-1.17
756.70 Omphalocele	240	2.34	2.05-2.64

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Crude Prevalence (per 10,000 live births)	
		Rate	95% CI
756.71 Gastroschisis	472	4.61	4.19-5.02
756.8 Other spec anomalies of muscle, tendon, connective tissue	2,614	25.51*	24.54-26.49
756.9 Unspecified anomalies of musculoskeletal system	6	0.06	0.02-0.13
757.0 Hereditary edema of legs	<5	NS	NS
757.1 Ichthyosis congenita	22	0.21	0.13-0.33
757.3 Other specified anomalies of skin	1,099	10.73*	10.09-11.36
757.4 Specified anomalies of hair	93	0.91*	0.73-1.11
757.5 Specified anomalies of nails	454	4.43*	4.02-4.84
757.6 Specified anomalies of breast	127	1.24	1.02-1.46
757.8 Other specified anomalies of the integument	76	0.74	0.58-0.93
757.9 Unspecified anomalies of the integument	9	0.09	0.04-0.17
758.0 Down syndrome	1,510	14.74*	14.00-15.48
758.1 Patau syndrome	149	1.45	1.22-1.69
758.2 Edwards syndrome	323	3.15*	2.81-3.50
758.3 Autosomal deletion syndromes	243	2.37	2.07-2.67
758.4 Balanced autosomal translocation in normal individual	26	0.25	0.17-0.37
758.5 Other conditions due to autosomal anomalies	317	3.09	2.75-3.43
758.6 Gonadal dysgenesis	156	1.52	1.28-1.76
758.7 Klinefelter syndrome	35	0.34	0.24-0.48
758.8 Other conditions due to sex chromosome anomalies	88	0.86	0.69-1.06
758.9 Conditions due to anomalies of unspecified chromosomes	20	0.20	0.12-0.30
759.0 Anomalies of spleen	178	1.74*	1.48-1.99
759.1 Anomalies of adrenal gland	71	0.69	0.54-0.87
759.2 Anomalies of other endocrine glands	156	1.52	1.28-1.76
759.3 Situs inversus	156	1.52	1.28-1.76
759.4 Conjoined twins	38	0.37	0.26-0.51
759.5 Tuberosus sclerosis	30	0.29	0.20-0.42
759.6 Other hamartoses, not elsewhere classified	50	0.49	0.36-0.64
759.7 Multiple congenital anomalies	82	0.80*	0.64-0.99
759.8 Other specified anomalies and syndromes	539	5.26*	4.82-5.71
759.9 Congenital anomalies, unspecified	56	0.55	0.41-0.71
760.7 Fetal alcohol, hydrantoin, or Accutane syndrome	20	0.20	0.12-0.30
771.0 Rubella, congenital	<5	NS	NS
888.8 Any monitored congenital anomalies	50,589	493.78*	489.48-498.08

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals. -

** Significantly lower than Texas prevalence based on non-overlapping confidence intervals. -

NS—Not shown. For confidentiality, prevalence and confidence intervals are suppressed when there are 1-4 reported cases. -

NOS—Not otherwise specified. -

Table A.4.1.e. Birth defects cases by BPA4 code and crude prevalence of birth defects per 10,000 live births with 95% confidence intervals (CI) for Texas, 1999-2008. Data Source: TDSHS TBDES.

Defect	Cases	Prevalence (per 10,000 live births)	
		Rate	95% CI
216.9 Hairy nevus	45	0.12	0.09-0.16
228.0 Hemangioma	3,789	9.95	9.64-10.27
228.1 Cystic hygroma, lymphangioma any site	992	2.61	2.44-2.77
237.7 Neurofibromatosis	77	0.20	0.16-0.25
238.0 Teratoma	143	0.38	0.31-0.44
239.2 Neck cyst	<5	NS	NS
243.9 Hypothyroidism, congenital	444	1.17	1.06-1.27
253.8 Diencephalic syndrome	<5	NS	NS
257.8 Testicular feminization/Androgen insensitivity syndrome	10	0.03	0.01-0.05
277.5 Hurler syndrome	8	0.02	0.01-0.04
279.1 DiGeorge syndrome (279.11)	241	0.63	0.55-0.71
335.0 Infantile spinal muscular atrophy	49	0.13	0.10-0.17
345.6 Infantile spasms, congenital	36	0.09	0.07-0.13
352.6 Moebius syndrome	28	0.07	0.05-0.11
362.6 Retinal degeneration, peripheral	<5	NS	NS
362.7 Retinitis pigmentosa	<5	NS	NS
425.3 Endocardial fibroelastosis, myocardial fibrosis	45	0.12	0.09-0.16

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Prevalence (per 10,000 live births)	
		Rate	95% CI
426.7 Congenital Wolfe-Parkinson-White syndrome	175	0.46	0.39-0.53
427.9 Cardiac arrhythmias, not elsewhere classified	377	0.99	0.89-1.09
524.0 Abnormalities of jaw size - micro/macrogathia	4,768	12.53	12.17-12.88
550.0 Inguinal hernia with mention of gangrene	15	0.04	0.02-0.06
550.1 Inguinal hernia with obstruction, no gangrene	115	0.30	0.25-0.36
550.9 Inguinal hernia with no obstruction, no gangrene	1,472	3.87	3.67-4.06
740.0 Anencephalus	968	2.54	2.38-2.70
740.1 Craniorachischisis	16	0.04	0.02-0.07
740.2 Iniencephaly	7	0.02	0.01-0.04
741 Spina bifida	1,390	3.65	3.46-3.84
742.0 Encephalocele	348	0.91	0.82-1.01
742.1 Microcephalus	3,367	8.85	8.55-9.14
742.2 Reduction deformities of brain	2,594	6.82	6.55-7.08
742.3 Congenital hydrocephalus	2,666	7.00	6.74-7.27
742.4 Other specified anomalies of brain	4,484	11.78	11.44-12.13
742.5 Other specified anomalies of spinal cord	768	2.02	1.88-2.16
742.8 Other specified anomalies of nervous system	180	0.47	0.40-0.54
742.9 Unspecified anomalies of central nervous system	26	0.07	0.04-0.10
743.0 Anophthalmos	122	0.32	0.26-0.38
743.1 Microphthalmos	1,038	2.73	2.56-2.89
743.2 Buphthalmos	245	0.64	0.56-0.72
743.3 Congenital cataract and lens anomalies	731	1.92	1.78-2.06
743.4 Coloboma, other anomalies of anterior segments	966	2.54	2.38-2.70
743.5 Congenital anomalies of posterior segment	661	1.74	1.60-1.87
743.6 Congenital anomalies of eyelids, lacrimal system, and orbit	2,458	6.46	6.20-6.71
743.8 Other specified anomalies of eye	49	0.13	0.10-0.17
743.9 Unspecified anomalies of eye	70	0.18	0.14-0.23
744.0 Anomalies of ear causing impairment of hearing	1,131	2.97	2.80-3.14
744.2 Other specified anomalies of ear	8,900	23.38	22.90-23.87
744.3 Unspecified anomalies of ear	228	0.60	0.52-0.68
744.4 Branchial cleft, cyst, or fistula	552	1.45	1.33-1.57
744.8 Other specified anomalies of face and neck	2,075	5.45	5.22-5.69
744.9 Congenital anomalies of face, Not otherwise specified.	3,550	9.33	9.02-9.63
745.0 Common truncus	293	0.77	0.68-0.86
745.1 Transposition of great vessels	1,883	4.95	4.72-5.17
745.2 Tetralogy of Fallot	1,343	3.53	3.34-3.72
745.3 Single ventricle	347	0.91	0.82-1.01
745.4 Ventricular septal defect	19,866	52.19	51.47-52.92
745.5 Ostium secundum type atrial septal defect	36,510	95.92	94.94-96.90
745.6 Endocardial cushion defects	1,589	4.17	3.97-4.38
745.8 Other specified defects of septal closure	5	0.01	0.00-0.03
745.9 Unspecified defect of septal closure	14	0.04	0.02-0.06
746.0 Anomalies of pulmonary valve	3,872	10.17	9.85-10.49
746.1 Anomalies of tricuspid valve	1,116	2.93	2.76-3.10
746.2 Ebsteins anomaly	266	0.70	0.61-0.78
746.3 Congenital stenosis of aortic valve	896	2.35	2.20-2.51
746.4 Other anomalies of aortic valve	1,129	2.97	2.79-3.14
746.5 Congenital mitral stenosis	1,349	3.54	3.35-3.73
746.7 Hypoplastic left heart syndrome	789	2.07	1.93-2.22
746.8 Other specified anomalies of the heart	10,718	28.16	27.63-28.69
746.9 Unspecified anomalies of heart	1,562	4.10	3.90-4.31
747.0 Patent ductus arteriosus (PDA)	18,908	49.68	48.97-50.38
747.1 Coarctation of aorta	1,861	4.89	4.67-5.11
747.2 Other anomalies of aorta	4,345	11.42	11.08-11.75
747.3 Anomalies of pulmonary artery	7,760	20.39	19.93-20.84
747.4 Anomalies of great veins	2,009	5.28	5.05-5.51
747.6 Other anomalies of peripheral vascular system	759	1.99	1.85-2.14
747.8 Other specified anomalies of circulatory system	118	0.31	0.25-0.37
747.9 Unspecified anomalies of circulatory system	5	0.01	0.00-0.03
748.0 Choanal atresia	448	1.18	1.07-1.29
748.1 Other anomalies of nose	397	1.04	0.94-1.15
748.2 Web of larynx	33	0.09	0.06-0.12

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Prevalence (per 10,000 live births)	
		Rate	95% CI
748.3 Other anomalies of larynx, trachea, and bronchus	850	2.23	2.08-2.38
748.4 Congenital cystic lung	281	0.74	0.65-0.82
748.5 Agenesis, aplasia, hypoplasia, or dysplasia of lung	1,417	3.72	3.53-3.92
748.6 Other anomalies of lung	150	0.39	0.33-0.46
748.8 Other specified anomalies of respiratory system	67	0.18	0.14-0.22
748.9 Unspecified anomalies of respiratory system	<5	NS	NS
749.0 Cleft palate alone	2,244	5.90	5.65-6.14
749.1 Cleft lip with/without cleft palate	4,157	10.92	10.59-11.25
750.1 Other anomalies of tongue	1,290	3.39	3.20-3.57
750.2 Other specified anomalies of mouth and pharynx	1,920	5.04	4.82-5.27
750.3 T-E fistula, esophageal atresia and stenosis	783	2.06	1.91-2.20
750.4 Other specified anomalies of esophagus	41	0.11	0.08-0.15
750.5 Congenital hypertrophic pyloric stenosis	7,433	19.53	19.08-19.97
750.6 Congenital hiatus hernia	160	0.42	0.36-0.49
750.7 Other specified anomalies of stomach	211	0.55	0.48-0.63
750.8 Other specified anomalies of upper alimentary tract	<5	NS	NS
750.9 Unspecified anomalies of upper alimentary tract	9	0.02	0.01-0.04
751.0 Persistent omphalomesenteric/vitelline duct	67	0.18	0.14-0.22
751.1 Atresia and stenosis of small intestine	1,209	3.18	3.00-3.36
751.2 Atresia/stenosis of large intestine, rectum and anal canal	2,007	5.27	5.04-5.50
751.3 Hirschsprungs disease, other anomalies of the colon	505	1.33	1.21-1.44
751.4 Anomalies of intestinal fixation	1,325	3.48	3.29-3.67
751.5 Other anomalies of intestine	1,527	4.01	3.81-4.21
751.6 Anomalies of gallbladder, bile ducts, and liver	567	1.49	1.37-1.61
751.7 Anomalies of pancreas	167	0.44	0.37-0.51
751.8 Other specified anomalies of digestive system	10	0.03	0.01-0.05
751.9 Unspecified anomalies of digestive system	6	0.02	0.01-0.03
752.0 Anomalies of ovaries	402	1.06	0.95-1.16
752.1 Anomalies of fallopian tubes and broad ligaments	39	0.10	0.07-0.14
752.2 Doubling of uterus	34	0.09	0.06-0.12
752.3 Other anomalies of uterus	128	0.34	0.28-0.39
752.4 Anomalies of cervix, vagina, external female genitalia	2,788	7.32	7.05-7.60
752.5 Undescended testicle	6,665	17.51	17.09-17.93
752.6 Hypospadias, epispadias, and congenital chordee	12,745	33.48	32.90-34.07
752.7 Indeterminate sex and pseudohermaphroditism	370	0.97	0.87-1.07
752.8 Other specified anomalies of male genital organs	5,326	13.99	13.62-14.37
752.9 Unspecified anomalies of genital organs	39	0.10	0.07-0.14
753.0 Renal agenesis and dysgenesis	2,101	5.52	5.28-5.76
753.1 Cystic kidney disease	2,230	5.86	5.62-6.10
753.2 Obstructive defects of renal pelvis and ureter	13,499	35.46	34.87-36.06
753.3 Other specified anomalies of kidney	2,284	6.00	5.75-6.25
753.4 Other specified anomalies of ureter	3,282	8.62	8.33-8.92
753.5 Exstrophy of urinary bladder	77	0.20	0.16-0.25
753.6 Atresia and stenosis of urethra and bladder neck	593	1.56	1.43-1.68
753.7 Anomalies of urachus	157	0.41	0.35-0.48
753.8 Other specified anomalies of bladder and urethra	934	2.45	2.30-2.61
753.9 Unspecified anomalies of urinary system	42	0.11	0.08-0.15
754.0 Certain anomalies of skull, face, and jaw	13,141	34.52	33.93-35.11
754.1 Anomalies of sternocleidomastoid muscle	124	0.33	0.27-0.38
754.2 Certain congenital musculoskeletal deformities of spine	449	1.18	1.07-1.29
754.3 Congenital dislocation of hip	1,731	4.55	4.33-4.76
754.4 Congenital genu recurvatum, bowing of leg bones	877	2.30	2.15-2.46
754.5 Varus (inward) deformities of feet	3,607	9.48	9.17-9.79
754.6 Valgus (outward) deformities of feet	1,910	5.02	4.79-5.24
754.7 Other deformities of feet	5,337	14.02	13.65-14.40
754.8 Other specified congenital musculoskeletal deformities	3,526	9.26	8.96-9.57
755.0 Polydactyly	6,919	18.18	17.75-18.61
755.1 Syndactyly	2,922	7.68	7.40-7.96
755.2 Reduction defects of upper limb	1,551	4.07	3.87-4.28
755.3 Reduction defects of lower limb	745	1.96	1.82-2.10
755.4 Reduction defects, unspecified limb	33	0.09	0.06-0.12
755.5 Other anomalies of upper limb, including shoulder girdle	2,406	6.32	6.07-6.57

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Defect	Cases	Prevalence (per 10,000 live births)	
		Rate	95% CI
755.6 Other anomalies of lower limb, including pelvic girdle	6,147	16.15	15.75-16.55
755.8 Other specified anomalies of unspecified limb	2,157	5.67	5.43-5.91
755.9 Unspecified anomalies of unspecified limb	80	0.21	0.17-0.26
756.0 Anomalies of skull and face bones	8,484	22.29	21.82-22.76
756.1 Anomalies of spine	2,045	5.37	5.14-5.61
756.3 Other anomalies of ribs and sternum	1,553	4.08	3.88-4.28
756.4 Chondrodystrophy	435	1.14	1.04-1.25
756.5 Osteodystrophies	220	0.58	0.50-0.65
756.6 Anomalies of diaphragm	1,314	3.45	3.27-3.64
756.7 Anomalies of abdominal wall	338	0.89	0.79-0.98
756.70 Omphalocele	797	2.09	1.95-2.24
756.71 Gastroschisis	1,834	4.82	4.60-5.04
756.8 Other spec anomalies of muscle, tendon, connective tissue	4,484	11.78	11.44-12.13
756.9 Unspecified anomalies of musculoskeletal system	31	0.08	0.06-0.12
757.0 Hereditary edema of legs	12	0.03	0.02-0.06
757.1 Ichthyosis congenita	99	0.26	0.21-0.32
757.3 Other specified anomalies of skin	3,207	8.43	8.13-8.72
757.4 Specified anomalies of hair	244	0.64	0.56-0.72
757.5 Specified anomalies of nails	1,284	3.37	3.19-3.56
757.6 Specified anomalies of breast	361	0.95	0.85-1.05
757.8 Other specified anomalies of the integument	278	0.73	0.64-0.82
757.9 Unspecified anomalies of the integument	28	0.07	0.05-0.11
758.0 Down syndrome	4,945	12.99	12.63-13.35
758.1 Patau syndrome	440	1.16	1.05-1.26
758.2 Edwards syndrome	927	2.44	2.28-2.59
758.3 Autosomal deletion syndromes	828	2.18	2.03-2.32
758.4 Balanced autosomal translocation in normal individual	74	0.19	0.15-0.24
758.5 Other conditions due to autosomal anomalies	984	2.59	2.42-2.75
758.6 Gonadal dysgenesis	557	1.46	1.34-1.58
758.7 Klinefelter syndrome	129	0.34	0.28-0.40
758.8 Other conditions due to sex chromosome anomalies	244	0.64	0.56-0.72
758.9 Conditions due to anomalies of unspecified chromosomes	80	0.21	0.17-0.26
759.0 Anomalies of spleen	503	1.32	1.21-1.44
759.1 Anomalies of adrenal gland	225	0.59	0.51-0.67
759.2 Anomalies of other endocrine glands	458	1.20	1.09-1.31
759.3 Situs inversus	520	1.37	1.25-1.48
759.4 Conjoined twins	83	0.22	0.17-0.27
759.5 Tuberous sclerosis	95	0.25	0.20-0.31
759.6 Other hamartoses, not elsewhere classified	196	0.51	0.44-0.59
759.7 Multiple congenital anomalies	188	0.49	0.42-0.56
759.8 Other specified anomalies and syndromes	1,557	4.09	3.89-4.29
759.9 Congenital anomalies, unspecified	137	0.36	0.30-0.42
760.7 Fetal alcohol, hydrantoin, or Accutane syndrome	93	0.24	0.20-0.30
771.0 Rubella, congenital	<5	NS	NS
888.8 Any monitored congenital anomalies	153,039	402.07	400.05-404.08

NS—Not shown. For confidentiality, prevalence and confidence intervals are suppressed when there are 1-4 reported cases.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.f. Crude prevalence of birth defects per 10,000 live births with 95% confidence intervals (CI) for birth defects with 5 or more cases in the Potential area of impact for Midlothian potential area of impact, city of Midlothian, Ellis County, Public Health Region 3, and Texas, 1999-2008. Data Source: TDSHS TBDES.

Defect	Potential area of impact		Midlothian		Ellis County		Public Health Region 3		Texas	
	Crude Prevalence (per 10,000 live births)		Crude Prevalence (per 10,000 live births)		Crude Prevalence (per 10,000 live births)		Crude Prevalence (per 10,000 live births)		Prevalence (per 10,000 live births)	
	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI
744.2 Other specified anomalies of ear	56.82*	29.36-99.25	59.11*	35.03-93.42	45.14*	36.25-55.55	33.62*	32.49-34.74	23.38	22.90-23.87
745.4 Ventricular septal defect	42.61	19.49-80.89	45.98	25.14-77.14	45.65	36.71-56.11	52.26	50.86-53.66	52.19	51.47-52.92
745.5 Ostium secundum type atrial septal defect	85.23	50.51-134.70	82.1	53.13-121.20	87.24	74.2-100.28	98.32	96.40-100.24	95.92	94.94-96.90
746.0 Anomalies of pulmonary valve	23.67	7.69-55.25	19.7	7.23-42.89	13.19	8.61-19.32	11.41*	10.76-12.06	10.17	9.85-10.49
746.8 Other specified anomalies of the heart	42.61	19.49-80.89	32.84	15.75-60.40	28.4	21.46-36.89	27.32	26.31-28.33	28.16	27.63-28.69
747.0 Patent ductus arteriosus (PDA)	47.35	22.71-87.08	39.41	20.36-68.84	52.24	42.15-62.33	50.64	49.26-52.02	49.68	48.97-50.38
750.5 Congenital hypertrophic pyloric stenosis	52.08*	26.00-93.19	39.41*	20.36-68.84	22.83	16.65-30.54	18.22**	17.40-19.05	19.53	19.08-19.97
752.5 Undescended testicle	28.41	10.43-61.83	22.99	9.24-47.37	28.40*	21.46-36.89	21.15*	20.26-22.04	17.51	17.09-17.93
752.6 Hypospadias, epispadias, and congenital chordee	71.02*	39.75-117.14	78.82*	50.5-117.27	52.75*	42.61-62.89	41.77*	40.51-43.02	33.48	32.90-34.07
752.8 Other specified anomalies of male genital organs	28.41	10.43-61.83	19.7	7.23-42.89	24.85*	18.39-32.86	19.86*	19.00-20.73	13.99	13.62-14.37
753.2 Obstructive defects of renal pelvis and ureter	47.35	22.71-87.08	49.26	27.57-81.25	32.46	25.00-41.45	37.63*	36.44-38.82	35.46	34.87-36.06
753.4 Other specified anomalies of ureter	23.67	7.69-55.25	19.7	7.23-42.89	10.14	6.2-15.67	12.38*	11.70-13.06	8.62	8.33-8.92
754.0 Certain anomalies of skull, face, and jaw	94.70*	57.84-146.25	88.67*	58.43-129.01	82.17*	69.52-94.82	69.16*	67.55-70.77	34.52	33.93-35.11
756.0 Anomalies of skull and face bones	33.14	13.33-68.29	29.56	13.52-56.11	36.52*	28.57-45.99	28.57*	27.53-29.60	22.29	21.82-22.76
756.8 Other spec anom of muscle, tendon, connective tissue	47.35*	22.71-87.08	36.12*	18.03-64.64	36.52*	28.57-45.99	25.51*	24.54-26.49	11.78	11.44-12.13
757.3 Other specified anomalies of skin	23.67	7.69-55.25	16.42	5.33-38.32	13.19	8.61-19.32	10.73*	10.09-11.36	8.43	8.13-8.72
758.0 Down syndrome	28.41	10.43-61.83	22.99	9.24-47.37	18.26	12.79-25.28	14.74*	14.00-15.48	12.99	12.63-13.35
888.8 Any monitored congenital anomalies	568.18*	466.52-669.84	535.30*	453.12-617.48	508.75*	477.26-540.24	493.78*	489.48-498.08	402.07	400.05-404.08

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals.

** Significantly lower than Texas prevalence based on non-overlapping confidence intervals.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.g. Adjusted† prevalence of birth defects for the Midlothian potential area of impact, city of Midlothian, Ellis County, and Public Health Region 3, and Texas prevalence for birth defects with 5 or more cases in the Midlothian Potential area of impact, 1999-2008. Data Source: TDSHS TBDES.

Defect	Potential area of impact		Midlothian		Ellis County		Public Health Region 3		Texas		
	Adjusted Prevalence (per 10,000 live births)		Adjusted Prevalence (per 10,000 live births)		Adjusted Prevalence (per 10,000 live births)		Adjusted Prevalence (per 10,000 live births)		Prevalence (per 10,000 live births)		
	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	Rate	95% CI	
744.2 Other specified anomalies of ear	53.2	14.60 - 91.86	68.2*	26.06 - 110.42	40.8*	31.48 - 50.13	34.3*	33.13 - 35.48	23.38	22.90	- 23.87
745.4 Ventricular septal defect	33.9	0 - 68.87	29.6	6.18 - 53.03	42.5	32.81 - 52.20	52.8	51.33 - 54.24	52.19	51.47	- 52.92
745.5 Ostium secundum type atrial septal defect	64.9	25.02 - 104.85	54.9**	25.91 - 83.95	83.9	70.13 - 97.61	97.2	95.22 - 99.11	95.92	94.94	- 96.90
746.0 Anomalies of pulmonary valve	19.5	0 - 41.42	15.9	0 - 33.39	13.5	7.85 - 19.25	11.4*	10.74 - 12.08	10.17	9.85	- 10.49
746.8 Other specified anomalies of the heart	27.2	4.08 - 50.39	21.4	3.06 - 39.72	30.4	20.96 - 39.83	26.7	25.64 - 27.67	28.16	27.63	- 28.69
747.0 Patent ductus arteriosus (PDA)	22.2**	8.35 - 35.98	17.9**	7.74 - 28.09	52.9	41.77 - 64.13	49.9	48.52 - 51.32	49.68	48.97	- 50.38
750.5 Congenital hypertrophic pyloric stenosis	52.2	4.35 - 100.12	36.5	5.39 - 67.59	18.6	12.54 - 24.62	18.9	18.03 - 19.79	19.53	19.08	- 19.97
752.5 Undescended testicle	21.5	0 - 44.99	16.4	0.42 - 32.35	29.5*	21.02 - 37.93	21.6*	20.70 - 22.57	17.51	17.09	- 17.93
752.6 Hypospadias, epispadias, and congenital chordee	59.5	2.00 - 116.97	74.2	20.07 - 128.28	44.2*	34.79 - 53.60	38.5*	37.29 - 39.65	33.48	32.90	- 34.07
752.8 Other specified anomalies of male genital organs	12.9	2.58 - 23.19	8.8	1.76 - 15.79	21.2*	14.69 - 27.73	19.0*	18.11 - 19.81	13.99	13.62	- 14.37
753.2 Obstructive defects of renal pelvis and ureter	34.9	1.37 - 68.38	40.2	9.32 - 71.06	31.0	21.98 - 39.97	37.1	35.93 - 38.35	35.46	34.87	- 36.06
753.4 Other specified anomalies of ureter	39.6	0 - 85.57	26.4	0 - 55.27	13.3	6.15 - 20.35	12.2*	11.53 - 12.92	8.62	8.33	- 8.92
754.0 Certain anomalies of skull, face, and jaw	60.9	26.49 - 95.32	62.2	31.65 - 92.83	71.6*	58.92 - 84.33	71.8*	70.05 - 73.48	34.52	33.93	- 35.11
756.0 Anomalies of skull and face bones	28.3	0 - 60.95	21.6	0.98 - 42.13	35.6*	26.60 - 44.61	28.9*	27.80 - 29.95	22.29	21.82	- 22.76
756.8 Other spec anom of muscle, tendon, connective tissue	39.9	7.97 - 71.75	27.4	6.60 - 48.12	31.6*	23.55 - 39.66	25.6*	24.56 - 26.58	11.78	11.44	- 12.13
757.3 Other specified anomalies of skin	24.0	0 - 56.09	15.3	0 - 34.90	11.1	6.29 - 15.90	11.3*	10.61 - 11.98	8.43	8.13	- 8.72
758.0 Down syndrome	23.1	0 - 47.17	16.9	0.73 - 33.06	19.3	12.43 - 26.16	14.5*	13.74 - 15.26	12.99	12.63	- 13.35
888.8 Any monitored congenital anomalies	497.7	361.71 - 633.67	482.4	369.17 - 595.69	486.6*	452.87 - 520.34	492.9*	488.62 - 497.25	402.07	400.05	- 404.08

†Directly standardized to the maternal race/ethnic-and-age-group distribution of all Texas resident live births during 1999-2008.

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals.

** Significantly lower than Texas prevalence based on non-overlapping confidence intervals.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.h. Crude and adjusted† prevalence of birth defects for the Midlothian Potential area of impact and Texas prevalence for birth defects with 5 or more cases in the Midlothian potential area of impact, 1999-2008. Data Source: TDSHS TBDES.

Defect	Potential area of impact		Potential area of impact		Texas	
	Crude Prevalence (per 10,000 live births)		Adjusted† Prevalence (per 10,000 live births)		Prevalence (per 10,000 live births)	
	Rate	95% CI	Rate	95% CI	Rate	95% CI
744.2 Other specified anomalies of ear	56.82*	29.36-99.25	53.2	14.60 - 91.86	23.38	22.90-23.87
745.4 Ventricular septal defect	42.61	19.49-80.89	33.9	0.00 - 68.87	52.19	51.47-52.92
745.5 Ostium secundum type atrial septal defect	85.23	50.51-134.7	64.9	25.02 - 104.85	95.92	94.94-96.90
746.0 Anomalies of pulmonary valve	23.67	7.69-55.25	19.5	0.00 - 41.42	10.17	9.85-10.49
746.8 Other specified anomalies of the heart	42.61	19.49-80.89	27.2	4.08 - 50.39	28.16	27.63-28.69
747.0 Patent ductus arteriosus (PDA)	47.35	22.71-87.08	22.2**	8.35 - 35.98	49.68	48.97-50.38
750.5 Congenital hypertrophic pyloric stenosis	52.08*	26.00-93.19	52.2	4.35 - 100.12	19.53	19.08-19.97
752.5 Undescended testicle	28.41	10.43-61.83	21.5	0.00 - 44.99	17.51	17.09-17.93
752.6 Hypospadias, epispadias, and congenital chordee	71.02*	39.75-117.14	59.5	2.00 - 116.97	33.48	32.90-34.07
752.8 Other specified anomalies of male genital organs	28.41	10.43-61.83	12.9	2.58 - 23.19	13.99	13.62-14.37
753.2 Obstructive defects of renal pelvis and ureter	47.35	22.71-87.08	34.9	1.37 - 68.38	35.46	34.87-36.06
753.4 Other specified anomalies of ureter	23.67	7.69-55.25	39.6	0.00 - 85.57	8.62	8.33-8.92
754.0 Certain anomalies of skull, face, and jaw	94.70*	57.84-146.25	60.9	26.49 - 95.32	34.52	33.93-35.11
756.0 Anomalies of skull and face bones	33.14	13.33-68.29	28.3	0.00 - 60.95	22.29	21.82-22.76
756.8 Other spec anom of muscle, tendon, connective tissue	47.35*	22.71-87.08	39.9	7.97 - 71.75	11.78	11.44-12.13
757.3 Other specified anomalies of skin	23.67	7.69-55.25	24.0	0.00 - 56.09	8.43	8.13-8.72
758.0 Down syndrome	28.41	10.43-61.83	23.1	0.00 - 47.17	12.99	12.63-13.35
888.8 Any monitored congenital anomalies	568.18*	466.52-669.84	497.7	361.71 - 633.67	402.07	400.05-404.08

†Directly standardized to the maternal race/ethnic-and-age-group distribution of all Texas resident live births during 1999-2008.

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals.

** Significantly lower than Texas prevalence based on non-overlapping confidence intervals.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.i. Crude and adjusted† prevalence of birth defects for the city of Midlothian, TX and Texas prevalence for birth defects with 5 or more cases in the Midlothian potential area of impact, 1999-2008. Data Source: TDSHS TBDES.

Defect	Midlothian		Midlothian		Texas	
	Crude Prevalence (per 10,000 live births)		Adjusted† Prevalence (per 10,000 live births)		Prevalence (per 10,000 live births)	
	Rate	95% CI	Rate	95% CI	Rate	95% CI
744.2 Other specified anomalies of ear	59.11*	35.03-93.42	68.2*	26.06 - 110.42	23.38	22.90-23.87
745.4 Ventricular septal defect	45.98	25.14-77.14	29.6	6.18 - 53.03	52.19	51.47-52.92
745.5 Ostium secundum type atrial septal defect	82.10	53.13-121.20	54.9**	25.91 - 83.95	95.92	94.94-96.90
746.0 Anomalies of pulmonary valve	19.70	7.23-42.89	15.9	0.00 - 33.39	10.17	9.85-10.49
746.8 Other specified anomalies of the heart	32.84	15.75-60.4	21.4	3.06 - 39.72	28.16	27.63-28.69
747.0 Patent ductus arteriosus (PDA)	39.41	20.36-68.84	17.9**	7.74 - 28.09	49.68	48.97-50.38
750.5 Congenital hypertrophic pyloric stenosis	39.41*	20.36-68.84	36.5	5.39 - 67.59	19.53	19.08-19.97
752.5 Undescended testicle	22.99	9.24-47.37	16.4	0.42 - 32.35	17.51	17.09-17.93
752.6 Hypospadias, epispadias, and congenital chordee	78.82*	50.50-117.27	74.2	20.07 - 128.28	33.48	32.90-34.07
752.8 Other specified anomalies of male genital organs	19.70	7.23-42.89	8.8	1.76 - 15.79	13.99	13.62-14.37
753.2 Obstructive defects of renal pelvis and ureter	49.26	27.57-81.25	40.2	9.32 - 71.06	35.46	34.87-36.06
753.4 Other specified anomalies of ureter	19.70	7.23-42.89	26.4	0.00 - 55.27	8.62	8.33-8.92
754.0 Certain anomalies of skull, face, and jaw	88.67*	58.43-129.01	62.2	31.65 - 92.83	34.52	33.93-35.11
756.0 Anomalies of skull and face bones	29.56	13.52-56.11	21.6	0.98 - 42.13	22.29	21.82-22.76
756.8 Other spec anom of muscle, tendon, connective tissue	36.12*	18.03-64.64	27.4	6.60 - 48.12	11.78	11.44-12.13
757.3 Other specified anomalies of skin	16.42	5.33-38.32	15.3	0.00 - 34.90	8.43	8.13-8.72
758.0 Down syndrome	22.99	9.24-47.37	16.9	0.73 - 33.06	12.99	12.63-13.35
888.8 Any monitored congenital anomalies	535.30*	453.12-617.48	482.4	369.17 - 595.69	402.07	400.05-404.08

†Directly standardized to the maternal race/ethnic-and-age-group distribution of all Texas resident live births during 1999-2008.

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals.

** Significantly lower than Texas prevalence based on non-overlapping confidence intervals.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.j. Crude and adjusted† prevalence of birth defects for Ellis County, TX and Texas prevalence for birth defects with 5 or more cases in the Midlothian potential area of impact, 1999-2008. Data Source: TDSHS TBDES.

Defect	Ellis County		Ellis County		Texas	
	Crude Prevalence (per 10,000 live births)		Adjusted† Prevalence (per 10,000 live births)		Prevalence (per 10,000 live births)	
	Rate	95% CI	Rate	95% CI	Rate	95% CI
744.2 Other specified anomalies of ear	45.14*	36.25-55.55	40.8*	31.48 - 50.13	23.38	22.90-23.87
745.4 Ventricular septal defect	45.65	36.71-56.11	42.5	32.81 - 52.20	52.19	51.47-52.92
745.5 Ostium secundum type atrial septal defect	87.24	74.20-100.28	83.9	70.13 - 97.61	95.92	94.94-96.90
746.0 Anomalies of pulmonary valve	13.19	8.61-19.32	13.5	7.85 - 19.25	10.17	9.85-10.49
746.8 Other specified anomalies of the heart	28.40	21.46-36.89	30.4	20.96 - 39.83	28.16	27.63-28.69
747.0 Patent ductus arteriosus (PDA)	52.24	42.15-62.33	52.9	41.77 - 64.13	49.68	48.97-50.38
750.5 Congenital hypertrophic pyloric stenosis	22.83	16.65-30.54	18.6	12.54 - 24.62	19.53	19.08-19.97
752.5 Undescended testicle	28.40*	21.46-36.89	29.5*	21.02 - 37.93	17.51	17.09-17.93
752.6 Hypospadias, epispadias, and congenital chordee	52.75*	42.61-62.89	44.2*	34.79 - 53.60	33.48	32.90-34.07
752.8 Other specified anomalies of male genital organs	24.85*	18.39-32.86	21.2*	14.69 - 27.73	13.99	13.62-14.37
753.2 Obstructive defects of renal pelvis and ureter	32.46	25.00-41.45	31.0	21.98 - 39.97	35.46	34.87-36.06
753.4 Other specified anomalies of ureter	10.14	6.20-15.67	13.3	6.15 - 20.35	8.62	8.33-8.92
754.0 Certain anomalies of skull, face, and jaw	82.17*	69.52-94.82	71.6*	58.92 - 84.33	34.52	33.93-35.11
756.0 Anomalies of skull and face bones	36.52*	28.57-45.99	35.6*	26.60 - 44.61	22.29	21.82-22.76
756.8 Other spec anom of muscle, tendon, connective tissue	36.52*	28.57-45.99	31.6*	23.55 - 39.66	11.78	11.44-12.13
757.3 Other specified anomalies of skin	13.19	8.61-19.32	11.1	6.29 - 15.90	8.43	8.13-8.72
758.0 Down syndrome	18.26	12.79-25.28	19.3	12.43 - 26.16	12.99	12.63-13.35
888.8 Any monitored congenital anomalies	508.75*	477.26-540.24	486.6*	452.87 - 520.34	402.07	400.05-404.08

†Directly standardized to the maternal race/ethnic-and-age-group distribution of all Texas resident live births during 1999-2008.

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.k. Crude and adjusted† prevalence of birth defects for Public Health Region 3, TX and Texas prevalence for birth defects with 5 or more cases in the Midlothian potential area of impact, 1999-2008. Data Source: TDSHS TBDES.

Defect	Public Health Region 3		Public Health Region 3		Texas	
	Crude Prevalence (per 10,000 live births)		Adjusted† Prevalence (per 10,000 live births)		Prevalence (per 10,000 live births)	
	Rate	95% CI	Rate	95% CI	Rate	95% CI
744.2 Other specified anomalies of ear	33.62*	32.49-34.74	34.3*	33.13 - 35.48	23.38	22.90-23.87
745.4 Ventricular septal defect	52.26	50.86-53.66	52.8	51.33 - 54.24	52.19	51.47-52.92
745.5 Ostium secundum type atrial septal defect	98.32	96.40-100.24	97.2	95.22 - 99.11	95.92	94.94-96.90
746.0 Anomalies of pulmonary valve	11.41*	10.76-12.06	11.4*	10.74 - 12.08	10.17	9.85-10.49
746.8 Other specified anomalies of the heart	27.32	26.31-28.33	26.7	25.64 - 27.67	28.16	27.63-28.69
747.0 Patent ductus arteriosus (PDA)	50.64	49.26-52.02	49.9	48.52 - 51.32	49.68	48.97-50.38
750.5 Congenital hypertrophic pyloric stenosis	18.22**	17.40-19.05	18.9	18.03 - 19.79	19.53	19.08-19.97
752.5 Undescended testicle	21.15*	20.26-22.04	21.6*	20.70 - 22.57	17.51	17.09-17.93
752.6 Hypospadias, epispadias, and congenital chordee	41.77*	40.51-43.02	38.5*	37.29 - 39.65	33.48	32.90-34.07
752.8 Other specified anomalies of male genital organs	19.86*	19.00-20.73	19.0*	18.11 - 19.81	13.99	13.62-14.37
753.2 Obstructive defects of renal pelvis and ureter	37.63*	36.44-38.82	37.1	35.93 - 38.35	35.46	34.87-36.06
753.4 Other specified anomalies of ureter	12.38*	11.70-13.06	12.2*	11.53 - 12.92	8.62	8.33-8.92
754.0 Certain anomalies of skull, face, and jaw	69.16*	67.55-70.77	71.8*	70.05 - 73.48	34.52	33.93-35.11
756.0 Anomalies of skull and face bones	28.57*	27.53-29.60	28.9*	27.80 - 29.95	22.29	21.82-22.76
756.8 Other spec anom of muscle, tendon, connective tissue	25.51*	24.54-26.49	25.6*	24.56 - 26.58	11.78	11.44-12.13
757.3 Other specified anomalies of skin	10.73*	10.09-11.36	11.3*	10.61 - 11.98	8.43	8.13-8.72
758.0 Down syndrome	14.74*	14.00-15.48	14.5*	13.74 - 15.26	12.99	12.63-13.35
888.8 Any monitored congenital anomalies	493.78*	489.48-498.08	492.9*	488.62 - 497.25	402.07	400.05-404.08

†Directly standardized to the maternal race/ethnic-and-age-group distribution of all Texas resident live births during 1999-2008.

* Significantly higher than Texas prevalence based on non-overlapping confidence intervals.

** Significantly lower than Texas prevalence based on non-overlapping confidence intervals.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.I. Number of cases, crude prevalence per 10,000 live births, and crude prevalence ratio with 95% confidence interval (CI) and p-value for birth defects with 1 or more cases in the Midlothian potential area of impact (AOI) compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008. Data Source: TDSHS TBDES.

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Potential area of impact compared to Remainder of PHR3		
	Potential AOI	Remainder of PHR3	Potential AOI	Remainder of PHR3	Ratio	95% CI	p-value
228.0 Hemangioma	<5	NS	NS	NS	0.59	0.10 - 1.82	0.4126
237.7 Neurofibromatosis	<5	NS	NS	NS	13.60	0.77 - 62.89	0.0675
243.9 Hypothyroidism, congenital	<5	NS	NS	NS	2.40	0.14 - 10.68	0.4444
524.0 Abnormalities of jaw size - micro/macrogathia	<5	NS	NS	NS	1.05	0.26 - 2.74	0.9278
550.9 Inguinal hernia with no obstruction, no gangrene	<5	NS	NS	NS	0.85	0.05 - 3.76	0.8677
742.1 Microcephalus	<5	NS	NS	NS	0.78	0.13 - 2.41	0.7141
742.4 Other specified anomalies of brain	<5	NS	NS	NS	0.54	0.09 - 1.67	0.3343
742.5 Other specified anomalies of spinal cord	<5	NS	NS	NS	1.92	0.11 - 8.51	0.5567
743.1 Microphthalmos	<5	NS	NS	NS	3.14	0.52 - 9.77	0.1741
743.3 Congenital cataract and lens anomalies	<5	NS	NS	NS	1.71	0.10 - 7.59	0.6218
743.5 Congenital anomalies of posterior segment	<5	NS	NS	NS	9.16*	2.82 - 21.54	0.0012
743.6 Congenital anomalies of eyelids, lacrimal system, and orbit	<5	NS	NS	NS	0.53	0.03 - 2.34	0.4803
744.2 Other specified anomalies of ear	12	3,384	56.82	33.65	1.69	0.90 - 2.84	0.0955
744.9 Congenital anomalies of face, NOS	<5	NS	NS	NS	1.31	0.32 - 3.40	0.6575
745.1 Transposition of great vessels	<5	NS	NS	NS	0.86	0.05 - 3.82	0.8812
745.4 Ventricular septal defect	9	5,263	42.61	52.33	0.81	0.39 - 1.47	0.5237
745.5 Ostium secundum type atrial septal defect	18	9,918	85.23	98.62	0.86	0.52 - 1.33	0.5260
745.6 Endocardial cushion defects	<5	NS	NS	NS	2.01	0.33 - 6.24	0.3760
745.9 Unspecified defect of septal closure	<5	NS	NS	NS	238.08*	11.07 - 2,484.67	0.0035
746.0 Anomalies of pulmonary valve	5	1,145	23.67	11.39	2.08	0.74 - 4.48	0.1450
746.1 Anomalies of the tricuspid valve	<5	NS	NS	NS	4.81*	1.19 - 12.57	0.0310
746.3 Congenital stenosis of aortic valve	<5	NS	NS	NS	3.94	0.65 - 12.26	0.1148
746.4 Other anomalies of aortic valve	<5	NS	NS	NS	1.83	0.10 - 8.12	0.5830

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Potential area of impact compared to Remainder of PHR3		
	Potential AOI	Remainder of PHR3	Potential AOI	Remainder of PHR3	Ratio	95% CI	p-value
Birth Defect							
746.5 Congenital mitral stenosis	<5	NS	NS	NS	1.34	0.08 - 5.92	0.7817
746.7 Hypoplastic left heart syndrome	<5	NS	NS	NS	2.21	0.13 - 9.83	0.4831
746.8 Other specified anomalies of the heart	9	2,748	42.61	27.33	1.56	0.75 - 2.81	0.2151
747.0 Patent ductus arteriosus (PDA)	10	5,103	47.35	50.74	0.93	0.47 - 1.64	0.8249
747.1 Coarctation of aorta	<5	NS	NS	NS	0.97	0.06 - 4.28	0.9738
747.2 Other anomalies of aorta	<5	NS	NS	NS	0.45	0.03 - 2.00	0.3637
747.3 Anomalies of pulmonary artery	<5	NS	NS	NS	1.09	0.27 - 2.84	0.8806
747.6 Other anomalies of peripheral vascular system	<5	NS	NS	NS	2.26	0.13 - 10.02	0.4740
749.0 Cleft palate alone	<5	NS	NS	NS	0.74	0.04 - 3.27	0.7534
750.3 T-E fistula, esophageal atresia and stenosis	<5	NS	NS	NS	3.69	0.61 - 11.49	0.1294
750.5 Congenital hypertrophic pyloric stenosis	11	1,824	52.08	18.14	2.87*	1.49 - 4.93	0.0029
751.1 Atresia and stenosis of small intestine	<5	NS	NS	NS	1.37	0.08 - 6.07	0.7640
751.2 Atresia/stenosis of large intestine, rectum and anal canal	<5	NS	NS	NS	0.95	0.05 - 4.20	0.9591
751.3 Hirschsprungs disease, other anom of the colon	<5	NS	NS	NS	5.88	0.97 - 18.39	0.0528
752.5 Undescended testicle	6	2,128	28.41	21.16	1.34	0.53 - 2.72	0.4921
752.6 Hypospadias, epispadias, and congenital chordee	15	4,205	71.02	41.81	1.70	0.98 - 2.71	0.0597
752.8 Other specified anomalies of male genital organs	6	1,999	28.41	19.88	1.43	0.57 - 2.90	0.4096
753.1 Cystic kidney disease	<5	NS	NS	NS	1.47	0.24 - 4.55	0.6107
753.2 Obstructive defects of renal pelvis and ureter	10	3,783	47.35	37.62	1.26	0.63 - 2.21	0.4840
753.3 Other specified anomalies of kidney	<5	NS	NS	NS	2.54	0.79 - 5.93	0.1066
753.4 Other specified anomalies of ureter	5	1,246	23.67	12.39	1.91	0.68 - 4.12	0.1918
754.0 Certain anomalies of skull, face, and jaw	20	6,975	94.70	69.36	1.37	0.85 - 2.06	0.1860
754.3 Congenital dislocation of hip	<5	NS	NS	NS	1.71	0.28 - 5.30	0.4868
754.5 Varus (inward) deformities of feet	<5	NS	NS	NS	1.87	0.58 - 4.35	0.2578
754.7 Other deformities of feet	<5	NS	NS	NS	1.19	0.37 - 2.77	0.7360
754.8 Other specified cong musculoskeletal deformities	<5	NS	NS	NS	0.43	0.02 - 1.88	0.3204

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Potential area of impact compared to Remainder of PHR3		
	Potential AOI	Remainder of PHR3	Potential AOI	Remainder of PHR3	Ratio	95% CI	p-value
Birth Defect							
755.0 Polydactyly	<5	NS	NS	NS	0.48	0.08 - 1.49	0.2386
755.3 Reduction defects of lower limb	<5	NS	NS	NS	2.19	0.12 - 9.74	0.4876
755.5 Other anomalies of upper limb, including shoulder girdle	<5	NS	NS	NS	0.62	0.04 - 2.74	0.6049
755.6 Other anomalies of lower limb, including pelvic girdle	<5	NS	NS	NS	0.82	0.25 - 1.91	0.6836
755.8 Other specified anomalies of unspecified limb	<5	NS	NS	NS	0.70	0.04 - 3.07	0.6989
756.0 Anomalies of skull and face bones	7	2,860	33.14	28.44	1.17	0.50 - 2.26	0.6932
756.1 Anomalies of spine	<5	NS	NS	NS	1.50	0.25 - 4.63	0.5945
756.3 Other anomalies of ribs and sternum	<5	NS	NS	NS	1.11	0.06 - 4.90	0.9202
756.6 Anomalies of diaphragm	<5	NS	NS	NS	1.32	0.08 - 5.85	0.7896
756.71 Gastroschisis	<5	NS	NS	NS	1.04	0.06 - 4.57	0.9726
756.8 Other specified anomalies of muscle, tendon, connective tissue	10	2,577	47.35	25.63	1.85	0.92 - 3.25	0.0785
756.9 Unspecified anomalies of musculoskeletal system	<5	NS	NS	NS	95.23*	4.97 - 590.53	0.0084
757.3 Other specified anomalies of skin	5	1,076	23.67	10.70	2.21	0.79 - 4.77	0.1172
757.4 Specified anomalies of hair	<5	NS	NS	NS	5.18	0.29 - 23.21	0.1966
758.0 Down syndrome	6	1,483	28.41	14.75	1.93	0.76 - 3.91	0.1481
758.1 Patau syndrome	<5	NS	NS	NS	3.31	0.19 - 14.73	0.3189
759.8 Other specified anomalies and syndromes	<5	NS	NS	NS	0.90	0.05 - 3.98	0.9163

NS—Not shown. For confidentiality, prevalence is suppressed when there are 1-4 reported cases.

NOS—Not otherwise specified.

* Significantly high at an alpha level 0.05, as determined by Poisson regression analysis.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.m. Number of cases, crude prevalence per 10,000 live births, and crude prevalence ratio with 95% confidence interval (CI) and p-value for birth defects with 1 or more cases in the city of Midlothian compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008. Data Source: TDSHS TBDES.

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Midlothian compared to Remainder of PHR3		
	Midlothian	Remainder of PHR3	Midlothian	Remainder of PHR3	Ratio	95% CI	p-value
228.0 Hemangioma	<5	NS	NS	NS	0.20**	0.01 - 0.90	0.0321
237.7 Neurofibromatosis	<5	NS	NS	NS	9.58	0.54 - 44.30	0.1000
243.9 Hypothyroidism, congenital	<5	NS	NS	NS	3.39	0.56 - 10.57	0.1520
524.0 Abnormalities of jaw size - micro/macrognathia	<5	NS	NS	NS	0.98	0.30 - 2.27	0.9621
550.0 Inguinal hernia with mention of gangrene	<5	NS	NS	NS	55.91*	2.96 - 327.37	0.0149
550.9 Inguinal hernia with no obstruction, no gangrene	<5	NS	NS	NS	0.59	0.03 - 2.61	0.5643
741 Spina bifida	<5	NS	NS	NS	0.83	0.05 - 3.67	0.8481
742.1 Microcephalus	<5	NS	NS	NS	1.09	0.34 - 2.53	0.8714
742.4 Other specified anomalies of brain	<5	NS	NS	NS	0.38	0.06 - 1.16	0.0990
742.5 Other specified anomalies of spinal cord	<5	NS	NS	NS	1.35	0.08 - 5.97	0.7768
743.1 Microphthalmos	<5	NS	NS	NS	2.16	0.36 - 6.73	0.3341
743.3 Congenital cataract and lens anomalies	<5	NS	NS	NS	1.19	0.07 - 5.25	0.8689
743.4 Coloboma, other anomalies of anterior segments	<5	NS	NS	NS	1.04	0.06 - 4.58	0.9725
743.5 Congenital anomalies of posterior segment	<5	NS	NS	NS	6.30*	1.94 - 14.82	0.0048
743.6 Congenital anomalies of eyelids, lacrimal system, and orbit	<5	NS	NS	NS	0.37	0.02 - 1.63	0.2324
744.2 Other specified anomalies of ear	18	3,426	59.11	33.54	1.76*	1.07 - 2.71	0.0283
744.8 Other specified anomalies of face and neck	<5	NS	NS	NS	0.61	0.03 - 2.68	0.5876
744.9 Congenital anomalies of face, NOS	5	1,104	16.42	10.81	1.52	0.54 - 3.27	0.3828
745.1 Transposition of great vessels	<5	NS	NS	NS	1.19	0.20 - 3.70	0.8080
745.4 Ventricular septal defect	14	5,340	45.98	52.28	0.88	0.50 - 1.43	0.6239
745.5 Ostium secundum type atrial septal defect	25	10,048	82.10	98.37	0.83	0.55 - 1.21	0.3521
745.6 Endocardial cushion defects	<5	NS	NS	NS	1.40	0.23 - 4.33	0.6543
745.9 Unspecified defect of septal closure	<5	<5	NS	NS	167.73*	7.80 - 1,750.48	0.0051
746.0 Anomalies of pulmonary valve	6	1,163	19.70	11.39	1.73	0.69 - 3.52	0.2191

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Midlothian compared to Remainder of PHR3		
	Midlothian	Remainder of PHR3	Midlothian	Remainder of PHR3	Ratio	95% CI	p-value
746.1 Anomalies of the tricuspid valve	<5	NS	NS	NS	3.32	0.82 - 8.68	0.0836
746.3 Congenital stenosis of aortic valve	<5	NS	NS	NS	4.07*	1.01 - 10.67	0.0489
746.4 Other anomalies of aortic valve	<5	NS	NS	NS	1.29	0.07 - 5.70	0.8099
746.5 Congenital mitral stenosis	<5	NS	NS	NS	0.94	0.05 - 4.15	0.9477
746.7 Hypoplastic left heart syndrome	<5	NS	NS	NS	1.55	0.09 - 6.89	0.6822
746.8 Other specified anomalies of the heart	10	2,789	32.84	27.30	1.20	0.60 - 2.11	0.5717
747.0 Patent ductus arteriosus (PDA)	12	5,176	39.41	50.67	0.78	0.42 - 1.31	0.3641
747.1 Coarctation of aorta	<5	NS	NS	NS	1.34	0.22 - 4.15	0.6942
747.2 Other anomalies of aorta	<5	NS	NS	NS	0.63	0.10 - 1.95	0.4796
747.3 Anomalies of pulmonary artery	<5	NS	NS	NS	0.76	0.19 - 1.97	0.6191
747.6 Other anomalies of peripheral vascular system	<5	NS	NS	NS	1.56	0.09 - 6.92	0.6793
749.0 Cleft palate alone	<5	NS	NS	NS	1.54	0.38 - 4.00	0.4868
749.1 Cleft lip with/without cleft palate	<5	NS	NS	NS	0.29	0.02 - 1.28	0.1207
750.2 Other specified anomalies of mouth and pharynx	<5	NS	NS	NS	0.55	0.03 - 2.44	0.5098
750.3 T-E fistula, esophageal atresia and stenosis	<5	NS	NS	NS	3.89	0.96 - 10.17	0.0554
750.5 Congenital hypertrophic pyloric stenosis	12	1,855	39.41	18.16	2.17*	1.16 - 3.65	0.0176
751.1 Atresia and stenosis of small intestine	<5	NS	NS	NS	0.97	0.06 - 4.28	0.9729
751.2 Atresia/stenosis of large intestine, rectum and anal canal	<5	NS	NS	NS	1.32	0.22 - 4.09	0.7093
751.3 Hirschsprungs disease, other anom of the colon	<5	NS	NS	NS	4.12	0.68 - 12.87	0.1057
752.5 Undescended testicle	7	2,160	22.99	21.15	1.09	0.47 - 2.11	0.8277
752.6 Hypospadias, epispadias, and congenital chordee	24	4,255	78.82	41.66	1.89*	1.23 - 2.76	0.0048
752.7 Indeterminate sex and pseudohermaphroditism	<5	NS	NS	NS	3.49	0.20 - 15.66	0.3011
752.8 Other specified anomalies of male genital organs	6	2,029	19.70	19.86	0.99	0.39 - 2.01	0.9843
753.1 Cystic kidney disease	<5	NS	NS	NS	2.02	0.63 - 4.71	0.2087
753.2 Obstructive defects of renal pelvis and ureter	15	3,840	49.26	37.59	1.31	0.75 - 2.09	0.3172
753.3 Other specified anomalies of kidney	<5	NS	NS	NS	1.75	0.54 - 4.08	0.3060

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Midlothian compared to Remainder of PHR3		
	Midlothian	Remainder of PHR3	Midlothian	Remainder of PHR3	Ratio	95% CI	p-value
753.4 Other specified anomalies of ureter	6	1,262	19.70	12.35	1.59	0.63 - 3.24	0.2895
753.8 Other specified anomalies of bladder and urethra	<5	NS	NS	NS	1.12	0.06 - 4.95	0.9128
754.0 Certain anomalies of skull, face, and jaw	27	7,059	88.67	69.11	1.28	0.86 - 1.83	0.2144
754.2 Certain congenital musculoskeletal deformities of spine	<5	NS	NS	NS	2.45	0.14 - 10.92	0.4366
754.3 Congenital dislocation of hip	<5	NS	NS	NS	1.19	0.20 - 3.70	0.8080
754.4 Congenital genu recurvatum, bowing of leg bones	<5	NS	NS	NS	1.05	0.06 - 4.67	0.9578
754.5 Varus (inward) deformities of feet	<5	NS	NS	NS	0.96	0.24 - 2.51	0.9504
754.7 Other deformities of feet	5	1,634	16.42	16.00	1.03	0.37 - 2.21	0.9536
754.8 Other specified cong musculoskeletal deformities	<5	NS	NS	NS	0.59	0.10 - 1.83	0.4166
755.0 Polydactyly	<5	NS	NS	NS	0.66	0.21 - 1.54	0.3800
755.1 Syndactyly	<5	NS	NS	NS	0.75	0.12 - 2.32	0.6677
755.3 Reduction defects of lower limb	<5	NS	NS	NS	3.02	0.50 - 9.42	0.1872
755.5 Other anomalies of upper limb, including shoulder girdle	<5	NS	NS	NS	0.43	0.02 - 1.89	0.3245
755.6 Other anomalies of lower limb, including pelvic girdle	8	2,357	26.27	23.07	1.14	0.52 - 2.12	0.7197
755.8 Other specified anomalies of unspecified limb	<5	NS	NS	NS	0.97	0.16 - 3.00	0.9650
756.0 Anomalies of skull and face bones	9	2,918	29.56	28.57	1.03	0.50 - 1.87	0.9192
756.1 Anomalies of spine	<5	NS	NS	NS	1.04	0.17 - 3.22	0.9576
756.3 Other anomalies of ribs and sternum	<5	NS	NS	NS	0.77	0.04 - 3.42	0.7901
756.4 Chondrodystrophy	<5	NS	NS	NS	2.47	0.14 - 11.00	0.4333
756.6 Anomalies of diaphragm	<5	NS	NS	NS	0.90	0.05 - 3.98	0.9141
756.71 Gastroschisis	<5	NS	NS	NS	1.43	0.24 - 4.43	0.6352
756.8 Other specified anomalies of muscle, tendon, connective tissue	11	2,603	36.12	25.48	1.42	0.74 - 2.43	0.2748
756.9 Unspecified anomalies of musculoskeletal system	<5	NS	NS	NS	67.09*	3.50 - 416.03	0.0123
757.3 Other specified anomalies of skin	5	1,094	16.42	10.71	1.53	0.55 - 3.30	0.3732
757.4 Specified anomalies of hair	<5	NS	NS	NS	3.65	0.21 - 16.35	0.2877
757.5 Specified anomalies of nails	<5	NS	NS	NS	0.74	0.04 - 3.27	0.7522

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Midlothian compared to Remainder of PHR3		
	Midlothian	Remainder of PHR3	Midlothian	Remainder of PHR3	Ratio	95% CI	p-value
758.0 Down syndrome	7	1,503	22.99	14.71	1.56	0.67 - 3.03	0.2727
758.1 Patau syndrome	<5	NS	NS	NS	2.27	0.13 - 10.10	0.4722
758.3 Autosomal deletion syndromes	<5	NS	NS	NS	1.39	0.08 - 6.15	0.7572
758.5 Other conditions due to autosomal anomalies	<5	NS	NS	NS	1.06	0.06 - 4.70	0.9529
759.8 Other specified anomalies and syndromes	<5	NS	NS	NS	0.62	0.04 - 2.75	0.6086

NS—Not shown. For confidentiality, prevalence is suppressed when there are 1-4 reported cases.

NOS—Not otherwise specified.

* Significantly high at an alpha level 0.05, as determined by Poisson regression analysis.

** Significantly low at an alpha level of 0.05, as determined by Poisson regression analysis.

Table A.4.1.n. Number of cases, crude prevalence per 10,000 live births, and crude prevalence ratio with 95% confidence interval (CI) and p-value for birth defects with 1 or more cases in Ellis County compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008. Data Source: TDSHS TBDES.

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Ellis County compared to remainder of PHR3		
	Ellis County	Remainder of PHR3	Ellis County	Remainder of PHR3	Ratio	95% CI	p-value
228.0 Hemangioma	32	1,609	16.23	16.01	1.01	0.70 - 1.41	0.9397
228.1 Cystic hygroma, lymphangioma any site	<5	NS	NS	NS	0.64	0.20 - 1.49	0.3337
237.7 Neurofibromatosis	<5	NS	NS	NS	3.00	0.49 - 9.84	0.1955
238.0 Teratoma	<5	NS	NS	NS	1.38	0.08 - 6.35	0.7636
243.9 Hypothyroidism, congenital	7	193	3.55	1.92	1.85	0.79 - 3.64	0.1451
426.7 Congenital Wolfe-Parkinson-White syndrome	<5	NS	NS	NS	0.86	0.05 - 3.91	0.8818
427.9 Cardiac arrhythmias, not elsewhere classified	<5	NS	NS	NS	0.99	0.25 - 2.61	0.9902
524.0 Abnormalities of jaw size - micro/macrogathia	27	1,351	13.70	13.45	1.02	0.68 - 1.46	0.9248
550.0 Inguinal hernia with mention of gangrene	<5	NS	NS	NS	8.49	0.45 - 49.74	0.1219
550.1 Inguinal hernia with obstruction, no gangrene	<5	NS	NS	NS	1.27	0.07 - 5.85	0.8177

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Ellis County compared to remainder of PHR3		
	Ellis County	Remainder of PHR3	Ellis County	Remainder of PHR3	Ratio	95% CI	p-value
550.9 Inguinal hernia with no obstruction, no gangrene	9	560	4.57	5.57	0.82	0.39 - 1.49	0.5395
740.0 Anencephalus	6	305	3.04	3.04	1.00	0.40 - 2.05	0.9949
741 Spina bifida	<5	NS	NS	NS	0.51	0.16 - 1.19	0.1305
742.0 Encephalocele	<5	NS	NS	NS	1.89	0.58 - 4.49	0.2563
742.1 Microcephalus	27	1,213	13.70	12.07	1.13	0.76 - 1.63	0.5251
742.2 Reduction deformities of brain	13	798	6.59	7.94	0.83	0.46 - 1.37	0.4929
742.3 Congenital hydrocephalus	13	732	6.59	7.28	0.91	0.50 - 1.50	0.7174
742.4 Other specified anomalies of brain	27	1,760	13.70	17.52	0.78	0.52 - 1.12	0.1864
742.5 Other specified anomalies of spinal cord	5	245	2.54	2.44	1.04	0.37 - 2.26	0.9310
743.1 Microphthalmos	<5	NS	NS	NS	0.49	0.12 - 1.29	0.1710
743.2 Buphthalmos	<5	NS	NS	NS	1.36	0.22 - 4.31	0.6830
743.3 Congenital cataract and lens anomalies	9	275	4.57	2.74	1.67	0.79 - 3.05	0.1621
743.4 Coloboma, other anomalies of anterior segments	10	315	5.07	3.13	1.62	0.80 - 2.87	0.1637
743.5 Congenital anomalies of posterior segment	9	208	4.57	2.07	2.21*	1.05 - 4.04	0.0385
743.6 Congenital anomalies of eyelids, lacrimal system, and orbit	19	892	9.64	8.88	1.09	0.67 - 1.66	0.7266
743.8 Other specified anomalies of eye	<5	NS	NS	NS	3.40	0.19 - 16.76	0.3166
743.9 Unspecified anomalies of eye	<5	NS	NS	NS	4.43	0.71 - 14.98	0.0968
744.0 Anomalies of ear causing impairment of hearing	12	424	6.09	4.22	1.44	0.77 - 2.44	0.2368
744.2 Other specified anomalies of ear	89	3,355	45.14	33.39	1.35*	1.09 - 1.66	0.0074
744.3 Unspecified anomalies of ear	<5	NS	NS	NS	1.27	0.21 - 4.04	0.7445
744.4 Branchial cleft, cyst, or fistula	<5	NS	NS	NS	0.67	0.17 - 1.75	0.4571
744.8 Other specified anomalies of face and neck	7	546	3.55	5.43	0.65	0.28 - 1.27	0.2296
744.9 Congenital anomalies of face, NOS	19	1,090	9.64	10.85	0.89	0.54 - 1.36	0.6022
745.0 Common truncus	<5	NS	NS	NS	1.52	0.25 - 4.85	0.5834
745.1 Transposition of great vessels	14	550	7.10	5.47	1.30	0.73 - 2.12	0.3557
745.2 Tetralogy of Fallot	8	378	4.06	3.76	1.08	0.49 - 2.03	0.8341

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Ellis County compared to remainder of PHR3		
	Ellis County	Remainder of PHR3	Ellis County	Remainder of PHR3	Ratio	95% CI	p-value
745.3 Single ventricle	<5	NS	NS	NS	1.84	0.45 - 4.92	0.3426
745.4 Ventricular septal defect	90	5,264	45.65	52.39	0.87	0.70 - 1.07	0.1854
745.5 Ostium secundum type atrial septal defect	172	9,901	87.24	98.54	0.89	0.76 - 1.03	0.1065
745.6 Endocardial cushion defects	10	472	5.07	4.70	1.08	0.54 - 1.91	0.8124
745.9 Unspecified defect of septal closure	<5	NS	NS	NS	25.48*	1.19 - 265.95	0.0414
746.0 Anomalies of pulmonary valve	26	1,143	13.19	11.38	1.16	0.77 - 1.67	0.4664
746.1 Anomalies of the tricuspid valve	6	300	3.04	2.99	1.02	0.40 - 2.09	0.9631
746.2 Ebsteins anomaly	<5	NS	NS	NS	0.89	0.05 - 4.06	0.9101
746.3 Congenital stenosis of aortic valve	5	245	2.54	2.44	1.04	0.37 - 2.26	0.9310
746.4 Other anomalies of aortic valve	5	257	2.54	2.56	0.99	0.35 - 2.16	0.9850
746.5 Congenital mitral stenosis	7	352	3.55	3.50	1.01	0.43 - 1.98	0.9720
746.7 Hypoplastic left heart syndrome	6	211	3.04	2.10	1.45	0.57 - 2.98	0.3972
746.8 Other specified anomalies of the heart	56	2,743	28.40	27.30	1.04	0.79 - 1.34	0.7700
746.9 Unspecified anomalies of heart	<5	NS	NS	NS	0.25**	0.04 - 0.77	0.0112
747.0 Patent ductus arteriosus (PDA)	103	5,085	52.24	50.61	1.03	0.84 - 1.25	0.7502
747.1 Coarctation of aorta	7	496	3.55	4.94	0.72	0.31 - 1.40	0.3605
747.2 Other anomalies of aorta	21	1,046	10.65	10.41	1.02	0.64 - 1.53	0.9173
747.3 Anomalies of pulmonary artery	16	1,311	8.12	13.05	0.62**	0.36 - 0.98	0.0409
747.4 Anomalies of great veins	14	598	7.10	5.95	1.19	0.67 - 1.95	0.5251
747.6 Other anomalies of peripheral vascular system	5	211	2.54	2.10	1.21	0.43 - 2.63	0.6855
747.8 Other specified anomalies of circulatory system	<5	NS	NS	NS	1.76	0.10 - 8.21	0.6105
748.0 Choanal atresia	<5	NS	NS	NS	1.53	0.47 - 3.63	0.4304
748.1 Other anomalies of nose	<5	NS	NS	NS	0.94	0.15 - 2.94	0.9243
748.3 Other anomalies of larynx, trachea, and bronchus	5	292	2.54	2.91	0.87	0.31 - 1.89	0.7576
748.4 Congenital cystic lung	<5	NS	NS	NS	2.18	0.53 - 5.86	0.2371
748.5 Agenesis, aplasia, hypoplasia, or dysplasia of lung	<5	NS	NS	NS	0.43	0.11 - 1.12	0.0898

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Ellis County compared to remainder of PHR3		
	Ellis County	Remainder of PHR3	Ellis County	Remainder of PHR3	Ratio	95% CI	p-value
748.6 Other anomalies of lung	<5	NS	NS	NS	1.59	0.09 - 7.40	0.6693
749.0 Cleft palate alone	12	645	6.09	6.42	0.95	0.51 - 1.60	0.8540
749.1 Cleft lip with/without cleft palate	18	1,138	9.13	11.33	0.81	0.49 - 1.24	0.3474
750.1 Other anomalies of tongue	6	360	3.04	3.58	0.85	0.34 - 1.74	0.6839
750.2 Other specified anomalies of mouth and pharynx	10	599	5.07	5.96	0.85	0.42 - 1.50	0.6030
750.3 T-E fistula, esophageal atresia and stenosis	6	256	3.04	2.55	1.19	0.47 - 2.45	0.6756
750.5 Congenital hypertrophic pyloric stenosis	45	1,822	22.83	18.13	1.26	0.92 - 1.67	0.1412
750.7 Other specified anomalies of stomach	<5	NS	NS	NS	0.72	0.04 - 3.24	0.7280
751.0 Persistent omphalomesenteric / vitelline duct	<5	NS	NS	NS	2.83	0.16 - 13.71	0.3816
751.1 Atresia and stenosis of small intestine	9	339	4.57	3.37	1.35	0.65 - 2.47	0.3929
751.2 Atresia/stenosis of large intestine, rectum and anal canal	12	499	6.09	4.97	1.23	0.65 - 2.07	0.4999
751.3 Hirschsprungs disease, other anom of the colon	7	158	3.55	1.57	2.26	0.96 - 4.46	0.0610
751.4 Anomalies of intestinal fixation	10	438	5.07	4.36	1.16	0.58 - 2.06	0.6436
751.5 Other anomalies of intestine	13	401	6.59	3.99	1.65	0.90 - 2.75	0.0986
751.6 Anomalies of gallbladder, bile ducts, and liver	6	170	3.04	1.69	1.80	0.71 - 3.71	0.1955
751.7 Anomalies of pancreas	<5	NS	NS	NS	4.08*	1.23 - 9.98	0.0249
752.0 Anomalies of ovaries	<5	NS	NS	NS	1.32	0.32 - 3.49	0.6509
752.3 Other anomalies of uterus	<5	NS	NS	NS	1.34	0.08 - 6.18	0.7819
752.4 Anomalies of cervix, vagina, ext female genitalia	16	1,020	8.12	10.15	0.80	0.47 - 1.26	0.3568
752.5 Undescended testicle	56	2,111	28.40	21.01	1.35*	1.02 - 1.74	0.0335
752.6 Hypospadias, epispadias, and congenital chordee	104	4,175	52.75	41.55	1.27*	1.04 - 1.53	0.0205
752.7 Indeterminate sex and pseudohermaphroditism	<5	NS	NS	NS	2.19	0.67 - 5.24	0.1705
752.8 Other specified anomalies of male genital organs	49	1,986	24.85	19.76	1.26	0.93 - 1.65	0.1263
753.0 Renal agenesis and dysgenesis	9	632	4.57	6.29	0.73	0.35 - 1.32	0.3140
753.1 Cystic kidney disease	21	647	10.65	6.44	1.65*	1.04 - 2.49	0.0354
753.2 Obstructive defects of renal pelvis and ureter	64	3,791	32.46	37.73	0.86	0.67 - 1.09	0.2216

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Ellis County compared to remainder of PHR3		
	Ellis County	Remainder of PHR3	Ellis County	Remainder of PHR3	Ratio	95% CI	p-value
753.3 Other specified anomalies of kidney	8	762	4.06	7.58	0.54	0.24 - 1.00	0.0502
753.4 Other specified anomalies of ureter	20	1,248	10.14	12.42	0.82	0.51 - 1.23	0.3533
753.6 Atresia and stenosis of urethra and bladder neck	6	163	3.04	1.62	1.88	0.74 - 3.87	0.1681
753.8 Other specified anomalies of bladder and urethra	6	295	3.04	2.94	1.04	0.41 - 2.12	0.9309
754.0 Certain anomalies of skull, face, and jaw	162	6,924	82.17	68.91	1.19*	1.02 - 1.39	0.0312
754.1 Anomalies of sternocleidomastoid muscle	<5	NS	NS	NS	2.22	0.36 - 7.16	0.3266
754.2 Certain congenital musculoskeletal deformities of spine	<5	NS	NS	NS	1.13	0.28 - 2.99	0.8343
754.3 Congenital dislocation of hip	6	558	3.04	5.55	0.55	0.22 - 1.12	0.1044
754.4 Congenital genu recurvatum, bowing of leg bones	5	314	2.54	3.12	0.81	0.29 - 1.76	0.6317
754.5 Varus (inward) deformities of feet	16	1,030	8.12	10.25	0.79	0.46 - 1.25	0.3354
754.6 Valgus (outward) deformities of feet	10	486	5.07	4.84	1.05	0.52 - 1.85	0.8826
754.7 Other deformities of feet	32	1,607	16.23	15.99	1.01	0.70 - 1.41	0.9342
754.8 Other specified cong musculoskeletal deformities	18	1,118	9.13	11.13	0.82	0.50 - 1.27	0.3899
755.0 Polydactyly	31	1,994	15.72	19.84	0.79	0.54 - 1.11	0.1815
755.1 Syndactyly	16	882	8.12	8.78	0.92	0.54 - 1.46	0.7528
755.2 Reduction defects of upper limb	9	485	4.57	4.83	0.95	0.45 - 1.72	0.8672
755.3 Reduction defects of lower limb	7	217	3.55	2.16	1.64	0.70 - 3.23	0.2298
755.4 Reduction defects, unspecified limb	<5	<5	NS	NS	25.48*	1.19 - 265.95	0.0414
755.5 Other anomalies of upper limb, including shoulder girdle	15	769	7.61	7.65	0.99	0.57 - 1.59	0.9820
755.6 Other anomalies of lower limb, including pelvic girdle	52	2,313	26.38	23.02	1.15	0.86 - 1.49	0.3421
755.8 Other specified anomalies of unspecified limb	13	681	6.59	6.78	0.97	0.53 - 1.61	0.9216
755.9 Unspecified anomalies of unspecified limb	<5	NS	NS	NS	4.25	0.23 - 21.56	0.2512
756.0 Anomalies of skull and face bones	72	2,855	36.52	28.41	1.29*	1.01 - 1.61	0.0431
756.1 Anomalies of spine	16	632	8.12	6.29	1.29	0.75 - 2.04	0.3332
756.3 Other anomalies of ribs and sternum	11	423	5.58	4.21	1.33	0.68 - 2.29	0.3773
756.4 Chondrodystrophy	<5	134	NS	NS	1.14	0.28 - 3.01	0.8248

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Ellis County compared to remainder of PHR3		
	Ellis County	Remainder of PHR3	Ellis County	Remainder of PHR3	Ratio	95% CI	p-value
756.6 Anomalies of diaphragm	5	369	2.54	3.67	0.69	0.25 - 1.50	0.3818
756.7 Anomalies of abdominal wall	<5	NS	NS	NS	1.61	0.40 - 4.28	0.4502
756.70 Omphalocele	<5	NS	NS	NS	0.65	0.16 - 1.69	0.4168
756.71 Gastroschisis	12	460	6.09	4.58	1.33	0.71 - 2.25	0.3513
756.8 Other specified anomalies of muscle, tendon, connective tissue	72	2,542	36.52	25.30	1.44*	1.13 - 1.81	0.0037
756.9 Unspecified anomalies of musculoskeletal system	<5	NS	NS	NS	10.19	0.53 - 63.21	0.1011
757.3 Other specified anomalies of skin	26	1,073	13.19	10.68	1.23	0.82 - 1.78	0.3036
757.4 Specified anomalies of hair	<5	NS	NS	NS	0.55	0.03 - 2.48	0.5159
757.5 Specified anomalies of nails	<5	NS	NS	NS	0.45	0.14 - 1.06	0.0704
757.6 Specified anomalies of breast	<5	NS	NS	NS	0.82	0.13 - 2.56	0.7673
758.0 Down syndrome	36	1,474	18.26	14.67	1.24	0.88 - 1.70	0.2097
758.1 Patau syndrome	<5	NS	NS	NS	1.05	0.26 - 2.76	0.9374
758.2 Edwards syndrome	<5	NS	NS	NS	0.64	0.20 - 1.50	0.3374
758.3 Autosomal deletion syndromes	<5	NS	NS	NS	0.64	0.16 - 1.67	0.4025
758.4 Balanced autosomal translocation in normal indl	<5	NS	NS	NS	2.04	0.11 - 9.61	0.5294
758.5 Other conditions due to autosomal anomalies	6	311	3.04	3.10	0.98	0.39 - 2.01	0.9673
758.6 Gonadal dysgenesis	<5	NS	NS	NS	0.33	0.02 - 1.46	0.1760
758.7 Klinefelter syndrome	<5	NS	NS	NS	1.50	0.08 - 6.94	0.7076
758.8 Other conditions due to sex chromosome anomalies	<5	NS	NS	NS	1.80	0.44 - 4.80	0.3600
758.9 Conditions due to anom of unspec chromosomes	<5	NS	NS	NS	2.68	0.15 - 12.92	0.4031
759.0 Anomalies of spleen	<5	NS	NS	NS	0.87	0.22 - 2.30	0.8127
759.1 Anomalies of adrenal gland	<5	NS	NS	NS	0.73	0.04 - 3.28	0.7398
759.2 Anomalies of other endocrine glands	<5	NS	NS	NS	1.00	0.25 - 2.63	0.9991
759.3 Situs inversus	<5	NS	NS	NS	1.34	0.41 - 3.17	0.5797
759.8 Other specified anomalies and syndromes	10	529	5.07	5.26	0.96	0.48 - 1.70	0.9066
759.9 Congenital anomalies, unspecified	<5	NS	NS	NS	0.93	0.05 - 4.21	0.9391

NS—Not shown. For confidentiality, prevalence is suppressed when there are 1-4 reported cases; NOS—Not otherwise specified.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

* Significantly high at an alpha level 0.05, as determined by Poisson regression analysis.
 ** Significantly low at an alpha level of 0.05, as determined by Poisson regression analysis.

Table A.4.1.o. Crude and adjusted prevalence ratios with 95% confidence intervals (CI) and p-values for birth defects with 1 or more cases in the Midlothian potential area of impact compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008. Data Source: TDSHS TBDES.

Birth Defect	Crude Prevalence Ratio for Potential area of impact compared to remainder of PHR3			Adjusted Prevalence Ratio for Potential area of impact compared to remainder of PHR3		
	Ratio	95% CI	p-value	Ratio	95% CI	p-value
228.0 Hemangioma	0.59	0.10 - 1.82	0.4126	0.52	0.13 - 1.35	0.2045
237.7 Neurofibromatosis	13.60	0.77 - 62.89	0.0675	15.71	0.55 - 86.03	0.0878
243.9 Hypothyroidism, congenital	2.40	0.14 - 10.68	0.4444	2.46	0.23 - 9.47	0.3717
524.0 Abnormalities of jaw size - micro/macrogathia	1.05	0.26 - 2.74	0.9278	0.99	0.29 - 2.38	0.9890
550.9 Inguinal hernia with no obstruction, no gangrene	0.85	0.05 - 3.76	0.8677	0.84	0.10 - 3.00	0.8300
742.1 Microcephalus	0.78	0.13 - 2.41	0.7141	0.90	0.05 - 3.93	0.9121
742.4 Other specified anomalies of brain	0.54	0.09 - 1.67	0.3343	0.51	0.04 - 2.06	0.4132
742.5 Other specified anomalies of spinal cord	1.92	0.11 - 8.51	0.5567	1.97	0.00 - 16.53	0.7087
743.1 Microphthalmos	3.14	0.52 - 9.77	0.1741	3.28	0.55 - 10.17	0.1588
743.3 Congenital cataract and lens anomalies	1.71	0.10 - 7.59	0.6218	1.80	0.23 - 6.13	0.4935
743.5 Congenital anomaly of posterior segment	9.16*	2.82 - 21.54	0.0012	8.33*	2.72 - 19.10	0.0010
743.6 Congenital anomaly of eyelids, lacrimal system, and orbit	0.53	0.03 - 2.34	0.4803	0.55	0.03 - 2.43	0.5107
744.2 Other specified anomalies of ear	1.69	0.90 - 2.84	0.0955	1.67	0.59 - 3.60	0.2953
744.9 Congenital anomaly of face, NOS	1.31	0.32 - 3.40	0.6575	1.45	0.35 - 3.84	0.5517
745.1 Transposition of great vessels	0.86	0.05 - 3.82	0.8812	0.86	0.12 - 2.88	0.8408
745.4 Ventricular septal defect	0.81	0.39 - 1.47	0.5237	0.83	0.49 - 1.28	0.4115
745.5 Ostium secundum type atrial septal defect	0.86	0.52 - 1.33	0.5260	0.86	0.49 - 1.40	0.5746
745.6 Endocardial cushion defects	2.01	0.33 - 6.24	0.3760	2.03	0.54 - 5.11	0.2534
745.9 Unspecified defect of septal closure	238.08*	11.07 - 2,484.67	0.0035	NC	NC	NC
746.0 Anomalies of pulmonary valve	2.08	0.74 - 4.48	0.1450	2.18	0.90 - 4.32	0.0786
746.1 Anomalies of the tricuspid valve	4.81*	1.19 - 12.57	0.0310	5.11*	1.94 - 10.68	0.0025
746.3 Congenital stenosis of aortic valve	3.94	0.65 - 12.26	0.1148	3.37	0.83 - 8.85	0.0817

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Crude Prevalence Ratio for Potential area of impact compared to remainder of PHR3			Adjusted Prevalence Ratio for Potential area of impact compared to remainder of PHR3		
	Ratio	95% CI	p-value	Ratio	95% CI	p-value
746.4 Other anomalies of aortic valve	1.83	0.10 - 8.12	0.5830	1.74	0.34 - 5.06	0.4396
746.5 Congenital mitral stenosis	1.34	0.08 - 5.92	0.7817	1.32	0.12 - 5.16	0.7641
746.7 Hypoplastic left heart syndrome	2.21	0.13 - 9.83	0.4831	2.10	0.43 - 6.02	0.3053
746.8 Other specified anomalies of the heart	1.56	0.75 - 2.81	0.2151	1.61	0.78 - 2.89	0.1811
747.0 Patent ductus arteriosus (PDA)	0.93	0.47 - 1.64	0.8249	0.96	0.49 - 1.65	0.8936
747.1 Coarctation of aorta	0.97	0.06 - 4.28	0.9738	0.86	0.22 - 2.21	0.7859
747.2 Other anomalies of aorta	0.45	0.03 - 2.00	0.3637	0.44	0.01 - 2.28	0.4102
747.3 Anomalies of pulmonary artery	1.09	0.27 - 2.84	0.8806	1.23	0.37 - 2.93	0.6948
747.6 Other anomalies of peripheral vascular system	2.26	0.13 - 10.02	0.4740	2.30	0.20 - 9.02	0.4127
749.0 Cleft palate alone	0.74	0.04 - 3.27	0.7534	0.68	0.13 - 2.02	0.5473
750.3 T-E fistula, esophageal atresia and stenosis	3.69	0.61 - 11.49	0.1294	3.61	0.90 - 9.41	0.0662
750.5 Congenital hypertrophic pyloric stenosis	2.87*	1.49 - 4.93	0.0029	2.41*	1.40 - 3.83	0.0027
751.1 Atresia and stenosis of small intestine	1.37	0.08 - 6.07	0.7640	1.41	0.04 - 7.67	0.7825
751.2 Atresia/stenosis of large intestine, rectum and anal canal	0.95	0.05 - 4.20	0.9591	1.02	0.03 - 5.26	0.9892
751.3 Hirschsprungs disease, other anom of the colon	5.88	0.97 - 18.39	0.0528	5.55*	1.16 - 15.80	0.0350
752.5 Undescended testicle	1.34	0.53 - 2.72	0.4921	1.46	0.55 - 3.04	0.4075
752.6 Hypospadias, epispadias, and congenital chordee	1.70	0.98 - 2.71	0.0597	1.40	0.81 - 2.23	0.2120
752.8 Other specified anomalies of male genital organs	1.43	0.57 - 2.90	0.4096	1.32	0.75 - 2.14	0.3142
753.1 Cystic kidney disease	1.47	0.24 - 4.55	0.6107	1.49	0.48 - 3.40	0.4429
753.2 Obstructive defects of renal pelvis and ureter	1.26	0.63 - 2.21	0.4840	1.18	0.76 - 1.72	0.4455
753.3 Other specified anomalies of kidney	2.54	0.79 - 5.93	0.1066	2.50*	1.01 - 5.04	0.0483
753.4 Other specified anomalies of ureter	1.91	0.68 - 4.12	0.1918	1.61	0.70 - 3.12	0.2386
754.0 Certain anomalies of skull, face, and jaw	1.37	0.85 - 2.06	0.1860	1.36	0.69 - 2.37	0.3443
754.3 Congenital dislocation of hip	1.71	0.28 - 5.30	0.4868	1.52	0.33 - 4.19	0.5320
754.5 Varus (inward) deformities of feet	1.87	0.58 - 4.35	0.2578	1.75	0.79 - 3.30	0.1534
754.7 Other deformities of feet	1.19	0.37 - 2.77	0.7360	1.23	0.40 - 2.80	0.6820
754.8 Other specified congenital musculoskeletal deformities	0.43	0.02 - 1.88	0.3204	0.44	0.04 - 1.71	0.2857

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Crude Prevalence Ratio for Potential area of impact compared to remainder of PHR3			Adjusted Prevalence Ratio for Potential area of impact compared to remainder of PHR3		
	Ratio	95% CI	p-value	Ratio	95% CI	p-value
755.0 Polydactyly	0.48	0.08 - 1.49	0.2386	0.61	0.19 - 1.43	0.2897
755.3 Reduction defects of lower limb	2.19	0.12 - 9.74	0.4876	2.38	0.38 - 7.55	0.2929
755.5 Other anomaly of upper limb, including shoulder girdle	0.62	0.04 - 2.74	0.6049	0.64	0.03 - 2.92	0.6396
755.6 Other anomaly of lower limb, including pelvic girdle	0.82	0.25 - 1.91	0.6836	0.86	0.41 - 1.56	0.6529
755.8 Other specified anomalies of unspecified limb	0.70	0.04 - 3.07	0.6989	0.68	0.11 - 2.08	0.5518
756.0 Anomalies of skull and face bones	1.17	0.50 - 2.26	0.6932	1.16	0.67 - 1.87	0.5684
756.1 Anomalies of spine	1.50	0.25 - 4.63	0.5945	1.61	0.25 - 5.13	0.5475
756.3 Other anomalies of ribs and sternum	1.11	0.06 - 4.90	0.9202	1.25	0.35 - 3.06	0.6880
756.6 Anomalies of diaphragm	1.32	0.08 - 5.85	0.7896	1.31	0.10 - 5.39	0.7849
756.71 Gastroschisis	1.04	0.06 - 4.57	0.9726	0.92	0.02 - 5.17	0.9467
756.8 Other spec anomaly of muscle, tendon, connective tissue	1.85	0.92 - 3.25	0.0785	1.66	0.47 - 4.04	0.3804
756.9 Unspecified anomalies of musculoskeletal system	95.23*	4.97 - 590.53	0.0084	NC	NC	NC
757.3 Other specified anomalies of skin	2.21	0.79 - 4.77	0.1172	2.49	0.97 - 5.12	0.0579
757.4 Specified anomalies of hair	5.18	0.29 - 23.21	0.1966	7.32*	1.43 - 21.45	0.0222
758.0 Down syndrome	1.93	0.76 - 3.91	0.1481	2.12*	1.09 - 3.65	0.0283
758.1 Patau syndrome	3.31	0.19 - 14.73	0.3189	3.69	0.54 - 12.07	0.1490
759.8 Other specified anomalies and syndromes	0.90	0.05 - 3.98	0.9163	0.89	0.08 - 3.40	0.8903
888.8 Any monitored congenital anomaly	1.15	0.96 - 1.37	0.1337	1.12	0.92 - 1.35	0.2325

NOS—Not otherwise specified. -

NC—Not calculated, an APR was not able to be calculated by Poisson regression analysis because of non-convergent cells. -

* Significantly high at an alpha level 0.05, as determined by Poisson regression analysis.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.p. Crude and adjusted prevalence ratios with 95% confidence intervals (CI) and p-values for birth defects with 1 or more cases in the city of Midlothian compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008. Data Source: TDSHS TBDES.

Birth Defect	Crude Prevalence Ratio for Midlothian compared to remainder of PHR3			Adjusted Prevalence Ratio for Midlothian compared to remainder of PHR3		
	Ratio	95% CI	p-value	Ratio	95% CI	p-value
228.0 Hemangioma	0.20**	0.01 - 0.90	0.0321	0.18**	0.03 - 0.59	0.0015
237.7 Neurofibromatosis	9.58	0.54 - 44.3	0.1000	11.37	0.46 - 60.04	0.1081
243.9 Hypothyroidism, congenital	3.39	0.56 - 10.57	0.1520	3.49	0.85 - 9.24	0.0771
524.0 Abnormalities of jaw size - micro/macrogathia	0.98	0.30 - 2.27	0.9621	0.91	0.31 - 2.02	0.8365
550.0 Inguinal hernia with mention of gangrene	55.91*	2.96 - 327.37	0.0149	0.58	0.07 - 2.06	0.4636
550.9 Inguinal hernia with no obstruction, no gangrene	0.59	0.03 - 2.61	0.5643	NC	NC	NC
741 Spina bifida	0.83	0.05 - 3.67	0.8481	0.81	0.08 - 3.04	0.8027
742.1 Microcephalus	1.09	0.34 - 2.53	0.8714	1.27	0.24 - 3.70	0.7309
742.4 Other specified anomalies of brain	0.38	0.06 - 1.16	0.0990	0.36	0.02 - 1.48	0.1897
742.5 Other specified anomalies of spinal cord	1.35	0.08 - 5.97	0.7768	1.38	0.00 - 10.90	0.8461
743.1 Microphthalmos	2.16	0.36 - 6.73	0.3341	2.26	0.41 - 6.78	0.2917
743.3 Congenital cataract and lens anomalies	1.19	0.07 - 5.25	0.8689	1.25	0.19 - 3.99	0.7673
743.4 Coloboma, other anomalies of anterior segments	1.04	0.06 - 4.58	0.9725	1.04	0.08 - 4.18	0.9626
743.5 Congenital anomaly of posterior segment	6.30*	1.94 - 14.82	0.0048	5.84*	1.94 - 13.25	0.0039
743.6 Congenital anomaly of eyelids, lacrimal system, and orbit	0.37	0.02 - 1.63	0.2324	0.38	0.02 - 1.71	0.2590
744.2 Other specified anomalies of ear	1.76*	1.07 - 2.71	0.0283	1.72	0.87 - 3.01	0.1121
744.8 Other specified anomalies of face and neck	0.61	0.03 - 2.68	0.5876	0.63	0.11 - 1.93	0.4760
744.9 Congenital anomaly of face, NOS	1.52	0.54 - 3.27	0.3828	1.67	0.59 - 3.64	0.2993
745.1 Transposition of great vessels	1.19	0.20 - 3.70	0.8080	1.18	0.29 - 3.09	0.7818
745.4 Ventricular septal defect	0.88	0.50 - 1.43	0.6239	0.89	0.58 - 1.27	0.5287
745.5 Ostium secundum type atrial septal defect	0.83	0.55 - 1.21	0.3521	0.83	0.52 - 1.25	0.3876
745.6 Endocardial cushion defects	1.40	0.23 - 4.33	0.6543	1.41	0.41 - 3.40	0.5367
745.9 Unspecified defect of septal closure	167.73*	7.80 - 1,750.48	0.0051	NC	NC	NC
746.0 Anomalies of pulmonary valve	1.73	0.69 - 3.52	0.2191	1.81	0.82 - 3.39	0.1279
746.1 Anomalies of the tricuspid valve	3.32	0.82 - 8.68	0.0836	3.53*	1.35 - 7.35	0.0134

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Crude Prevalence Ratio for Midlothian compared to remainder of PHR3			Adjusted Prevalence Ratio for Midlothian compared to remainder of PHR3		
	Ratio	95% CI	p-value	Ratio	95% CI	p-value
746.3 Congenital stenosis of aortic valve	4.07*	1.01 - 10.67	0.0489	3.40*	1.15 - 7.61	0.0300
746.4 Other anomalies of aortic valve	1.29	0.07 - 5.70	0.8099	1.22	0.23 - 3.57	0.7746
746.5 Congenital mitral stenosis	0.94	0.05 - 4.15	0.9477	0.92	0.08 - 3.66	0.9257
746.7 Hypoplastic left heart syndrome	1.55	0.09 - 6.89	0.6822	1.48	0.28 - 4.34	0.5801
746.8 Other specified anomalies of the heart	1.20	0.60 - 2.11	0.5717	1.24	0.64 - 2.16	0.4940
747.0 Patent ductus arteriosus (PDA)	0.78	0.42 - 1.31	0.3641	0.80	0.43 - 1.32	0.4031
747.1 Coarctation of aorta	1.34	0.22 - 4.15	0.6942	1.18	0.50 - 2.30	0.6687
747.2 Other anomalies of aorta	0.63	0.10 - 1.95	0.4796	0.62	0.08 - 2.11	0.5033
747.3 Anomalies of pulmonary artery	0.76	0.19 - 1.97	0.6191	0.86	0.26 - 2.03	0.7615
747.6 Other anomalies of peripheral vascular system	1.56	0.09 - 6.92	0.6793	1.58	0.13 - 6.37	0.6429
749.0 Cleft palate alone	1.54	0.38 - 4.00	0.4868	1.41	0.45 - 3.24	0.5031
749.1 Cleft lip with/without cleft palate	0.29	0.02 - 1.28	0.1207	0.28	0.00 - 6.42	0.6056
750.2 Other specified anomalies of mouth and pharynx	0.55	0.03 - 2.44	0.5098	0.58	0.08 - 1.95	0.4342
750.3 T-E fistula, esophageal atresia and stenosis	3.89	0.96 - 10.17	0.0554	3.77*	1.35 - 8.15	0.0149
750.5 Congenital hypertrophic pyloric stenosis	2.17*	1.16 - 3.65	0.0176	1.83*	1.10 - 2.83	0.0216
751.1 Atresia and stenosis of small intestine	0.97	0.06 - 4.28	0.9729	1.00	0.03 - 5.22	0.9993
751.2 Atresia/stenosis of large intestine, rectum and anal canal	1.32	0.22 - 4.09	0.7093	1.41	0.03 - 8.03	0.7921
751.3 Hirschsprungs disease, other anom of the colon	4.12	0.68 - 12.87	0.1057	3.94	0.80 - 11.36	0.0826
752.5 Undescended testicle	1.09	0.47 - 2.11	0.8277	1.18	0.50 - 2.30	0.6787
752.6 Hypospadias, epispadias, and congenital chordee	1.89*	1.23 - 2.76	0.0048	1.56	0.99 - 2.33	0.0567
752.7 Indeterminate sex and pseudohermaphroditism	3.49	0.20 - 15.66	0.3011	3.75	0.74 - 10.94	0.0973
752.8 Other specified anomalies of male genital organs	0.99	0.39 - 2.01	0.9843	0.92	0.47 - 1.59	0.7781
753.1 Cystic kidney disease	2.02	0.63 - 4.71	0.2087	2.03	0.95 - 3.73	0.0668
753.2 Obstructive defects of renal pelvis and ureter	1.31	0.75 - 2.09	0.3172	1.22	0.87 - 1.65	0.2472
753.3 Other specified anomalies of kidney	1.75	0.54 - 4.08	0.3060	1.73	0.73 - 3.39	0.1944
753.4 Other specified anomalies of ureter	1.59	0.63 - 3.24	0.2895	1.34	0.66 - 2.38	0.3870
753.8 Other specified anomalies of bladder and urethra	1.12	0.06 - 4.95	0.9128	1.14	0.15 - 3.88	0.8704

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Crude Prevalence Ratio for Midlothian compared to remainder of PHR3			Adjusted Prevalence Ratio for Midlothian compared to remainder of PHR3		
	Ratio	95% CI	p-value	Ratio	95% CI	p-value
754.0 Certain anomalies of skull, face, and jaw	1.28	0.86 - 1.83	0.2144	1.26	0.73 - 2.00	0.3774
754.2 Certain congenital musculoskeletal deform of spine	2.45	0.14 - 10.92	0.4366	2.10	0.29 - 7.06	0.3902
754.3 Congenital dislocation of hip	1.19	0.20 - 3.70	0.8080	1.05	0.23 - 2.89	0.9399
754.4 Congenital genu recurvatum, bowing of leg bones	1.05	0.06 - 4.67	0.9578	1.35	0.26 - 3.94	0.6613
754.5 Varus (inward) deformities of feet	0.96	0.24 - 2.51	0.9504	0.91	0.36 - 1.85	0.8106
754.7 Other deformities of feet	1.03	0.37 - 2.21	0.9536	1.06	0.43 - 2.12	0.8881
754.8 Other specified congenital musculoskeletal deformities	0.59	0.10 - 1.83	0.4166	0.61	0.13 - 1.72	0.3966
755.0 Polydactyly	0.66	0.21 - 1.54	0.3800	0.87	0.41 - 1.59	0.6768
755.1 Syndactyly	0.75	0.12 - 2.32	0.6677	0.73	0.27 - 1.55	0.4508
755.3 Reduction defects of lower limb	3.02	0.50 - 9.42	0.1872	3.30	0.84 - 8.51	0.0795
755.5 Other anomaly of upper limb, including shoulder girdle	0.43	0.02 - 1.89	0.3245	0.44	0.03 - 1.91	0.3359
755.6 Other anomaly of lower limb, including pelvic girdle	1.14	0.52 - 2.12	0.7197	1.19	0.75 - 1.77	0.4460
755.8 Other specified anomalies of unspecified limb	0.97	0.16 - 3.00	0.9650	0.94	0.34 - 2.03	0.8911
756.0 Anomalies of skull and face bones	1.03	0.50 - 1.87	0.9192	1.03	0.65 - 1.53	0.9096
756.1 Anomalies of spine	1.04	0.17 - 3.22	0.9576	1.11	0.18 - 3.47	0.8863
756.3 Other anomalies of ribs and sternum	0.77	0.04 - 3.42	0.7901	0.87	0.25 - 2.11	0.7927
756.4 Chondrodystrophy	2.47	0.14 - 11.00	0.4333	2.47	0.63 - 6.36	0.1659
756.6 Anomalies of diaphragm	0.90	0.05 - 3.98	0.9141	0.89	0.07 - 3.51	0.8912
756.71 Gastroschisis	1.43	0.24 - 4.43	0.6352	1.35	0.17 - 4.66	0.7199
756.8 Other spec anomaly of muscle, tendon, connective tissue	1.42	0.74 - 2.43	0.2748	1.25	0.43 - 2.74	0.6413
756.9 Unspecified anomalies of musculoskeletal system	67.09*	3.50 - 416.03	0.0123	NC	NC	NC
757.3 Other specified anomalies of skin	1.53	0.55 - 3.30	0.3732	1.71	0.68 - 3.46	0.2252
757.4 Specified anomalies of hair	3.65	0.21 - 16.35	0.2877	5.08*	1.04 - 14.55	0.0454
757.5 Specified anomalies of nails	0.74	0.04 - 3.27	0.7522	0.71	0.08 - 2.58	0.6612
758.0 Down syndrome	1.56	0.67 - 3.03	0.2727	1.70	0.96 - 2.75	0.0661
758.1 Patau syndrome	2.27	0.13 - 10.10	0.4722	2.58	0.36 - 8.66	0.2835
758.3 Autosomal deletion syndromes	1.39	0.08 - 6.15	0.7572	1.40	0.31 - 3.87	0.6055

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Crude Prevalence Ratio for Midlothian compared to remainder of PHR3			Adjusted Prevalence Ratio for Midlothian compared to remainder of PHR3		
	Ratio	95% CI	p-value	Ratio	95% CI	p-value
758.5 Other conditions due to autosomal anomalies	1.06	0.06 - 4.70	0.9529	0.99	0.16 - 3.13	0.9938
759.8 Other specified anomalies and syndromes	0.62	0.04 - 2.75	0.6086	0.61	0.05 - 2.47	0.5626
888.8 Any monitored congenital anomaly	1.08	0.93 - 1.26	0.3083	1.06	0.90 - 1.23	0.4881

NOS—Not otherwise specified. -

NC—Not calculated, an APR was not able to be calculated by Poisson regression analysis because of non-convergent cells. -

* Significantly high at an alpha level 0.05, as determined by Poisson regression analysis.

** Significantly low at an alpha level of 0.05, as determined by Poisson regression analysis.

Table A.4.1.q. Crude and adjusted prevalence ratios with 95% confidence intervals (CI) and p-values for birth defects with 1 or more cases in Ellis County compared to the remainder of Public Health Region 3 (PHR3), Texas, 1999-2008. Data Source: TDSHS TBDES.

Birth Defect	Crude Prevalence Ratio for Ellis County compared to remainder of PHR3			Adjusted Prevalence Ratio for Ellis County compared to remainder of PHR3		
	Ratio	95% CI	p-value	Ratio	95% CI	p-value
228.0 Hemangioma	1.01	0.70 - 1.41	0.9397	0.95	0.68 - 1.30	0.7805
228.1 Cystic hygroma, lymphangioma any site	0.64	0.20 - 1.49	0.3337	0.46	0.10 - 1.28	0.1573
237.7 Neurofibromatosis	3.00	0.49 - 9.84	0.1955	3.19	0.50 - 10.7	0.1801
238.0 Teratoma	1.38	0.08 - 6.35	0.7636	NC	NC	NC
243.9 Hypothyroidism, congenital	1.85	0.79 - 3.64	0.1451	2.00	0.77 - 4.20	0.1407
426.7 Congenital Wolfe-Parkinson-White syndrome	0.86	0.05 - 3.91	0.8818	0.77	0.18 - 2.10	0.6576
427.9 Cardiac arrhythmias, not elsewhere classified	0.99	0.25 - 2.61	0.9902	0.98	0.25 - 2.57	0.9745
524.0 Abnormalities of jaw size - micro/macrogathia	1.02	0.68 - 1.46	0.9248	0.99	0.60 - 1.54	0.9821
550.0 Inguinal hernia with mention of gangrene	8.49	0.45 - 49.74	0.1219	NC	NC	NC
550.1 Inguinal hernia with obstruction, no gangrene	1.27	0.07 - 5.85	0.8177	1.46	0.06 - 7.54	0.7480
550.9 Inguinal hernia with no obstruction, no gangrene	0.82	0.39 - 1.49	0.5395	0.82	0.42 - 1.43	0.5169
740.0 Anencephalus	1.00	0.40 - 2.05	0.9949	1.00	0.47 - 1.82	0.9895
741 Spina bifida	0.51	0.16 - 1.19	0.1305	0.50	0.18 - 1.09	0.0844
742.0 Encephalocele	1.89	0.58 - 4.49	0.2563	1.92	0.76 - 3.95	0.1511
742.1 Microcephalus	1.13	0.76 - 1.63	0.5251	1.20	0.80 - 1.73	0.3610

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Crude Prevalence Ratio for Ellis County compared to remainder of PHR3			Adjusted Prevalence Ratio for Ellis County compared to remainder of PHR3		
	Ratio	95% CI	p-value	Ratio	95% CI	p-value
742.2 Reduction deformities of brain	0.83	0.46 - 1.37	0.4929	0.82	0.44 - 1.38	0.4823
742.3 Congenital hydrocephalus	0.91	0.50 - 1.50	0.7174	0.90	0.50 - 1.48	0.7055
742.4 Other specified anomalies of brain	0.78	0.52 - 1.12	0.1864	0.75	0.44 - 1.17	0.2108
742.5 Other specified anomalies of spinal cord	1.04	0.37 - 2.26	0.9310	1.06	0.27 - 2.75	0.9230
743.1 Microphthalmos	0.49	0.12 - 1.29	0.1710	0.50	0.12 - 1.36	0.2027
743.2 Buphthalmos	1.36	0.22 - 4.31	0.6830	1.34	0.16 - 4.92	0.7311
743.3 Congenital cataract and lens anomalies	1.67	0.79 - 3.05	0.1621	1.67	0.85 - 2.91	0.1250
743.4 Coloboma, other anomalies of anterior segments	1.62	0.80 - 2.87	0.1637	1.62	0.79 - 2.90	0.1715
743.5 Congenital anomaly of posterior segment	2.21*	1.05 - 4.04	0.0385	2.00	0.87 - 3.88	0.0955
743.6 Congenital anomaly of eyelids, lacrimal system, and orbit	1.09	0.67 - 1.66	0.7266	1.12	0.58 - 1.93	0.7137
743.8 Other specified anomalies of eye	3.40	0.19 - 16.76	0.3166	NC	NC	NC
743.9 Unspecified anomalies of eye	4.43	0.71 - 14.98	0.0968	NC	NC	NC
744.0 Anomalies of ear causing impairment of hearing	1.44	0.77 - 2.44	0.2368	1.55	0.81 - 2.65	0.1687
744.2 Other specified anomalies of ear	1.35*	1.09 - 1.66	0.0074	1.36*	1.03 - 1.74	0.0295
744.3 Unspecified anomalies of ear	1.27	0.21 - 4.04	0.7445	1.29	0.25 - 3.85	0.7097
744.4 Branchial cleft, cyst, or fistula	0.67	0.17 - 1.75	0.4571	0.70	0.01 - 4.58	0.7823
744.8 Other specified anomalies of face and neck	0.65	0.28 - 1.27	0.2296	0.69	0.13 - 2.03	0.5504
744.9 Congenital anomaly of face, NOS	0.89	0.54 - 1.36	0.6022	0.94	0.56 - 1.46	0.8029
745.0 Common truncus	1.52	0.25 - 4.85	0.5834	1.64	0.51 - 3.86	0.3614
745.1 Transposition of great vessels	1.30	0.73 - 2.12	0.3557	1.32	0.77 - 2.08	0.2929
745.2 Tetralogy of Fallot	1.08	0.49 - 2.03	0.8341	1.13	0.19 - 3.54	0.8609
745.3 Single ventricle	1.84	0.45 - 4.92	0.3426	1.97	0.72 - 4.23	0.1655
745.4 Ventricular septal defect	0.87	0.70 - 1.07	0.1854	0.88	0.74 - 1.05	0.1658
745.5 Ostium secundum type atrial septal defect	0.89	0.76 - 1.03	0.1065	0.90	0.74 - 1.07	0.2442
745.6 Endocardial cushion defects	1.08	0.54 - 1.91	0.8124	1.12	0.58 - 1.93	0.7177
745.9 Unspecified defect of septal closure	25.48*	1.19 - 265.95	0.0414	NC	NC	NC
746.0 Anomalies of pulmonary valve	1.16	0.77 - 1.67	0.4664	1.19	0.62 - 2.07	0.5732

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

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	Ratio	95% CI	p-value	Ratio	95% CI	p-value
746.1 Anomalies of the tricuspid valve	1.02	0.40 - 2.09	0.9631	1.06	0.47 - 2.03	0.8696
746.2 Ebsteins anomaly	0.89	0.05 - 4.06	0.9101	0.90	0.14 - 2.92	0.8820
746.3 Congenital stenosis of aortic valve	1.04	0.37 - 2.26	0.9310	0.98	0.43 - 1.88	0.9543
746.4 Other anomalies of aortic valve	0.99	0.35 - 2.16	0.9850	0.96	0.46 - 1.76	0.9062
746.5 Congenital mitral stenosis	1.01	0.43 - 1.98	0.9720	1.02	0.22 - 2.88	0.9697
746.7 Hypoplastic left heart syndrome	1.45	0.57 - 2.98	0.3972	1.38	0.72 - 2.37	0.3043
746.8 Other specified anomalies of the heart	1.04	0.79 - 1.34	0.7700	1.08	0.78 - 1.45	0.6357
746.9 Unspecified anomalies of heart	0.25**	0.04 - 0.77	0.0112	0.25**	0.10 - 0.53	<.0001
747.0 Patent ductus arteriosus (PDA)	1.03	0.84 - 1.25	0.7502	1.07	0.83 - 1.36	0.5720
747.1 Coarctation of aorta	0.72	0.31 - 1.40	0.3605	0.69	0.34 - 1.23	0.2255
747.2 Other anomalies of aorta	1.02	0.64 - 1.53	0.9173	1.02	0.41 - 2.06	0.9597
747.3 Anomalies of pulmonary artery	0.62**	0.36 - 0.98	0.0409	0.66	0.24 - 1.42	0.3171
747.4 Anomalies of great veins	1.19	0.67 - 1.95	0.5251	1.24	0.76 - 1.89	0.3762
747.6 Other anomalies of peripheral vascular system	1.21	0.43 - 2.63	0.6855	1.20	0.47 - 2.48	0.6757
747.8 Other specified anomalies of circulatory system	1.76	0.10 - 8.21	0.6105	NC	NC	NC
748.0 Choanal atresia	1.53	0.47 - 3.63	0.4304	1.50	0.54 - 3.26	0.4003
748.1 Other anomalies of nose	0.94	0.15 - 2.94	0.9243	0.96	0.17 - 2.97	0.9564
748.3 Other anomalies of larynx, trachea, and bronchus	0.87	0.31 - 1.89	0.7576	0.87	0.41 - 1.61	0.6854
748.4 Congenital cystic lung	2.18	0.53 - 5.86	0.2371	2.06	0.72 - 4.59	0.1600
748.5 Agenesis, aplasia, hypoplasia, or dysplasia of lung	0.43	0.11 - 1.12	0.0898	0.44	0.12 - 1.09	0.0824
748.6 Other anomalies of lung	1.59	0.09 - 7.40	0.6693	1.73	0.30 - 5.41	0.4701
749.0 Cleft palate alone	0.95	0.51 - 1.60	0.8540	0.92	0.57 - 1.38	0.7010
749.1 Cleft lip with/without cleft palate	0.81	0.49 - 1.24	0.3474	0.79	0.40 - 1.38	0.4268
750.1 Other anomalies of tongue	0.85	0.34 - 1.74	0.6839	0.89	0.37 - 1.77	0.7573
750.2 Other specified anomalies of mouth and pharynx	0.85	0.42 - 1.50	0.6030	0.87	0.28 - 1.98	0.7632
750.3 T-E fistula, esophageal atresia and stenosis	1.19	0.47 - 2.45	0.6756	1.21	0.60 - 2.15	0.5738
750.5 Congenital hypertrophic pyloric stenosis	1.26	0.92 - 1.67	0.1412	1.09	0.80 - 1.44	0.5621

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

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	Ratio	95% CI	p-value	Ratio	95% CI	p-value
750.7 Other specified anomalies of stomach	0.72	0.04 - 3.24	0.7280	0.77	0.02 - 4.13	0.8138
751.0 Persistent omphalomesenteric/vitelline duct	2.83	0.16 - 13.71	0.3816	NC	NC	NC
751.1 Atresia and stenosis of small intestine	1.35	0.65 - 2.47	0.3929	1.32	0.75 - 2.13	0.3226
751.2 Atresia/stenosis of large intestine, rectum and anal canal	1.23	0.65 - 2.07	0.4999	1.15	0.67 - 1.82	0.5890
751.3 Hirschsprungs disease, other anomaly of the colon	2.26	0.96 - 4.46	0.0610	2.23	0.98 - 4.31	0.0557
751.4 Anomalies of intestinal fixation	1.16	0.58 - 2.06	0.6436	1.14	0.68 - 1.77	0.6020
751.5 Other anomalies of intestine	1.65	0.90 - 2.75	0.0986	1.69*	1.07 - 2.54	0.0269
751.6 Anomalies of gallbladder, bile ducts, and liver	1.80	0.71 - 3.71	0.1955	1.93	0.80 - 3.86	0.1292
751.7 Anomalies of pancreas	4.08*	1.23 - 9.98	0.0249	4.33*	1.80 - 8.76	0.0023
752.0 Anomalies of ovaries	1.32	0.32 - 3.49	0.6509	1.34	0.51 - 2.81	0.5173
752.3 Other anomalies of uterus	1.34	0.08 - 6.18	0.7819	1.32	0.33 - 3.49	0.6450
752.4 Anomaly of cervix, vagina, ext female genitalia	0.80	0.47 - 1.26	0.3568	0.89	0.57 - 1.31	0.5614
752.5 Undescended testicle	1.35*	1.02 - 1.74	0.0335	1.39*	1.00 - 1.87	0.0499
752.6 Hypospadias, epispadias, and congenital chordee	1.27*	1.04 - 1.53	0.0205	1.19	0.98 - 1.42	0.0728
752.7 Indeterminate sex and pseudohermaphroditism	2.19	0.67 - 5.24	0.1705	2.19	0.98 - 4.18	0.0561
752.8 Other specified anomalies of male genital organs	1.26	0.93 - 1.65	0.1263	1.25	0.95 - 1.61	0.1143
753.0 Renal agenesis and dysgenesis	0.73	0.35 - 1.32	0.3140	0.72	0.38 - 1.23	0.2495
753.1 Cystic kidney disease	1.65*	1.04 - 2.49	0.0354	1.67	0.94 - 2.72	0.0798
753.2 Obstructive defects of renal pelvis and ureter	0.86	0.67 - 1.09	0.2216	0.85	0.64 - 1.10	0.2143
753.3 Other specified anomalies of kidney	0.54	0.24 - 1.00	0.0502	0.54**	0.29 - 0.91	0.0179
753.4 Other specified anomalies of ureter	0.82	0.51 - 1.23	0.3533	0.76	0.42 - 1.24	0.2870
753.6 Atresia and stenosis of urethra and bladder neck	1.88	0.74 - 3.87	0.1681	1.83	0.84 - 3.43	0.1173
753.8 Other specified anomalies of bladder and urethra	1.04	0.41 - 2.12	0.9309	1.05	0.55 - 1.80	0.8698
754.0 Certain anomalies of skull, face, and jaw	1.19*	1.02 - 1.39	0.0312	1.19	0.95 - 1.48	0.1269
754.1 Anomalies of sternocleidomastoid muscle	2.22	0.36 - 7.16	0.3266	2.40	0.77 - 5.58	0.1166
754.2 Certain congenital musculoskeletal deform of spine	1.13	0.28 - 2.99	0.8343	1.06	0.16 - 3.45	0.9425
754.3 Congenital dislocation of hip	0.55	0.22 - 1.12	0.1044	0.53**	0.24 - 0.97	0.0402

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Crude Prevalence Ratio for Ellis County compared to remainder of PHR3			Adjusted Prevalence Ratio for Ellis County compared to remainder of PHR3		
	Ratio	95% CI	p-value	Ratio	95% CI	p-value
754.4 Congenital genu recurvatum, bowing of leg bones	0.81	0.29 - 1.76	0.6317	0.86	0.40 - 1.59	0.6525
754.5 Varus (inward) deformities of feet	0.79	0.46 - 1.25	0.3354	0.76	0.40 - 1.29	0.3334
754.6 Valgus (outward) deformities of feet	1.05	0.52 - 1.85	0.8826	1.01	0.62 - 1.54	0.9574
754.7 Other deformities of feet	1.01	0.70 - 1.41	0.9342	1.00	0.69 - 1.39	0.9900
754.8 Other specified congenital musculoskeletal deformities	0.82	0.50 - 1.27	0.3899	0.79	0.46 - 1.25	0.3261
755.0 Polydactyly	0.79	0.54 - 1.11	0.1815	0.89	0.65 - 1.18	0.4145
755.1 Syndactyly	0.92	0.54 - 1.46	0.7528	0.91	0.59 - 1.33	0.6286
755.2 Reduction defects of upper limb	0.95	0.45 - 1.72	0.8672	0.94	0.46 - 1.68	0.8493
755.3 Reduction defects of lower limb	1.64	0.70 - 3.23	0.2298	1.67	0.72 - 3.25	0.2089
755.4 Reduction defects, unspecified limb	25.48*	1.19 - 265.95	0.0414	NC	NC	NC
755.5 Other anomaly of upper limb, including shoulder girdle	0.99	0.57 - 1.59	0.9820	1.00	0.45 - 1.91	0.9914
755.6 Other anomaly of lower limb, including pelvic girdle	1.15	0.86 - 1.49	0.3421	1.14	0.93 - 1.39	0.2075
755.8 Other specified anomalies of unspecified limb	0.97	0.53 - 1.61	0.9216	0.98	0.65 - 1.40	0.9068
755.9 Unspecified anomalies of unspecified limb	4.25	0.23 - 21.56	0.2512	NC	NC	NC
756.0 Anomalies of skull and face bones	1.29*	1.01 - 1.61	0.0431	1.30	0.97 - 1.69	0.0774
756.1 Anomalies of spine	1.29	0.75 - 2.04	0.3332	1.33	0.82 - 2.03	0.2300
756.3 Other anomalies of ribs and sternum	1.33	0.68 - 2.29	0.3773	1.39	0.87 - 2.10	0.1586
756.4 Chondrodystrophy	1.14	0.28 - 3.01	0.8248	1.15	0.48 - 2.29	0.7210
756.6 Anomalies of diaphragm	0.69	0.25 - 1.50	0.3818	0.68	0.26 - 1.42	0.3289
756.7 Anomalies of abdominal wall	1.61	0.40 - 4.28	0.4502	1.73	0.73 - 3.42	0.1962
756.70 Omphalocele	0.65	0.16 - 1.69	0.4168	0.65	0.22 - 1.45	0.3206
756.71 Gastroschisis	1.33	0.71 - 2.25	0.3513	1.06	0.20 - 3.23	0.9288
756.8 Other spec anomaly of muscle, tendon, connective tissue	1.44*	1.13 - 1.81	0.0037	1.39*	1.07 - 1.77	0.0142
756.9 Unspecified anomalies of musculoskeletal system	10.19	0.53 - 63.21	0.1011	NC	NC	NC
757.3 Other specified anomalies of skin	1.23	0.82 - 1.78	0.3036	1.26	0.80 - 1.89	0.3025
757.4 Specified anomalies of hair	0.55	0.03 - 2.48	0.5159	0.60	0.08 - 2.04	0.4727
757.5 Specified anomalies of nails	0.45	0.14 - 1.06	0.0704	0.45	0.15 - 1.02	0.0551

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Birth Defect	Crude Prevalence Ratio for Ellis County compared to remainder of PHR3			Adjusted Prevalence Ratio for Ellis County compared to remainder of PHR3		
	Ratio	95% CI	p-value	Ratio	95% CI	p-value
757.6 Specified anomalies of breast	0.82	0.13 - 2.56	0.7673	0.79	0.15 - 2.38	0.7220
758.0 Down syndrome	1.24	0.88 - 1.70	0.2097	1.40*	1.04 - 1.83	0.0260
758.1 Patau syndrome	1.05	0.26 - 2.76	0.9374	1.18	0.29 - 3.14	0.7829
758.2 Edwards syndrome	0.64	0.20 - 1.50	0.3374	0.56	0.14 - 1.45	0.2642
758.3 Autosomal deletion syndromes	0.64	0.16 - 1.67	0.4025	0.65	0.25 - 1.34	0.2666
758.4 Balanced autosomal translocation in normal indl	2.04	0.11 - 9.61	0.5294	NC	NC	NC
758.5 Other conditions due to autosomal anomalies	0.98	0.39 - 2.01	0.9673	0.98	0.48 - 1.75	0.9567
758.6 Gonadal dysgenesis	0.33	0.02 - 1.46	0.1760	0.31**	0.11 - 0.65	0.0009
758.7 Klinefelter syndrome	1.50	0.08 - 6.94	0.7076	1.72	0.09 - 8.22	0.6331
758.8 Other conditions due to sex chromosome anomalies	1.80	0.44 - 4.80	0.3600	2.11	0.70 - 4.81	0.1635
758.9 Conditions due to anoma;u of unspecified chromosomes	2.68	0.15 - 12.92	0.4031	NC	NC	NC
759.0 Anomalies of spleen	0.87	0.22 - 2.30	0.8127	0.89	0.26 - 2.13	0.8115
759.1 Anomalies of adrenal gland	0.73	0.04 - 3.28	0.7398	0.75	0.08 - 2.79	0.7237
759.2 Anomalies of other endocrine glands	1.00	0.25 - 2.63	0.9991	1.02	0.14 - 3.40	0.9843
759.3 Situs inversus	1.34	0.41 - 3.17	0.5797	1.44	0.31 - 4.07	0.5885
759.8 Other specified anomalies and syndromes	0.96	0.48 - 1.70	0.9066	0.97	0.54 - 1.60	0.9239
759.9 Congenital anomaly, unspecified	0.93	0.05 - 4.21	0.9391	0.86	0.08 - 3.42	0.8650
888.8 Any monitored congenital anomaly	1.03	0.97 - 1.10	0.3419	1.02	0.94 - 1.10	0.6140

NOS—Not otherwise specified. -

NC—Not calculated, an APR was not able to be calculated by Poisson regression analysis because of non-convergent cells. -

* Significantly high at an alpha level 0.05, as determined by Poisson regression analysis.

** Significantly low at an alpha level of 0.05, as determined by Poisson regression analysis.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.r. Number of cases, crude prevalence per 10,000 live births, and crude prevalence ratio with 95% confidence intervals (CI) and p-values for birth defects with 1 or more cases with statistically significant findings in the Midlothian potential area of impact (AOI) compared to the remainder of Ellis County, Texas, 1999-2008. Data Source: TDSHS TBDES.

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Potential area of impact compared to remainder of Ellis County		
	Potential AOI	Remainder of Ellis County	Potential AOI	Remainder of Ellis County	Ratio	95% CI	p-value
743.1 Microphthalmos	<5	<5	NS	NS	14.92*	1.43-320.85	0.0257
743.5 Congenital anomalies of posterior segment	<5	NS	NS	NS	5.97*	1.48-22.55	0.0145
746.1 Anomalies of the tricuspid valve	<5	<5	NS	NS	7.46*	1.38-40.31	0.0220
750.5 Congenital hypertrophic pyloric stenosis	11	29	52.08	18.40	2.83*	1.35-5.50	0.0072
753.3 Other specified anomalies of kidney	<5	<5	NS	NS	7.46*	1.76-31.55	0.0082

NS—Not shown. For confidentiality, prevalence is suppressed when there are 1-4 reported cases.

* Significantly high at an alpha level 0.05, as determined by Poisson regression analysis.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.s. Number of cases, crude prevalence per 10,000 live births, and crude prevalence ratio with 95% confidence intervals (CI) and p-values for birth defects with 1 or more cases with statistically significant findings in the city of Midlothian compared to the remainder of Ellis County, Texas, 1999-2008. Data Source: TDSHS TBDES.

Birth Defect	Cases		Crude Prevalence (cases per 10,000 live births)		Crude Prevalence Ratio for Midlothian compared to remainder of Ellis County		
	Midlothian	Remainder of Ellis County	Midlothian	Remainder of Ellis County	Ratio	95% CI	p-value
228.0 Hemangioma	<5	NS	NS	NS	0.18**	0.01-0.82	0.0221
743.1 Microphthalmos	<5	<5	NS	NS	10.95*	1.05-235.46	0.0458
743.5 Congenital anomalies of posterior segment	<5	NS	NS	NS	4.38*	1.08-16.55	0.0391
746.1 Anomalies of the tricuspid valve	<5	<5	NS	NS	5.48*	1.01-29.58	0.0484
746.3 Congenital stenosis of aortic valve	<5	<5	NS	NS	8.21*	1.36-62.34	0.0233
750.3 T-E fistula, esophageal atresia and stenosis	<5	<5	NS	NS	5.48*	1.01-29.58	0.0484
752.6 Hypospadias, epispadias, and congenital chordee	24	80	78.82	47.98	1.64*	1.02-2.55	0.0419
753.3 Other specified anomalies of kidney	<5	<5	NS	NS	5.48*	1.29-23.15	0.0226

NS—Not shown. For confidentiality, prevalence is suppressed when there are 1-4 reported cases.

* Significantly high at an alpha level 0.05, as determined by Poisson regression analysis.

** Significantly low at an alpha level of 0.05, as determined by Poisson regression analysis.

Table A.4.1.t. Crude and adjusted prevalence ratios with 95% confidence intervals (CI) and p-values for birth defects with 1 or more cases in the Midlothian potential area of impact compared to the remainder of Ellis County, Texas, 1999-2008. Data Source: TDSHS TBDES.

Birth Defect	Cases		Crude Prevalence Ratio for Potential area of impact compared to remainder of Ellis County			Adjusted Prevalence Ratio for Potential area of impact compared to remainder of Ellis County		
	Potential AOI	Remainder of Ellis County	Ratio	95% CI	p-value	Ratio	95% CI	p-value
744.2 Other specified anomalies of ear	12	69	1.30	0.67 - 2.30	0.4194	1.16	0.59 - 2.08	0.6502
745.5 Ostium secundum type atrial septal defect	18	146	0.92	0.54 - 1.46	0.7352	0.85	0.52 - 1.33	0.5046
747.0 Patent ductus arteriosus (PDA)	10	92	0.81	0.40 - 1.48	0.5174	0.78	0.40 - 1.37	0.4017
752.5 Undescended testicle	6	45	0.99	0.38 - 2.16	0.9903	1.09	0.52 - 2.05	0.7959
752.8 Other specified anomalies of male genital organs	6	40	1.12	0.43 - 2.44	0.7999	0.91	0.41 - 1.77	0.7866
754.0 Certain anomalies of skull, face, and jaw	20	130	1.15	0.70 - 1.79	0.5726	0.97	0.65 - 1.40	0.8767
888.8 Any monitored congenital anomaly	120	792	1.13	0.93 - 1.36	0.2177	1.08	0.94 - 1.25	0.2771

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.1.u. Crude and adjusted prevalence ratios with 95% confidence intervals (CI) and p-values for birth defects with 1 or more cases in the city of Midlothian compared to the remainder of Ellis County, Texas, 1999-2008. Data Source: TDSHS TBDES.

Birth Defect	Cases		Crude Prevalence Ratio for Midlothian compared to remainder of Ellis County			Adjusted Prevalence Ratio for Midlothian compared to remainder of Ellis County		
	Midlothian	Remainder of Ellis County	Ratio	95% CI	p-value	Ratio	95% CI	p-value
744.2 Other specified anomalies of ear	18	71	1.39	0.80 - 2.27	0.2294	1.23	0.73 - 1.97	0.4189
745.5 Ostium secundum type atrial septal defect	25	147	0.93	0.60 - 1.40	0.7395	0.84	0.55 - 1.24	0.3953
747.0 Patent ductus arteriosus (PDA)	12	91	0.72	0.38 - 1.26	0.2689	0.68	0.36 - 1.17	0.1719
752.5 Undescended testicle	7	49	0.78	0.32 - 1.61	0.5307	0.87	0.43 - 1.60	0.6704
752.8 Other specified anomalies of male genital organs	6	43	0.76	0.29 - 1.66	0.5229	0.61	0.27 - 1.20	0.1603
754.0 Certain anomalies of skull, face, and jaw	27	135	1.10	0.71 - 1.63	0.6699	0.91	0.62 - 1.29	0.5991
888.8 Any monitored congenital anomaly	163	840	1.06	0.90 - 1.25	0.4821	1.01	0.89 - 1.16	0.8296

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.a Standardized Incidence Ratios (SIR) Males, Selected Cancers, 1999-2008 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3). SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR.

Site	ZIP Code 76065#		Ellis County		PHR 3	
	SIR	99% CI	SIR	99% CI	SIR	99% CI
Total Cancer	0.8**	0.7 – 0.9	0.9	0.9 – 1.0	1	1.0 – 1.0
Total Childhood Cancers (Age 0-19)	0.7	0.2 – 2.0	0.6	0.3 – 1.0	1	0.9 – 1.0
Total Childhood Leukemia (Age 0-19)	1	0.1 – 4.8	0.9	0.3 – 1.9	0.9	0.8 – 1.1
Oral Cavity & Pharynx	1	0.5 – 1.8	0.9	0.6 – 1.1	1	0.9 – 1.0
Esophagus	0.7	0.2 – 2.1	0.9	0.5 – 1.3	1	0.9 – 1.0
Stomach	0.3	0.0 – 1.4	1	0.7 – 1.5	1	0.9 – 1.0
Colon and Rectum	1	0.7 – 1.4	1.1	1.0 – 1.3	1	1.0 – 1.0
Pancreas	0.3	0.0 – 1.1	1.2	0.9 – 1.6	1	0.9 – 1.0
Liver & Intrahepatic Bile Duct	0.8	0.2 – 2.0	0.8	0.5 – 1.2	0.9	0.9 – 1.0
Larynx	1.3	0.5 – 3.0	0.7	0.4 – 1.1	1	0.9 – 1.0
Lung and Bronchus	1	0.8 – 1.4	1	0.9 – 1.2	1	1.0 – 1.0
Nose, Nasal Cavity & Middle Ear	0	0.0 – 6.1	1	0.2 – 3.0	0.9	0.8 – 1.1
Soft Tissue	1.2	0.2 – 3.9	0.8	0.4 – 1.5	1	0.9 – 1.1
Bones & Joints	0.8	0.0 – 6.1	1	0.3 – 2.5	1	0.9 – 1.2
Melanomas of the Skin†	0.8	0.4 – 1.5	0.7	0.5 – 1.0	0.9	0.9 – 1.0
Breast	2.2	0.1 – 10.0	0.9	0.2 – 2.7	1.1	0.9 – 1.3
Prostate	0.7**	0.5 – 0.9	0.9	0.8 – 1.0	1	1.0 – 1.0
Testis	0.3	0.0 – 1.5	0.6	0.3 – 1.1	0.9	0.9 – 1.0
Bladder	0.8	0.4 – 1.4	1	0.8 – 1.2	1	0.9 – 1.0
Kidney and Renal Pelvis	1.2	0.7 – 2.1	1.3	1.0 – 1.6	1	1.0 – 1.0
Malignant Brain & Other Nervous System‡	0.7	0.2 – 1.8	0.7	0.4 – 1.1	1	0.9 – 1.1
Thyroid	1.1	0.3 – 2.9	0.6	0.3 – 1.1	1	0.9 – 1.1
Myeloma	0.9	0.2 – 2.6	1	0.6 – 1.6	1.1	1.0 – 1.1
Hodgkin’s Lymphoma	1	0.1 – 3.5	1.2	0.7 – 2.1	1	0.9 – 1.1
Non-Hodgkin’s Lymphoma	0.5	0.2 – 1.1	0.9	0.7 – 1.1	1	1.0 – 1.1
Total Leukemia	0.8	0.3 – 1.6	1	0.7 – 1.3	1	0.9 – 1.0
Acute Lymphocytic Leukemia	0.5	0.0 – 3.7	0.8	0.3 – 1.7	0.9	0.8 – 1.0
Chronic Lymphocytic Leukemia	0.8	0.1 – 2.5	1	0.6 – 1.6	1	0.9 – 1.1
Acute Myeloid Leukemia	0.8	0.1 – 3.0	1.1	0.6 – 1.8	1	0.9 – 1.1
Chronic Myeloid Leukemia	1.1	0.1 – 5.1	0.8	0.3 – 1.9	0.9	0.8 – 1.0
Aleukemic, Subleukemic, & NOS	0	0.0 – 9.6	0.9	0.1 – 3.2	0.9	0.7 – 1.1

** Significantly lower than expected at the p< 0.01 level. -

NOS—Not otherwise specified. -

Based on the average of the 2000 and 2010 census population. -

†Melanomas are known to be under reported.

‡In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.b Standardized Incidence Ratios (SIR), Females, Selected Cancers, 1999-2008 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3). SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR.

Site	ZIP Code 76065 [#]		Ellis County		PHR 3	
	SIR	99% CI	SIR	99% CI	SIR	99% CI
Total Cancer	0.9	0.8–1.0	1	0.9–1.0	1	1.0–1.0
Total Childhood Cancers (Age 0-19)	1.5	0.5–3.3	1	0.6–1.5	1	0.9–1.1
Total Childhood Leukemia (Age 0-19)	1.3	0.1–6.1	1	0.4–2.3	1	0.9–1.1
Oral Cavity & Pharynx	1.1	0.3–2.8	1.1	0.7–1.6	1	0.9–1.1
Esophagus	0.7	0.0–5.2	0.4	0.1–1.3	1	0.9–1.1
Stomach	0.6	0.0–2.8	0.9	0.5–1.6	1	0.9–1.1
Colon and Rectum	1.1	0.7–1.7	1.2	1.0–1.4	1	1.0–1.0
Pancreas	0.8	0.2–2.0	1.2	0.8–1.6	1	1.0–1.1
Liver & Intrahepatic Bile Duct	1.3	0.2–4.2	1.2	0.7–2.0	1.1	1.0–1.1
Larynx	0.6	0.0–4.8	1	0.3–2.2	1.1	0.9–1.2
Lung and Bronchus	0.9	0.6–1.3	1.1	0.9–1.2	1	1.0–1.1
Nose, Nasal Cavity & Middle Ear	2	0.0–14.8	0.6	0.0–3.0	0.9	0.7–1.1
Soft Tissue	0.4	0.0–3.1	1	0.5–2.0	1.1	1.0–1.2
Bones & Joints	2	0.1–9.1	1.5	0.5–3.4	1	0.9–1.2
Melanomas of the Skin[†]	1	0.4–1.9	0.8	0.5–1.1	0.9**	0.9–0.9
Breast	0.9	0.7–1.1	0.9	0.8–1.0	1	1.0–1.0
Corpus & Uterus	0.7	0.3–1.4	1.1	0.8–1.4	1	1.0–1.0
Cervix	0.9	0.3–2.0	1	0.7–1.4	0.9	0.9–1.0
Ovary	1	0.4–2.0	1	0.7–1.3	1	1.0–1.1
Bladder	0.9	0.2–2.3	0.8	0.5–1.2	1	1.0–1.1
Kidney and Renal Pelvis	0.9	0.3–2.0	1.1	0.8–1.5	1	1.0–1.1
Malignant Brain & Other Nervous System[‡]	0.9	0.2–2.4	1	0.6–1.5	1	1.0–1.1
Thyroid	0.6	0.2–1.3	0.7	0.5–1.0	0.9**	0.8–0.9
Myeloma	1.2	0.3–3.4	0.8	0.4–1.3	1	1.0–1.1
Hodgkin’s Lymphoma	1.7	0.3–5.4	0.9	0.4–1.8	1	0.9–1.1
Non-Hodgkin’s Lymphoma	1	0.5–1.9	1.2	1.0–1.6	1	1.0–1.1
Total Leukemia	1	0.4–2.2	0.9	0.6–1.3	1	0.9–1.0
Acute Lymphocytic Leukemia	2	0.2–7.4	1.2	0.5–2.6	1	0.9–1.1
Chronic Lymphocytic Leukemia	0.3	0.0–2.4	1	0.6–1.8	1	0.9–1.1
Acute Myeloid Leukemia	1.7	0.4–4.8	0.6	0.2–1.3	1	0.9–1.1
Chronic Myeloid Leukemia	0.8	0.0–5.9	0.9	0.3–2.1	0.9	0.8–1.0
Aleukemic, Subleukemic, & NOS	0	0.0–12.4	1.6	0.4–4.6	0.9	0.7–1.1

** Significantly lower than expected at the p< 0.01 level.

Based on the average of the 2000 and 2010 census population.

† Melanomas are known to be under reported.

‡ In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.c Number of Observed and Expected Male Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Midlothian Zip Code 76065#, 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR.

Site	Males--Midlothian ZIP code 76065#			
	Observed	Expected	SIR	99% CI
Total Cancer	380	460.2	0.8**	0.7–0.9
Total Childhood Cancers (Age 0-19)	5	7.3	0.7	0.2–2.0
Total Childhood Leukemia (Age 0-19)	<5	NS	1	0.1–4.8
Oral Cavity & Pharynx	17	17.4	1	0.5–1.8
Esophagus	5	6.9	0.7	0.2–2.1
Stomach	<5	NS	0.3	0.0–1.4
Colon and Rectum	45	45.7	1	0.7–1.4
Pancreas	<5	NS	0.3	0.0–1.1
Liver & Intrahepatic Bile Duct	7	8.6	0.8	0.2–2.0
Larynx	9	6.7	1.3	0.5–3.0
Lung and Bronchus	74	72	1	0.8–1.4
Nose, Nasal Cavity & Middle Ear	0	0.9	0	0.0–6.1
Soft Tissue	<5	NS	1.2	0.2–3.9
Bones & Joints	<5	NS	0.8	0.0–6.1
Melanomas of the Skin†	17	20.2	0.8	0.4–1.5
Breast	<5	NS	2.2	0.1–10.0
Prostate	89	123.4	0.7**	0.5–0.9
Testis	<5	NS	0.3	0.0–1.5
Bladder	19	24.2	0.8	0.4–1.4
Kidney and Renal Pelvis	24	19.3	1.2	0.7–2.1
Malignant Brain & Other Nervous System‡	6	8.7	0.7	0.2–1.8
Thyroid	6	5.3	1.1	0.3–2.9
Myeloma	5	5.5	0.9	0.2–2.6
Hodgkin’s Lymphoma	<5	NS	1	0.1–3.5
Non-Hodgkin’s Lymphoma	10	19.9	0.5	0.2–1.1
Total Leukemia	11	14.6	0.8	0.3–1.6
Acute Lymphocytic Leukemia	<5	NS	0.5	0.0–3.7
Chronic Lymphocytic Leukemia	<5	NS	0.8	0.1–2.5
Acute Myeloid Leukemia	<5	NS	0.8	0.1–3.0
Chronic Myeloid Leukemia	<5	NS	1.1	0.1–5.1
Aleukemic, Subleukemic, & NOS	0	0.6	0	0.0–9.6

** Significantly lower than expected at the p< 0.01 level. -

NS—Not shown. For confidentiality, observed and expected number of cases is suppressed when there are 1-4 observed cases. -

Based on the average of the 2000 and 2010 census population. -

†Melanomas are known to be under reported.

‡In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.d Number of Observed and Expected Female Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Midlothian Zip Code 76065[#], 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR.

Site	Females--Midlothian ZIP code 76065 [#]			
	Observed	Expected	SIR	99% CI
Total Cancer	363	397.3	0.9	0.8–1.0
Total Childhood Cancers (Age 0-19)	9	6.1	1.5	0.5–3.3
Total Childhood Leukemia (Age 0-19)	<5	NS	1.3	0.1–6.1
Oral Cavity & Pharynx	7	6.1	1.1	0.3–2.8
Esophagus	<5	NS	0.7	0.0–5.2
Stomach	<5	NS	0.6	0.0–2.8
Colon and Rectum	40	35.6	1.1	0.7–1.7
Pancreas	6	7.9	0.8	0.2–2.0
Liver & Intrahepatic Bile Duct	<5	NS	1.3	0.2–4.2
Larynx	<5	NS	0.6	0.0–4.8
Lung and Bronchus	44	50.9	0.9	0.6–1.3
Nose, Nasal Cavity & Middle Ear	<5	NS	2	0.0–14.8
Soft Tissue	<5	NS	0.4	0.0–3.1
Bones & Joints	<5	NS	2	0.1–9.1
Melanomas of the Skin[†]	13	13.8	1	0.4–1.9
Breast	117	129.3	0.9	0.7–1.1
Corpus & Uterus	14	19.6	0.7	0.3–1.4
Cervix	9	9.9	0.9	0.3–2.0
Ovary	13	12.9	1	0.4–2.0
Bladder	6	6.8	0.9	0.2–2.3
Kidney and Renal Pelvis	10	10.9	0.9	0.3–2.0
Malignant Brain & Other Nervous System[‡]	6	6.6	0.9	0.2–2.4
Thyroid	9	15.2	0.6	0.2–1.3
Myeloma	5	4.2	1.2	0.3–3.4
Hodgkin’s Lymphoma	<5	NS	1.7	0.3–5.4
Non-Hodgkin’s Lymphoma	16	15.4	1	0.5–1.9
Total Leukemia	10	10	1	0.4–2.2
Acute Lymphocytic Leukemia	<5	NS	2	0.2–7.4
Chronic Lymphocytic Leukemia	<5	NS	0.3	0.0–2.4
Acute Myeloid Leukemia	5	2.9	1.7	0.4–4.8
Chronic Myeloid Leukemia	<5	NS	0.8	0.0–5.9
Aleukemic, Subleukemic, & NOS	0	0.4	0	0.0–12.4

NS—Not shown. For confidentiality, observed and expected number of cases is suppressed when there are 1-4 observed cases.

[#] Based on the average of the 2000 and 2010 census population.

[†] Melanomas are known to be under reported.

[‡] In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Table A.4.2.e Number of Observed and Expected Male Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Ellis County, TX, 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR.

Site	Males--Ellis County, TX			
	Observed	Expected	SIR	99% CI
Total Cancer	2,477	2,629.60	0.9	0.9 – 1.0
Total Childhood Cancers (Age 0-19)	23	39.4	0.6	0.3 – 1.0
Total Childhood Leukemia (Age 0-19)	10	11.1	0.9	0.3 – 1.9
Oral Cavity & Pharynx	78	91.6	0.9	0.6 – 1.1
Esophagus	33	38.8	0.9	0.5 – 1.3
Stomach	43	41.5	1	0.7 – 1.5
Colon and Rectum	297	269	1.1	1.0 – 1.3
Pancreas	71	58.8	1.2	0.9 – 1.6
Liver & Intrahepatic Bile Duct	42	51.9	0.8	0.5 – 1.2
Larynx	26	38.5	0.7	0.4 – 1.1
Lung and Bronchus	424	418.4	1	0.9 – 1.2
Nose, Nasal Cavity & Middle Ear	5	4.8	1	0.2 – 3.0
Soft Tissue	15	18.4	0.8	0.4 – 1.5
Bones & Joints	7	6.9	1	0.3 – 2.5
Melanomas of the Skin[†]	73	102.1	0.7	0.5 – 1.0
Breast	5	5.3	0.9	0.2 – 2.7
Prostate	613	706.3	0.9	0.8 – 1.0
Testis	21	32.8	0.6	0.3 – 1.1
Bladder	138	138.3	1	0.8 – 1.2
Kidney and Renal Pelvis	137	108.7	1.3	1.0 – 1.6
Malignant Brain & Other Nervous System[‡]	33	46.1	0.7	0.4 – 1.1
Thyroid	17	27.6	0.6	0.3 – 1.1
Myeloma	35	34.5	1	0.6 – 1.6
Hodgkin’s Lymphoma	21	17.1	1.2	0.7 – 2.1
Non-Hodgkin’s Lymphoma	96	111.3	0.9	0.7 – 1.1
Total Leukemia	82	84.4	1	0.7 – 1.3
Acute Lymphocytic Leukemia	9	11.7	0.8	0.3 – 1.7
Chronic Lymphocytic Leukemia	29	29.2	1	0.6 – 1.6
Acute Myeloid Leukemia	23	21.2	1.1	0.6 – 1.8
Chronic Myeloid Leukemia	9	10.7	0.8	0.3 – 1.9
Aleukemic, Subleukemic, & NOS	<5	NS	0.9	0.1 – 3.2

NS—Not shown. For confidentiality, observed and expected number of cases is suppressed when there are 1-4 observed cases.

[†]Melanomas are known to be under reported.

[‡]In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.f Number of Observed and Expected Female Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Ellis County, TX, 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR.

Site	Females--Ellis County, TX			
	Observed	Expected	SIR	99% CI
Total Cancer	2,361	2,389.40	1	0.9–1.0
Total Childhood Cancers (Age 0-19)	33	33	1	0.6–1.5
Total Childhood Leukemia (Age 0-19)	9	8.7	1	0.4–2.3
Oral Cavity & Pharynx	38	35.9	1.1	0.7–1.6
Esophagus	<5	NS	0.4	0.1–1.3
Stomach	23	24.8	0.9	0.5–1.6
Colon and Rectum	281	235.9	1.2	1.0–1.4
Pancreas	65	55.3	1.2	0.8–1.6
Liver & Intrahepatic Bile Duct	25	20.2	1.2	0.7–2.0
Larynx	9	9.1	1	0.3–2.2
Lung and Bronchus	337	315.3	1.1	0.9–1.2
Nose, Nasal Cavity & Middle Ear	<5	NS	0.6	0.0–3.0
Soft Tissue	15	14.4	1	0.5–2.0
Bones & Joints	9	5.8	1.5	0.5–3.4
Melanomas of the Skin[†]	55	71.1	0.8	0.5–1.1
Breast	679	737.4	0.9	0.8–1.0
Corpus & Uterus	122	114.1	1.1	0.8–1.4
Cervix	55	57	1	0.7–1.4
Ovary	74	76	1	0.7–1.3
Bladder	34	44.1	0.8	0.5–1.2
Kidney and Renal Pelvis	75	67.5	1.1	0.8–1.5
Malignant Brain & Other Nervous System[‡]	37	37	1	0.6–1.5
Thyroid	59	80.6	0.7	0.5–1.0
Myeloma	23	29.1	0.8	0.4–1.3
Hodgkin’s Lymphoma	12	13.4	0.9	0.4–1.8
Non-Hodgkin’s Lymphoma	118	94.9	1.2	1.0–1.6
Total Leukemia	57	63.4	0.9	0.6–1.3
Acute Lymphocytic Leukemia	11	8.9	1.2	0.5–2.6
Chronic Lymphocytic Leukemia	21	20.2	1	0.6–1.8
Acute Myeloid Leukemia	11	18	0.6	0.2–1.3
Chronic Myeloid Leukemia	7	8.1	0.9	0.3–2.1
Aleukemic, Subleukemic, & NOS	5	3.1	1.6	0.4–4.6

NS—Not shown. For confidentiality, observed and expected number of cases is suppressed when there are 1-4 observed cases.

[†]Melanomas are known to be under reported.

[‡]In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.g Number of Observed and Expected Male Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Public Health Region 3, TX, 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR.

Site	Males--Public Health Region 3			
	Observed	Expected	SIR	99% CI
Total Cancer	109,794	113,300.80	1	1.0 – 1.0
Total Childhood Cancers (Age 0-19)	1,684	1,742.70	1	0.9 – 1.0
Total Childhood Leukemia (Age 0-19)	475	509.7	0.9	0.8 – 1.1
Oral Cavity & Pharynx	3,696	3,878.50	1	0.9 – 1.0
Esophagus	1,556	1,641.8	1	0.9 – 1.0
Stomach	1,834	1,897.20	1	0.9 – 1.0
Colon and Rectum	11,396	11,663.80	1	1.0 – 1.0
Pancreas	2,480	2,530.30	1	0.9 – 1.0
Liver & Intrahepatic Bile Duct	2,243	2,415.90	0.9	0.9 – 1.0
Larynx	1,574	1,649.20	1	0.9 – 1.0
Lung and Bronchus	17,507	17,855.70	1	1.0 – 1.0
Nose, Nasal Cavity & Middle Ear	192	206.9	0.9	0.8 – 1.1
Soft Tissue	854	836.9	1	0.9 – 1.1
Bones & Joints	313	310.3	1	0.9 – 1.2
Melanomas of the Skin[†]	3,807	4,156.70	0.9	0.9 – 1.0
Breast	252	231.7	1.1	0.9 – 1.3
Prostate	28,971	30,105.90	1	1.0 – 1.0
Testis	1,488	1,592.80	0.9	0.9 – 1.0
Bladder	5,587	5,787.20	1	0.9 – 1.0
Kidney and Renal Pelvis	4,626	4,682.40	1	1.0 – 1.0
Malignant Brain & Other Nervous System[‡]	2,019	2,019.30	1	0.9 – 1.1
Thyroid	1,199	1,227.10	1	0.9 – 1.1
Myeloma	1,600	1,524.50	1.1	1.0 – 1.1
Hodgkin’s Lymphoma	818	803.9	1	0.9 – 1.1
Non-Hodgkin’s Lymphoma	4,947	4,848.30	1	1.0 – 1.1
Total Leukemia	3,553	3,696.60	1	0.9 – 1.0
Acute Lymphocytic Leukemia	519	557.3	0.9	0.8 – 1.0
Chronic Lymphocytic Leukemia	1,228	1,223.80	1	0.9 – 1.1
Acute Myeloid Leukemia	916	931.9	1	0.9 – 1.1
Chronic Myeloid Leukemia	419	477	0.9	0.8 – 1.0
Aleukemic, Subleukemic, & NOS	131	151.4	0.9	0.7 – 1.1

[†]Melanomas are known to be under reported.

[‡]In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.h Number of Observed and Expected Female Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Public Health Region 3, TX, 1999–2008. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1999–2008 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR.

Site	Females--Public Health Region 3			
	Observed	Expected	SIR	99% CI
Total Cancer	106,039	105,467.20	1	1.0 – 1.0
Total Childhood Cancers (Age 0-19)	1,442	1,463.90	1	0.9 – 1.1
Total Childhood Leukemia (Age 0-19)	406	405.8	1	0.9 – 1.1
Oral Cavity & Pharynx	1,565	1,572.70	1	0.9 – 1.1
Esophagus	423	433.1	1	0.9 – 1.1
Stomach	1,176	1,168.60	1	0.9 – 1.1
Colon and Rectum	10,638	10,465.00	1	1.0 – 1.0
Pancreas	2,518	2,441.00	1	1.0 – 1.1
Liver & Intrahepatic Bile Duct	988	944.2	1.1	1.0 – 1.1
Larynx	422	396.9	1.1	0.9 – 1.2
Lung and Bronchus	14,006	13,603.60	1	1.0 – 1.1
Nose, Nasal Cavity & Middle Ear	124	137.9	0.9	0.7 – 1.1
Soft Tissue	700	662.7	1.1	1.0 – 1.2
Bones & Joints	275	267.2	1	0.9 – 1.2
Melanomas of the Skin[†]	2,623	2,934.60	0.9**	0.9 – 0.9
Breast	33,311	32,489.50	1	1.0 – 1.0
Corpus & Uterus	5,060	5,023.70	1	1.0 – 1.0
Cervix	2,498	2,728.00	0.9	0.9 – 1.0
Ovary	3,370	3,353.00	1	1.0 – 1.1
Bladder	1,960	1,892.10	1	1.0 – 1.1
Kidney and Renal Pelvis	3,090	2,985.50	1	1.0 – 1.1
Malignant Brain & Other Nervous System[‡]	1,657	1,629.70	1	1.0 – 1.1
Thyroid	3,249	3,734.20	0.9**	0.8 – 0.9
Myeloma	1,372	1,317.60	1	1.0 – 1.1
Hodgkin's Lymphoma	623	630.2	1	0.9 – 1.1
Non-Hodgkin's Lymphoma	4,309	4,174.80	1	1.0 – 1.1
Total Leukemia	2,705	2,816.20	1	0.9 – 1.0
Acute Lymphocytic Leukemia	422	419.6	1	0.9 – 1.1
Chronic Lymphocytic Leukemia	851	863.3	1	0.9 – 1.1
Acute Myeloid Leukemia	778	802.6	1	0.9 – 1.1
Chronic Myeloid Leukemia	322	366.3	0.9	0.8 – 1.0
Aleukemic, Subleukemic, & NOS	118	137.2	0.9	0.7 – 1.1

** Significantly lower than expected at the p< 0.01 level.

[†]Melanomas are known to be under reported.

[‡]In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.i Number of Observed and Expected Male Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Midlothian Zip Code 76065[#], 2000–2009. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 2000–2009 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR.

Site	Males--Midlothian ZIP code 76065 [#]			
	Observed	Expected	SIR	99% CI
Total Cancer	425	463.9	0.9	0.8 – 1.0
Total Childhood Cancers (Age 0-19)	5	7.3	0.7	0.2 – 1.9
Total Childhood Leukemia (Age 0-19)	<5	NS	1.5	0.2 – 5.6
Oral Cavity & Pharynx	19	17.9	1.1	0.5 – 1.9
Esophagus	<5	NS	0.6	0.1 – 1.8
Stomach	<5	NS	0.3	0.0 – 1.4
Colon and Rectum	59	45.4	1.3	0.9 – 1.8
Pancreas	5	10.1	0.5	0.1 – 1.4
Liver & Intrahepatic Bile Duct	8	9.3	0.9	0.3 – 2.0
Larynx	8	6.7	1.2	0.4 – 2.8
Lung and Bronchus	72	71.2	1	0.7 – 1.4
Nose, Nasal Cavity & Middle Ear	0	0.9	0	0.0 – 6.0
Soft Tissue	5	3.4	1.5	0.3 – 4.2
Bones & Joints	<5	NS	0.8	0.0 – 6.1
Melanomas of the Skin[†]	19	20.7	0.9	0.5 – 1.6
Breast	<5	NS	2.1	0.1 – 9.7
Prostate	101	122.6	0.8	0.6 – 1.1
Testis	<5	NS	0.3	0.0 – 1.5
Bladder	22	24.5	0.9	0.5 – 1.5
Kidney and Renal Pelvis	26	20.1	1.3	0.7 – 2.1
Malignant Brain & Other Nervous System[‡]	6	8.8	0.7	0.2 – 1.8
Thyroid	6	5.7	1.1	0.3 – 2.7
Myeloma	6	5.7	1.1	0.3 – 2.8
Hodgkin’s Lymphoma	<5	NS	1	0.1 – 3.5
Non-Hodgkin’s Lymphoma	14	20	0.7	0.3 – 1.3
Total Leukemia	11	14.8	0.7	0.3 – 1.5
Acute Lymphocytic Leukemia	<5	NS	1	0.1 – 4.6
Chronic Lymphocytic Leukemia	<5	NS	0.4	0.0 – 1.8
Acute Myeloid Leukemia	<5	NS	0.8	0.1 – 3.0
Chronic Myeloid Leukemia	<5	NS	1.1	0.1 – 5.0
Aleukemic, Subleukemic, & NOS	0	0.6	0	0.0 – 8.6

NS—Not shown. For confidentiality, observed and expected number of cases is suppressed when there are 1-4 observed cases.

[#] Based on the average of the 2000 and 2010 census population.

[†]Melanomas are known to be under reported.

[‡]In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.j Number of Observed and Expected Female Cancer Cases and Adjusted Standardized Incidence Ratios (SIR), Selected Cancers, Midlothian Zip Code 76065[#], 2000-2009. SIR based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 2000–2009 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR.

Site	Females--Midlothian ZIP code 76065 [#]			
	Observed	Expected	SIR	99% CI
Total Cancer	384	402.1	1	0.8–1.1
Total Childhood Cancers (Age 0-19)	11	6.2	1.8	0.7–3.7
Total Childhood Leukemia (Age 0-19)	<5	NS	1.9	0.2–7.0
Oral Cavity & Pharynx	7	6.2	1.1	0.3–2.8
Esophagus	<5	NS	0.7	0.0–5.1
Stomach	<5	NS	0.6	0.0–2.8
Colon and Rectum	37	35.1	1.1	0.7–1.6
Pancreas	<5	NS	0.5	0.1–1.6
Liver & Intrahepatic Bile Duct	5	3.2	1.6	0.3–4.5
Larynx	<5	NS	0.7	0.0–4.8
Lung and Bronchus	45	51.1	0.9	0.6–1.3
Nose, Nasal Cavity & Middle Ear	<5	NS	1.9	0.0–14.5
Soft Tissue	<5	NS	0.8	0.0–3.9
Bones & Joints	<5	NS	2	0.1–9.1
Melanomas of the Skin[†]	13	14.2	0.9	0.4–1.8
Breast	126	129.7	1	0.8–1.2
Corpus & Uterus	18	19.9	0.9	0.5–1.6
Cervix	8	9.8	0.8	0.3–1.9
Ovary	15	13	1.2	0.5–2.2
Bladder	7	6.8	1	0.3–2.5
Kidney and Renal Pelvis	11	11.5	1	0.4–2.0
Malignant Brain & Other Nervous System[‡]	6	6.7	0.9	0.2–2.4
Thyroid	12	16.4	0.7	0.3–1.5
Myeloma	6	4.2	1.4	0.4–3.7
Hodgkin’s Lymphoma	<5	NS	1.3	0.1–4.6
Non-Hodgkin’s Lymphoma	18	15.6	1.2	0.6–2.1
Total Leukemia	12	10.2	1.2	0.5–2.4
Acute Lymphocytic Leukemia	<5	NS	2	0.2–7.2
Chronic Lymphocytic Leukemia	<5	NS	0.6	0.0–3.0
Acute Myeloid Leukemia	6	3	2	0.5–5.3
Chronic Myeloid Leukemia	<5	NS	0.8	0.0–5.8
Aleukemic, Subleukemic, & NOS	0	0.5	0	0.0–11.0

NS—Not shown. For confidentiality, observed and expected number of cases is suppressed when there are 1-4 observed cases.

[#] Based on the average of the 2000 and 2010 census population.

[†] Melanomas are known to be under reported.

[‡] In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.k Observed number of cancer cases in the potential area of impact, Midlothian ZIP code 76065, and Ellis County, TX, Select cancers, male and female combined, 1999-2008. Data source: TDSHS TCR.

Site	Area of Impact	ZIP 76065	Ellis County
Total Cancer	635	743	4,838
Total Childhood Cancers (Age 0-19)	14	14	56
Total Childhood Leukemia (Age 0-19)	<5	<5	19
Oral Cavity & Pharynx	15	24	116
Esophagus	<5	6	37
Stomach	<5	<5	66
Colon and Rectum	70	85	578
Pancreas	7	9	136
Liver & Intrahepatic Bile Duct	8	11	67
Larynx	9	10	35
Lung and Bronchus	100	118	761
Nose, Nasal Cavity & Middle Ear	<5	<5	7
Soft Tissue	<5	5	30
Bones & Joints	<5	<5	16
Breast	112	119	684
Prostate	66	89	613
Testis	<5	<5	21
Corpus & Uterus	12	14	122
Cervix	6	9	55
Ovary	11	13	74
Bladder	22	25	172
Kidney and Renal Pelvis	29	34	212
Malignant Brain & Other Nervous System[‡]	8	12	70
Thyroid	11	15	76
Myeloma	7	10	58
Hodgkin's Lymphoma	6	7	33
Non-Hodgkin's Lymphoma	21	26	214
Total Leukemia[¶]	18	21	139

Note: for confidentiality, observed number of cases is suppressed for 1-4 cases.

[‡]In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

[¶]Total Leukemia includes the 5 leukemia sub-types (acute lymphocytic, chronic lymphocytic, acute myeloid, chronic myeloid, and aleukemic, subleukemic and not otherwise specified (NOS)) for adults and children, combined.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.1 Standardized Mortality Ratios (SMR), Males, Selected Cancers, 2000-2009 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3). SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR and TCHS.

Site	ZIP Code 76065#		Ellis County		PHR 3	
	SMR	99% CI	SMR	99% CI	SMR	99% CI
Total Cancer	0.9	0.8 – 1.2	1.1	1.0 – 1.1	1	1.0 – 1.0
Total Childhood Cancers (Age 0-19)	1.8	0.1 – 8.1	0.6	0.1 – 1.9	0.9	0.8 – 1.0
Total Childhood Leukemia (Age 0-19)	3.1	0.0 – 23.0	0.5	0.0 – 3.9	0.8	0.6 – 1.1
Oral Cavity & Pharynx	1.4	0.3 – 3.8	1	0.5 – 1.6	0.9	0.8 – 1.0
Esophagus	1.2	0.4 – 3.0	0.9	0.5 – 1.4	1	0.9 – 1.0
Stomach	0.3	0.0 – 2.2	0.9	0.5 – 1.5	0.9	0.9 – 1.0
Colon and Rectum	0.8	0.3 – 1.6	1.1	0.9 – 1.4	1	0.9 – 1.0
Pancreas	0.2	0.0 – 1.1	1.3	1.0 – 1.8	1	1.0 – 1.1
Liver & Intrahepatic Bile Duct	1	0.3 – 2.5	0.8	0.5 – 1.3	0.9	0.9 – 1.0
Larynx	0.6	0.0 – 4.2	1	0.4 – 2.0	0.9	0.8 – 1.1
Lung and Bronchus	1.1	0.7 – 1.5	1.1	0.9 – 1.2	1	1.0 – 1.0
Nose, Nasal Cavity & Middle Ear	0	0.0 – 27.5	1.7	0.1 – 7.9	1	0.6 – 1.4
Soft Tissue	0.8	0.0 – 5.8	1.1	0.4 – 2.5	1	0.9 – 1.2
Bones & Joints	1.8	0.0 – 13.2	1.4	0.3 – 4.1	1	0.8 – 1.2
Melanomas of the Skin	1.8	0.5 – 4.4	0.9	0.5 – 1.6	1	0.9 – 1.1
Breast	0	0.0 – 31.3	0.9	0.0 – 6.5	0.9	0.6 – 1.3
Prostate	0.5	0.1 – 1.4	0.9	0.7 – 1.2	1	1.0 – 1.0
Testis	0	0.0 – 19.4	0	0.0 – 3.2	0.8	0.5 – 1.0
Bladder	0.5	0.0 – 2.2	0.7	0.4 – 1.3	1	1.0 – 1.1
Kidney and Renal Pelvis	1.5	0.5 – 3.5	1.5	1.0 – 2.1	1	0.9 – 1.1
Malignant Brain & Other Nervous System†	1.1	0.3 – 2.8	0.8	0.5 – 1.3	1	0.9 – 1.1
Thyroid	0	0.0 – 13.9	0	0.0 – 2.3	1.1	0.9 – 1.4
Myeloma	1.4	0.2 – 4.4	1.3	0.7 – 2.1	1.1	1.0 – 1.2
Hodgkin’s Lymphoma	4.2	0.2 – 19.6	1.1	0.1 – 3.9	1.1	0.9 – 1.4
Non-Hodgkin’s Lymphoma	0.8	0.2 – 2.3	1	0.6 – 1.5	1	0.9 – 1.1
Total Leukemia	0.9	0.2 – 2.3	1.1	0.8 – 1.6	0.9	0.9 – 1.0
Acute Lymphocytic Leukemia	0	0.0 – 9.3	1.4	0.3 – 3.9	0.9	0.7 – 1.1
Chronic Lymphocytic Leukemia	0	0.0 – 4.2	1.1	0.4 – 2.4	1	0.9 – 1.2
Acute Myeloid Leukemia	0.7	0.0 – 3.4	1.2	0.6 – 2.1	1	0.9 – 1.1
Chronic Myeloid Leukemia	2.4	0.0 – 17.8	1.1	0.1 – 4.0	0.9	0.7 – 1.2
Aleukemic, Subleukemic, & NOS	1	0.0 – 7.3	0.4	0.1 – 1.6	0.7**	0.6 – 0.9

** Significantly lower than expected at the p< 0.01 level. -

NOS—Not otherwise specified. -

Based on the average of the 2000 and 2010 census population. -

‡ In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.m Standardized Mortality Ratios (SMR), Females, Selected Cancers, 2000-2009 for Midlothian ZIP code 76065, Ellis County, and Public Health Region 3 (PHR 3). SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR and TCHS.

Site	ZIP Code 76065 [#]		Ellis County		PHR 3	
	SMR	99% CI	SIR	99% CI	SMR	99% CI
Total Cancer	1.1	0.8 – 1.3	1.1	1.0 – 1.2	1	1.0 – 1.0
Total Childhood Cancers (Age 0-19)	1.1	0.0 – 8.0	1.5	0.5 – 3.5	1	0.8 – 1.2
Total Childhood Leukemia (Age 0-19)	0	0.0 – 20.9	2.7	0.5 – 8.4	1.1	0.8 – 1.5
Oral Cavity & Pharynx	0.7	0.0 – 5.5	0.8	0.2 – 1.9	1	0.9 – 1.2
Esophagus	1.6	0.1 – 7.5	0.6	0.1 – 1.6	1	0.8 – 1.1
Stomach	0.5	0.0 – 3.9	1	0.4 – 1.8	1	0.9 – 1.1
Colon and Rectum	1	0.4 – 2.1	1.2	1.0 – 1.6	1	1.0 – 1.1
Pancreas	0.9	0.2 – 2.3	1.3	0.9 – 1.8	1	1.0 – 1.1
Liver & Intrahepatic Bile Duct	1.7	0.4 – 4.9	1.1	0.6 – 1.8	1	0.9 – 1.1
Larynx	0	0.0 – 13.3	0.8	0.0 – 3.5	1	0.8 – 1.2
Lung and Bronchus	1	0.7 – 1.6	1.1	1.0 – 1.3	1	1.0 – 1.0
Nose, Nasal Cavity & Middle Ear	0	0.0 – 52.6	0	0.0 – 6.8	0.8	0.5 – 1.3
Soft Tissue	1	0.0 – 7.3	1	0.3 – 2.5	1	0.8 – 1.1
Bones & Joints	2.5	0.0 – 18.5	1.1	0.1 – 4.1	1	0.7 – 1.2
Melanomas of the Skin	1.5	0.2 – 5.6	1.7	0.9 – 3.0	1.1	0.9 – 1.2
Breast	1.1	0.6 – 1.8	0.9	0.7 – 1.2	1	1.0 – 1.0
Corpus & Uterus	1.1	0.5 – 2.1	1	0.5 – 1.7	1.1	1.0 – 1.1
Cervix	1.4	0.2 – 4.3	1.1	0.6 – 1.9	0.9	0.8 – 1.0
Ovary	1.1	0.4 – 2.5	1	0.7 – 1.5	1	0.7 – 1.5
Bladder	2	0.2 – 7.3	1.2	0.6 – 2.3	1	0.9 – 1.1
Kidney and Renal Pelvis	1.5	0.3 – 4.7	1.4	0.8 – 2.3	1	0.9 – 1.1
Malignant Brain & Other Nervous System[‡]	0.8	0.1 – 2.8	1.1	0.6 – 1.8	1	1.0 – 1.1
Thyroid	0	0.0 – 13.8	0	0.0 – 1.9	0.9	0.7 – 1.1
Myeloma	0.9	0.1 – 4.2	0.9	0.4 – 1.6	1	1.0 – 1.1
Hodgkin’s Lymphoma	3	0.0 – 22.3	1.4	0.2 – 5.0	0.9	0.7 – 1.2
Non-Hodgkin’s Lymphoma	0.7	0.1 – 2.4	1.4	0.9 – 2.0	1	1.0 – 1.1
Total Leukemia	1.9	0.7 – 4.2	1.1	0.7 – 1.7	1	0.9 – 1.1
Acute Lymphocytic Leukemia	0	0.0 – 12.0	1.1	0.1 – 3.8	1	0.8 – 1.3
Chronic Lymphocytic Leukemia	4.3	0.5 – 15.7	1.9	0.7 – 3.8	1.1	0.9 – 1.3
Acute Myeloid Leukemia	2.5	0.5 – 7.1	0.8	0.3 – 1.8	1	0.9 – 1.1
Chronic Myeloid Leukemia	0	0.0 – 20.4	1	0.1 – 4.8	1	0.7 – 1.3
Aleukemic, Subleukemic, & NOS	1.5	0.0 – 10.9	0.9	0.2 – 2.6	0.9	0.8 – 1.1

NOS—Not otherwise specified. -

[#] Based on the average of the 2000 and 2010 census population. -

[‡] In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.n Number of Observed and Expected Male Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Midlothian Zip Code 76065#, 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR and TCHS.

Site	Males--Midlothian ZIP code 76065#			
	Observed	Expected	SMR	99% CI
Total Cancer	153	163.3	0.9	0.8 – 1.2
Total Childhood Cancers (Age 0-19)	<5	NS	1.8	0.1 – 8.1
Total Childhood Leukemia (Age 0-19)	<5	NS	3.1	0.0 – 23.0
Oral Cavity & Pharynx	5	3.7	1.4	0.3 – 3.8
Esophagus	7	5.7	1.2	0.4 – 3.0
Stomach	<5	NS	0.3	0.0 – 2.2
Colon and Rectum	12	15	0.8	0.3 – 1.6
Pancreas	<5	NS	0.2	0.0 – 1.1
Liver & Intrahepatic Bile Duct	7	7	1	0.3 – 2.5
Larynx	<5	NS	0.6	0.0 – 4.2
Lung and Bronchus	57	53.9	1.1	0.7 – 1.5
Nose, Nasal Cavity & Middle Ear	0	0.2	0	0.0 – 27.5
Soft Tissue	<5	NS	0.8	0.0 – 5.8
Bones & Joints	<5	NS	1.8	0.0 – 13.2
Melanomas of the Skin	7	3.9	1.8	0.5 – 4.4
Breast	0	0.2	0	0.0 – 31.3
Prostate	6	11	0.5	0.1 – 1.4
Testis	0	0.3	0	0.0 – 19.4
Bladder	<5	NS	0.5	0.0 – 2.2
Kidney and Renal Pelvis	8	5.3	1.5	0.5 – 3.5
Malignant Brain & Other Nervous System†	6	5.5	1.1	0.3 – 2.8
Thyroid	0	0.4	0	0.0 – 13.9
Myeloma	<5	NS	1.4	0.2 – 4.4
Hodgkin’s Lymphoma	<5	NS	4.2	0.2 – 19.6
Non-Hodgkin’s Lymphoma	5	6.1	0.8	0.2 – 2.3
Total Leukemia	6	6.9	0.9	0.2 – 2.3
Acute Lymphocytic Leukemia	0	0.6	0	0.0 – 9.3
Chronic Lymphocytic Leukemia	0	1.3	0	0.0 – 4.2
Acute Myeloid Leukemia	<5	NS	0.7	0.0 – 3.4
Chronic Myeloid Leukemia	<5	NS	2.4	0.0 – 17.8
Aleukemic, Subleukemic, & NOS	<5	NS	1	0.0 – 7.3

NS—Not shown. For confidentiality, observed and expected number of deaths is suppressed when there are 1-4 observed deaths. -NOS

—Not otherwise specified. -

Based on the average of the 2000 and 2010 census population. -

‡In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.o Number of Observed and Expected Female Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Midlothian Zip Code 76065[#], 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR and TCHS.

Site	Females--Midlothian ZIP code 76065 [#]			
	Observed	Expected	SMR	99% CI
Total Cancer	141	133.9	1.1	0.8 – 1.3
Total Childhood Cancers (Age 0-19)	<5	NS	1.1	0.0 – 8.0
Total Childhood Leukemia (Age 0-19)	0	0.3	0	0.0 – 20.9
Oral Cavity & Pharynx	<5	NS	0.7	0.0 – 5.5
Esophagus	<5	NS	1.6	0.1 – 7.5
Stomach	<5	NS	0.5	0.0 – 3.9
Colon and Rectum	12	11.7	1	0.4 – 2.1
Pancreas	6	6.9	0.9	0.2 – 2.3
Liver & Intrahepatic Bile Duct	5	2.9	1.7	0.4 – 4.9
Larynx	0	0.4	0	0.0 – 13.3
Lung and Bronchus	38	36.6	1	0.7 – 1.6
Nose, Nasal Cavity & Middle Ear	0	0.1	0	0.0 – 52.6
Soft Tissue	<5	NS	1	0.0 – 7.3
Bones & Joints	<5	NS	2.5	0.0 – 18.5
Melanomas of the Skin	<5	NS	1.5	0.2 – 5.6
Breast	24	22.2	1.1	0.6 – 1.8
Corpus & Uterus	14	12.9	1.1	0.5 – 2.1
Cervix	<5	NS	1.4	0.2 – 4.3
Ovary	8	7.4	1.1	0.4 – 2.5
Bladder	<5	NS	2	0.2 – 7.3
Kidney and Renal Pelvis	<5	NS	1.5	0.3 – 4.7
Malignant Brain & Other Nervous System[‡]	<5	NS	0.8	0.1 – 2.8
Thyroid	0	0.4	0	0.0 – 13.8
Myeloma	<5	NS	0.9	0.1 – 4.2
Hodgkin’s Lymphoma	<5	NS	3	0.0 – 22.3
Non-Hodgkin’s Lymphoma	<5	NS	0.7	0.1 – 2.4
Total Leukemia	9	4.7	1.9	0.7 – 4.2
Acute Lymphocytic Leukemia	0	0.4	0	0.0 – 12.0
Chronic Lymphocytic Leukemia	<5	NS	4.3	0.5 – 15.7
Acute Myeloid Leukemia	5	2	2.5	0.5 – 7.1
Chronic Myeloid Leukemia	0	0.3	0	0.0 – 20.4
Aleukemic, Subleukemic, & NOS	<5	NS	1.5	0.0 – 10.9

NS—Not shown. For confidentiality, observed and expected number of deaths is suppressed when there are 1-4 observed deaths. -NOS

—Not otherwise specified. -

[#] Based on the average of the 2000 and 2010 census population. -

[‡]In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.p Number of Observed and Expected Male Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Ellis County, Texas, 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR and TCHS.

Site	Males—Ellis County, TX			
	Observed	Expected	SMR	99% CI
Total Cancer	1,102	1,046.40	1.1	1.0 – 1.1
Total Childhood Cancers (Age 0-19)	<5	NS	0.6	0.1 – 1.9
Total Childhood Leukemia (Age 0-19)	<5	NS	0.5	0.0 – 3.9
Oral Cavity & Pharynx	21	22	1	0.5 – 1.6
Esophagus	29	34.2	0.9	0.5 – 1.4
Stomach	21	23.8	0.9	0.5 – 1.5
Colon and Rectum	111	98.1	1.1	0.9 – 1.4
Pancreas	75	56	1.3	1.0 – 1.8
Liver & Intrahepatic Bile Duct	38	45.3	0.8	0.5 – 1.3
Larynx	11	11.5	1	0.4 – 2.0
Lung and Bronchus	361	335.1	1.1	0.9 – 1.2
Nose, Nasal Cavity & Middle Ear	<5	NS	1.7	0.1 – 7.9
Soft Tissue	9	7.9	1.1	0.4 – 2.5
Bones & Joints	5	3.5	1.4	0.3 – 4.1
Melanomas of the Skin	20	21.3	0.9	0.5 – 1.6
Breast	<5	NS	0.9	0.0 – 6.5
Prostate	83	88.2	0.9	0.7 – 1.2
Testis	0	1.6	0	0.0 – 3.2
Bladder	20	27.8	0.7	0.4 – 1.3
Kidney and Renal Pelvis	48	32.8	1.5	1.0 – 2.1
Malignant Brain & Other Nervous System[‡]	25	30.7	0.8	0.5 – 1.3
Thyroid	0	2.3	0	0.0 – 2.3
Myeloma	25	19.4	1.3	0.7 – 2.1
Hodgkin’s Lymphoma	<5	NS	1.1	0.1 – 3.9
Non-Hodgkin’s Lymphoma	38	38.6	1	0.6 – 1.5
Total Leukemia	50	44.7	1.1	0.8 – 1.6
Acute Lymphocytic Leukemia	5	3.6	1.4	0.3 – 3.9
Chronic Lymphocytic Leukemia	9	8.4	1.1	0.4 – 2.4
Acute Myeloid Leukemia	20	16.9	1.2	0.6 – 2.1
Chronic Myeloid Leukemia	<5	NS	1.1	0.1 – 4.0
Aleukemic, Subleukemic, & NOS	<5	NS	0.4	0.1 – 1.6

NS—Not shown. For confidentiality, observed and expected number of deaths is suppressed when there are 1-4 observed deaths. NOS—Not otherwise specified.

‡In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Table A.4.2.q Number of Observed and Expected Female Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Ellis County, Texas, 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR and TCHS.

Site	Females—Ellis County, TX			
	Observed	Expected	SMR	99% CI
Total Cancer	999	929.6	1.1	1.0 – 1.2
Total Childhood Cancers (Age 0-19)	8	5.3	1.5	0.5 – 3.5
Total Childhood Leukemia (Age 0-19)	<5	NS	2.7	0.5 – 8.4
Oral Cavity & Pharynx	7	9.2	0.8	0.2 – 1.9
Esophagus	5	8.8	0.6	0.1 – 1.6
Stomach	15	15.8	1	0.4 – 1.8
Colon and Rectum	109	88.3	1.2	1.0 – 1.6
Pancreas	67	51.9	1.3	0.9 – 1.8
Liver & Intrahepatic Bile Duct	24	21.8	1.1	0.6 – 1.8
Larynx	<5	NS	0.8	0.0 – 3.5
Lung and Bronchus	274	243	1.1	1.0 – 1.3
Nose, Nasal Cavity & Middle Ear	0	0.8	0	0.0 – 6.8
Soft Tissue	7	6.8	1	0.3 – 2.5
Bones & Joints	<5	NS	1.1	0.1 – 4.1
Melanomas of the Skin	20	11.6	1.7	0.9 – 3.0
Breast	137	148.4	0.9	0.7 – 1.2
Corpus & Uterus	21	21.4	1	0.5 – 1.7
Cervix	20	18.5	1.1	0.6 – 1.9
Ovary	50	49	1	0.7 – 1.5
Bladder	15	12.3	1.2	0.6 – 2.3
Kidney and Renal Pelvis	27	18.9	1.4	0.8 – 2.3
Malignant Brain & Other Nervous System[‡]	27	24.1	1.1	0.6 – 1.8
Thyroid	0	2.8	0	0.0 – 1.9
Myeloma	15	17.3	0.9	0.4 – 1.6
Hodgkin’s Lymphoma	<5	NS	1.4	0.2 – 5.0
Non-Hodgkin’s Lymphoma	45	33.3	1.4	0.9 – 2.0
Total Leukemia	37	33.8	1.1	0.7 – 1.7
Acute Lymphocytic Leukemia	<5	NS	1.1	0.1 – 3.8
Chronic Lymphocytic Leukemia	11	5.9	1.9	0.7 – 3.8
Acute Myeloid Leukemia	11	13	0.8	0.3 – 1.8
Chronic Myeloid Leukemia	<5	NS	1	0.1 – 4.8
Aleukemic, Subleukemic, & NOS	5	5.5	0.9	0.2 – 2.6

NS—Not shown. For confidentiality, observed and expected number of deaths is suppressed when there are 1-4 observed deaths. NOS—Not otherwise specified.

‡In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.r Number of Observed and Expected Male Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Public Health Region 3, Texas, 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR and TCHS.

Site	Males—Public Health Region 3, TX			
	Observed	Expected	SMR	99% CI
Total Cancer	42,953	44,477.00	1	1.0 – 1.0
Total Childhood Cancers (Age 0-19)	255	288.2	0.9	0.8 – 1.0
Total Childhood Leukemia (Age 0-19)	69	83.5	0.8	0.6 – 1.1
Oral Cavity & Pharynx	829	937.6	0.9	0.8 – 1.0
Esophagus	1,388	1,427.10	1	0.9 – 1.0
Stomach	996	1,071.60	0.9	0.9 – 1.0
Colon and Rectum	4,084	4,199.40	1	0.9 – 1.0
Pancreas	2,367	2,372.90	1	1.0 – 1.1
Liver & Intrahepatic Bile Duct	1,848	2,036.80	0.9	0.9 – 1.0
Larynx	462	491	0.9	0.8 – 1.1
Lung and Bronchus	13,644	14,085.90	1	1.0 – 1.0
Nose, Nasal Cavity & Middle Ear	48	49.7	1	0.6 – 1.4
Soft Tissue	353	345.8	1	0.9 – 1.2
Bones & Joints	151	155.5	1	0.8 – 1.2
Melanomas of the Skin	861	856.3	1	0.9 – 1.1
Breast	46	49.7	0.9	0.6 – 1.3
Prostate	3,735	3,767.30	1	1.0 – 1.0
Testis	60	79.7	0.8	0.5 – 1.0
Bladder	1,188	1,161.00	1	1.0 – 1.1
Kidney and Renal Pelvis	1,343	1,374.30	1	0.9 – 1.1
Malignant Brain & Other Nervous System[‡]	1,262	1,282.80	1	0.9 – 1.1
Thyroid	136	125.4	1.1	0.9 – 1.4
Myeloma	878	831.9	1.1	1.0 – 1.2
Hodgkin’s Lymphoma	136	125.4	1.1	0.9 – 1.4
Non-Hodgkin’s Lymphoma	1,630	1,649.20	1	0.9 – 1.1
Total Leukemia	1,789	1,920.70	0.9	0.9 – 1.0
Acute Lymphocytic Leukemia	146	165.8	0.9	0.7 – 1.1
Chronic Lymphocytic Leukemia	358	352.8	1	0.9 – 1.2
Acute Myeloid Leukemia	709	721.9	1	0.9 – 1.1
Chronic Myeloid Leukemia	113	120.8	0.9	0.7 – 1.2
Aleukemic, Subleukemic, & NOS	211	295.3	0.7**	0.6 – 0.9

** Significantly lower than expected at the p< 0.01 level.

NOS—Not otherwise specified.

‡In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Table A.4.2.s Number of Observed and Expected Female Cancer Deaths and Adjusted Standardized Mortality Ratios (SMR), Selected Cancers, Public Health Region 3, Texas, 2000-2009. SMR based on race-, sex-, and age-specific cancer mortality rates for Texas during the period 2000-2009 rounded to the first decimal place with 99% confidence intervals. Data source: TDSHS TCR and TCHS.

Site	Females—Public Health Region 3, TX			
	Observed	Expected	SMR	99% CI
Total Cancer	40,402	40,253.30	1	1.0 – 1.0
Total Childhood Cancers (Age 0-19)	231	231.6	1	0.8 – 1.2
Total Childhood Leukemia (Age 0-19)	71	66	1.1	0.8 – 1.5
Oral Cavity & Pharynx	409	396.5	1	0.9 – 1.2
Esophagus	370	381.5	1	0.8 – 1.1
Stomach	726	722.9	1	0.9 – 1.1
Colon and Rectum	3,960	3,844.50	1	1.0 – 1.1
Pancreas	2,335	2,247.60	1	1.0 – 1.1
Liver & Intrahepatic Bile Duct	943	979	1	0.9 – 1.1
Larynx	113	115.8	1	0.8 – 1.2
Lung and Bronchus	10,471	10,343.00	1	1.0 – 1.0
Nose, Nasal Cavity & Middle Ear	28	35	0.8	0.5 – 1.3
Soft Tissue	294	304.2	1	0.8 – 1.1
Bones & Joints	107	114.8	1	0.7 – 1.2
Melanomas of the Skin	496	473.1	1.1	0.9 – 1.2
Breast	6,401	6,503.00	1	1.0 – 1.0
Corpus & Uterus	996	948.1	1.1	1.0 – 1.1
Cervix	763	848.6	0.9	0.8 – 1.0
Ovary	50	49	1	0.7 – 1.5
Bladder	528	526.4	1	0.9 – 1.1
Kidney and Renal Pelvis	815	808.5	1	0.9 – 1.1
Malignant Brain & Other Nervous System[‡]	1,050	1,017.90	1	1.0 – 1.1
Thyroid	113	125.4	0.9	0.7 – 1.1
Myeloma	794	762.3	1	1.0 – 1.1
Hodgkin’s Lymphoma	92	98	0.9	0.7 – 1.2
Non-Hodgkin’s Lymphoma	1,467	1,426.10	1	1.0 – 1.1
Total Leukemia	1,472	1,464.50	1	0.9 – 1.1
Acute Lymphocytic Leukemia	135	129.6	1	0.8 – 1.3
Chronic Lymphocytic Leukemia	278	252.4	1.1	0.9 – 1.3
Acute Myeloid Leukemia	555	564.2	1	0.9 – 1.1
Chronic Myeloid Leukemia	82	86.2	1	0.7 – 1.3
Aleukemic, Subleukemic, & NOS	220	239.4	0.9	0.8 – 1.1

NOS—Not otherwise specified.

[‡]In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.2.t Number of Observed Cancer Deaths (ranked by number of observed deaths in Midlothian ZIP code 76065), in Midlothian ZIP code 76065, Ellis County, and Public Health Region 3, Texas, Select cancers, male and female combined, 2000-2009 Data source: TDSHS TCR and TCHS.

Site	ZIP Code 76065		Ellis County		PHR 3	
	Rank	Observed	Rank	Observed	Rank	Observed
Total Cancer		294		2,101		83,355
Total Childhood Cancers (Age 0-19)		<5		12		486
Total Childhood Leukemia (Age 0-19)		<5		5		140
Lung and Bronchus	1	95	1	635	1	24,115
Colon and Rectum	2	24	2	220	2	8,044
Breast	2	24	4	138	3	6,447
Total Leukemia¶	4	15	5	87	6	3,261
Corpus & Uterus	5	14	18	21	17	996
Kidney and Renal Pelvis	6	12	8	75	10	2,158
Liver & Intrahepatic Bile Duct	6	12	9	62	8	2,791
Melanomas of the Skin	8	10	12	40	15	1,357
Malignant Brain & Other Nervous System‡	9	9	10	52	9	2,312
Esophagus	9	9	16	34	11	1,758
Pancreas	11	8	3	142	4	4,702
Non-Hodgkin’s Lymphoma	11	8	6	83	7	3,097
Ovary	11	8	11	50	26	50
Prostate	14	6	6	83	5	3,735
Myeloma	14	6	12	40	14	1,672
Oral Cavity & Pharynx	14	6	17	28	16	1,238
Bladder	17	5	15	35	13	1,716
Stomach	NS	<5	14	36	12	1,722
Cervix	NS	<5	19	20	18	763
Soft Tissue	NS	<5	20	16	19	647
Larynx	NS	<5	21	13	20	575
Bones & Joints	NS	<5	22	8	21	258
Hodgkin’s Lymphoma	NS	<5	23	6	23	228
Nose, Nasal Cavity & Middle Ear	NA	0	24	2	24	76
Thyroid	NA	0	NA	0	22	249
Testis	NA	0	NA	0	25	60

Note: for confidentiality, observed number of deaths is suppressed for 1-4 deaths. -

NS—Not shown. The order of the sites for these unranked cancers in ZIP code 76065 reflects the ranking order of these sites in Ellis County and -does not suggest a number of cases. For confidentiality, observed number of deaths is suppressed when there are 1-4 observed deaths. -

NA—Not applicable. -

‡ In 2004, TDSHS required reporting of benign and malignant brain tumors, the table includes only diagnoses of malignant brain tumors.

¶ Total Leukemia includes the 5 leukemia sub-types (acute lymphocytic, chronic lymphocytic, acute myeloid, chronic myeloid, and aleukemic, subleukemic and not otherwise specified (NOS)) for adults and children, combined.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.a Cause of Death with description and underlying ICD-10 codes for the 33 leading causes of death in Texas.

Cause of Death	Cause of Death (COD) description	ICD-10 Underlying Cause of Death Codes
Heart Disease	Heart diseases	I00-I09, I11, I13, I20-I51
Cancer	Malignant neoplasms	C00-C97
Stroke	Cerebrovascular diseases	I60-I69
Accidents	Accidents (unintentional injuries)	V01-X59, Y85-Y86
COPD/Asthma	Chronic bronchitis, emphysema, COPD, asthma, pneumoconioses	J40-J67
Diabetes	Diabetes mellitus	E10-E14
Alzheimer's Disease	Alzheimer's disease	G30
Senility/Dementia	Senility and dementia, unspecified	F03, R54
Flu/Pneumonia	Influenza and pneumonia	J09-J18
Liver Disease	Cirrhosis, alcoholic, and other liver disease & failure	K70-K75, K751-K769
GI Tract Disorders	Gastrointestinal tract disorders	K20-K60, K62-K69, K80-K92
Kidney Disease	Nephritis, nephrotic syndrome and nephrosis	N00-N07, N17-N19, N25-N27
Other Infectious Disease	Infectious disease (residual)	A00-A39, A42-B19, B25-B99, G00-G06, J36-J37, J390, J391, J85, K61, K750, L00-L09, M00, M86, M462, M726, N10-N12, N136, N151, N390
Septicemia	Septicemia	A40-A41
Suicide	Intentional self-harm (suicide)	U03, X60-X84, Y870
Vascular Disease	Vascular diseases: atherosclerosis, aneurysm, phlebitis, thrombosis, varices	I70-I87
Birth Defect/Infant Mortality	Birth defects, congenital malformations, & other causes of perinatal & infant mortality	P00-P99, Q00-Q99, R95
Neurologic Disorders	Neurologic, CNS, & neurodegenerative disorders	G08-G19, G230-G29, G31-G98, R568
Respiratory Disease	Respiratory arrest, acute/chronic, upper/lower respiratory tract disease	J384-J389, J392-J399, J70-J84, J86-J94, J96-J97, J980-J989, R090, R092
Nutrition/Metabolic Disorders	Over/under nutrition, vitamin deficiencies, metabolic disorders, hypovolemia, acidosis	E40-E89
Homicide	Assault (homicide)	U01-U02, X85-Y09, Y871
Hypertension	Essential hypertension and hypertensive renal disease	I10, I12, I15
Parkinson's Disease	Parkinson's disease	G20-G21
Chemical Pneumonitis	Pneumonitis due to solids, liquids, gases, fumes, vapors	J680-J698
HIV Disease	Human immunodeficiency virus (HIV) Disease	B20-B24
Psychiatric/Drug Disorders	Behavioral, psychological, psychiatric, drug & alcohol-induced disorders	F01-F02, F04-F69
Blood/Endocrine Disorders	Anemia, coagulopathy, DIC, endocrine disorders, immunodeficiency, purpura	D50-E09, E15-E39
Benign Tumors	Benign neoplasms, carcinoma in situ, & neoplasms of uncertain behavior	D00-D49
Autoimmune Disease	Rheumatoid arthritis, SLE, systemic sclerosis, PMDM, & other autoimmune disease	M023-M359
Muscle/Bone Disorders	Musculoskeletal disorders	M40-M725, M727-M85, M87-M98
Genitourinary Disorders	Genitourinary disorders, kidney & bladder calculi, and breast disorders	N130-N135, N137-N150, N159-N169, N20-N250, N280-N390, N398-N96
Skin Disorders	Skin disorders	L10-L99
All Other Causes	All other causes of death (residual)	(residual)

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.b Number of deaths, percentage of total deaths, and crude mortality rates per 100,000 population for all causes and the 33 leading causes of death, for males, females and combined, in ZIP code 76065, Texas, 1999-2010. Data source: TDSHS CHS.

Cause of Death	Number of deaths, 1999-2010			Percentage of Total Deaths			Crude Mortality per 100,000		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
All Causes	715	691	1,406	100.00%	100.00%	100.00%	525.17	504.76	514.94
Heart Disease	188	163	351	26.29%	23.59%	24.96%	138.09	119.07	128.55
Cancer	176	167	343	24.62%	24.17%	24.40%	129.27	121.99	125.62
Stroke	42	51	93	5.87%	7.38%	6.61%	30.85	37.25	34.06
Accidents	48	24	72	6.71%	3.47%	5.12%	35.26	17.53	26.37
COPD/Asthma	35	49	84	4.90%	7.09%	5.97%	25.71	35.79	30.76
Diabetes	26	13	39	3.64%	1.88%	2.77%	19.10	9.50	14.28
Alzheimer's Disease	11	35	46	1.54%	5.07%	3.27%	8.08	25.57	16.85
Senility/Dementia	11	27	38	1.54%	3.91%	2.70%	8.08	19.72	13.92
Flu/Pneumonia	11	10	21	1.54%	1.45%	1.49%	8.08	7.30	7.69
Liver Disease	14	6	20	1.96%	0.87%	1.42%	10.28	4.38	7.32
GI Tract Disorders	14	18	32	1.96%	2.60%	2.28%	10.28	13.15	11.72
Kidney Disease	13	8	21	1.82%	1.16%	1.49%	9.55	5.84	7.69
Other Infectious Disease	9	14	23	1.26%	2.03%	1.64%	6.61	10.23	8.42
Septicemia	9	5	14	1.26%	0.72%	1.00%	6.61	3.65	5.13
Suicide	14	5	19	1.96%	0.72%	1.35%	10.28	3.65	6.96
Vascular Disease	6	9	15	0.84%	1.30%	1.07%	4.41	6.57	5.49
Birth Def/Inf Mortality	12	14	26	1.68%	2.03%	1.85%	8.81	10.23	9.52
Neurologic Disorders	11	9	20	1.54%	1.30%	1.42%	8.08	6.57	7.32
Respiratory Disease	9	9	18	1.26%	1.30%	1.28%	6.61	6.57	6.59
Nutrition/Metabolic D/O	5	12	17	0.70%	1.74%	1.21%	3.67	8.77	6.23
Homicide	10	<5	NS	1.40%	NS	NS	7.35	NS	NS
Hypertension	<5	8	NS	NS	1.16%	NS	NS	5.84	NS
Parkinson's Disease	7	7	14	0.98%	1.01%	1.00%	5.14	5.11	5.13
Chemical Pneumonitis	7	<5	NS	0.98%	NS	NS	5.14	NS	NS
HIV Disease	6	0	6	0.84%	0.00%	0.43%	4.41	0.00	2.20
Psychiatric/Drug D/O	6	<5	NS	0.84%	NS	NS	4.41	NS	NS
Blood/Endocrine D/O	<5	6	NS	NS	0.87%	NS	NS	4.38	3.66
Benign Tumors	<5	<5	<5	NS	NS	NS	NS	NS	NS
Autoimmune Disease	0	<5	<5	0.00%	NS	NS	0.00	NS	NS
Muscle/Bone Disorders	0	<5	<5	0.00%	NS	NS	0.00	NS	NS
Genitourinary Disorders	<5	0	<5	NS	0.00%	NS	NS	0.00	NS
Skin Disorders	<5	0	<5	NS	0.00%	NS	NS	0.00	NS
All Other Causes	5	5	10	0.70%	0.72%	0.71%	3.67	3.65	3.66

COPD – chronic obstructive pulmonary disease; Inf – infant; D/O – disorder -
 NS—Not shown. For confidentiality, number of deaths is suppressed when there are 1-4 deaths. -

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.c Number of deaths, percentage of total deaths, and crude mortality rates per 100,000 population for all causes and the 33 leading causes of death, for males, females and combined, in Ellis County, Texas, 1999-2010.
Data source: TDSHS CHS.

Cause of Death	Number of Deaths, 1999-2010			Percentage of Total Deaths			Crude Mortality per 100,000		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
All Causes	5,602	5,810	11,412	100.00%	100.00%	100.00%	707.83	734.23	721.03
Heart Disease	1,485	1,489	2,974	26.51%	25.63%	26.06%	187.63	188.17	187.90
Cancer	1,352	1,227	2,579	24.13%	21.12%	22.60%	170.83	155.06	162.95
Stroke	290	421	711	5.18%	7.25%	6.23%	36.64	53.20	44.92
Accidents	376	212	588	6.71%	3.65%	5.15%	47.51	26.79	37.15
COPD/Asthma	289	331	620	5.16%	5.70%	5.43%	36.52	41.83	39.17
Diabetes	186	157	343	3.32%	2.70%	3.01%	23.50	19.84	21.67
Alzheimer's Disease	126	362	488	2.25%	6.23%	4.28%	15.92	45.75	30.83
Senility/Dementia	106	245	351	1.89%	4.22%	3.08%	13.39	30.96	22.18
Flu/Pneumonia	120	127	247	2.14%	2.19%	2.16%	15.16	16.05	15.61
Liver Disease	100	64	164	1.79%	1.10%	1.44%	12.64	8.09	10.36
GI Tract Disorders	93	131	224	1.66%	2.25%	1.96%	11.75	16.55	14.15
Kidney Disease	84	90	174	1.50%	1.55%	1.52%	10.61	11.37	10.99
Other Infectious Disease	80	103	183	1.43%	1.77%	1.60%	10.11	13.02	11.56
Septicemia	66	86	152	1.18%	1.48%	1.33%	8.34	10.87	9.60
Suicide	124	37	161	2.21%	0.64%	1.41%	15.67	4.68	10.17
Vascular Disease	78	86	164	1.39%	1.48%	1.44%	9.86	10.87	10.36
Birth Def/Inf Mortality	75	86	161	1.34%	1.48%	1.41%	9.48	10.87	10.17
Neurologic Disorders	86	71	157	1.54%	1.22%	1.38%	10.87	8.97	9.92
Respiratory Disease	50	63	113	0.89%	1.08%	0.99%	6.32	7.96	7.14
Nutrition/Metabolic D/O	56	64	120	1.00%	1.10%	1.05%	7.08	8.09	7.58
Homicide	62	17	79	1.11%	0.29%	0.69%	7.83	2.15	4.99
Hypertension	30	71	101	0.54%	1.22%	0.89%	3.79	8.97	6.38
Parkinson's Disease	46	42	88	0.82%	0.72%	0.77%	5.81	5.31	5.56
Chemical Pneumonitis	47	40	87	0.84%	0.69%	0.76%	5.94	5.05	5.50
HIV Disease	34	9	43	0.61%	0.15%	0.38%	4.30	1.14	2.72
Psychiatric/Drug D/O	31	23	54	0.55%	0.40%	0.47%	3.92	2.91	3.41
Blood/Endocrine D/O	26	28	54	0.46%	0.48%	0.47%	3.29	3.54	3.41
Benign Tumors	23	24	47	0.41%	0.41%	0.41%	2.91	3.03	2.97
Autoimmune Disease	9	32	41	0.16%	0.55%	0.36%	1.14	4.04	2.59
Muscle/Bone Disorders	<5	13	NS	NS	0.22%	NS	NS	1.64	NS
Genitourinary Disorders	9	<5	NS	0.16%	NS	NS	1.14	NS	NS
Skin Disorders	5	<5	NS	0.09%	NS	NS	0.63	NS	NS
All Other Causes	54	52	106	0.96%	0.90%	0.93%	6.82	6.57	6.70

COPD – chronic obstructive pulmonary disease; Inf – infant; D/O – disorder -
NS—Not shown. For confidentiality, number of deaths is suppressed when there are 1-4 deaths. -

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.d Number of deaths, percentage of total deaths, and crude mortality rates per 100,000 population for all causes and the 33 leading causes of death, for males, females and combined, in Public Health Region 3, Texas, 1999-2010. Data source: TDSHS CHS.

Cause of Death	Number of Deaths, 1999-2010			Percentage of Total Deaths			Crude Mortality per 100,000		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
All Causes	221,348	226,223	447,571	100.00%	100.00%	100.00%	601.70	616.37	609.02
Heart Disease	58,377	57,696	116,073	26.37%	25.50%	25.93%	158.69	157.20	157.94
Cancer	51,649	48,487	100,136	23.33%	21.43%	22.37%	140.40	132.11	136.26
Stroke	10,946	17,772	28,718	4.95%	7.86%	6.42%	29.75	48.42	39.08
Accidents	15,279	7,751	23,030	6.90%	3.43%	5.15%	41.53	21.12	31.34
COPD/Asthma	11,186	12,861	24,047	5.05%	5.69%	5.37%	30.41	35.04	32.72
Diabetes	6,130	6,352	12,482	2.77%	2.81%	2.79%	16.66	17.31	16.98
Alzheimer's Disease	3,932	10,006	13,938	1.78%	4.42%	3.11%	10.69	27.26	18.97
Senility/Dementia	3,780	9,585	13,365	1.71%	4.24%	2.99%	10.28	26.12	18.19
Flu/Pneumonia	4,097	5,288	9,385	1.85%	2.34%	2.10%	11.14	14.41	12.77
Liver Disease	4,655	2,719	7,374	2.10%	1.20%	1.65%	12.65	7.41	10.03
GI Tract Disorders	3,459	4,839	8,298	1.56%	2.14%	1.85%	9.40	13.18	11.29
Kidney Disease	3,481	3,813	7,294	1.57%	1.69%	1.63%	9.46	10.39	9.93
Other Infectious Disease	3,398	3,983	7,381	1.54%	1.76%	1.65%	9.24	10.85	10.04
Septicemia	2,655	3,359	6,014	1.20%	1.48%	1.34%	7.22	9.15	8.18
Suicide	5,742	1,573	7,315	2.59%	0.70%	1.63%	15.61	4.29	9.95
Vascular Disease	2,899	3,224	6,123	1.31%	1.43%	1.37%	7.88	8.78	8.33
Birth Def/Inf Mortality	4,212	3,415	7,627	1.90%	1.51%	1.70%	11.45	9.30	10.38
Neurologic Disorders	3,015	2,845	5,860	1.36%	1.26%	1.31%	8.20	7.75	7.97
Respiratory Disease	2,188	2,363	4,551	0.99%	1.04%	1.02%	5.95	6.44	6.19
Nutrition/Metabolic D/O	2,186	2,805	4,991	0.99%	1.24%	1.12%	5.94	7.64	6.79
Homicide	3,719	1,072	4,791	1.68%	0.47%	1.07%	10.11	2.92	6.52
Hypertension	1,490	2,481	3,971	0.67%	1.10%	0.89%	4.05	6.76	5.40
Parkinson's Disease	2,032	1,638	3,670	0.92%	0.72%	0.82%	5.52	4.46	4.99
Chemical Pneumonitis	1,674	1,648	3,322	0.76%	0.73%	0.74%	4.55	4.49	4.52
HIV Disease	2,637	673	3,310	1.19%	0.30%	0.74%	7.17	1.83	4.50
Psychiatric/Drug D/O	1,521	1,194	2,715	0.69%	0.53%	0.61%	4.13	3.25	3.69
Blood/Endocrine D/O	871	1,320	2,191	0.39%	0.58%	0.49%	2.37	3.60	2.98
Benign Tumors	1,074	1,047	2,121	0.49%	0.46%	0.47%	2.92	2.85	2.89
Autoimmune Disease	361	1,196	1,557	0.16%	0.53%	0.35%	0.98	3.26	2.12
Muscle/Bone Disorders	187	436	623	0.08%	0.19%	0.14%	0.51	1.19	0.85
Genitourinary Disorders	298	234	532	0.13%	0.10%	0.12%	0.81	0.64	0.72
Skin Disorders	139	263	402	0.06%	0.12%	0.09%	0.38	0.72	0.55
All Other Causes	2,079	2,285	4,364	0.94%	1.01%	0.98%	5.65	6.23	5.94

COPD – chronic obstructive pulmonary disease; Inf – infant; D/O – disorder -
 NS—Not shown. For confidentiality, number of deaths is suppressed when there are 1-4 deaths. -

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.e Number of deaths, percentage of total deaths, and crude mortality rates per 100,000 population for all causes and the 33 leading causes of death, for males, females and combined, in Texas, 1999-2010. Data source: TDSHS CHS.

Cause of Death	Number of Deaths, 1999-2010			Percentage of Total Deaths			Crude Mortality per 100,000		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
All Causes	946,368	929,483	1,875,851	100.00%	100.00%	100.00%	693.37	679.06	686.21
Heart Disease	247,531	239,100	486,631	26.16%	25.72%	25.94%	181.36	174.68	178.02
Cancer	219,240	193,539	412,779	23.17%	20.82%	22.00%	160.63	141.40	151.00
Stroke	46,875	71,401	118,276	4.95%	7.68%	6.31%	34.34	52.16	43.27
Accidents	66,831	35,430	102,261	7.06%	3.81%	5.45%	48.96	25.88	37.41
COPD/Asthma	47,679	48,112	95,791	5.04%	5.18%	5.11%	34.93	35.15	35.04
Diabetes	30,048	32,888	62,936	3.18%	3.54%	3.36%	22.02	24.03	23.02
Alzheimer's Disease	15,271	36,111	51,382	1.61%	3.89%	2.74%	11.19	26.38	18.80
Senility/Dementia	13,874	33,563	47,437	1.47%	3.61%	2.53%	10.17	24.52	17.35
Flu/Pneumonia	18,497	22,928	41,425	1.95%	2.47%	2.21%	13.55	16.75	15.15
Liver Disease	24,020	12,936	36,956	2.54%	1.39%	1.97%	17.60	9.45	13.52
GI Tract Disorders	15,443	21,021	36,464	1.63%	2.26%	1.94%	11.31	15.36	13.34
Kidney Disease	16,101	17,010	33,111	1.70%	1.83%	1.77%	11.80	12.43	12.11
Other Infectious Disease	14,835	16,809	31,644	1.57%	1.81%	1.69%	10.87	12.28	11.58
Septicemia	13,577	16,490	30,067	1.43%	1.77%	1.60%	9.95	12.05	11.00
Suicide	22,772	5,988	28,760	2.41%	0.64%	1.53%	16.68	4.37	10.52
Vascular Disease	12,312	13,289	25,601	1.30%	1.43%	1.36%	9.02	9.71	9.37
Birth Def/Inf Mortality	14,327	11,757	26,084	1.51%	1.26%	1.39%	10.50	8.59	9.54
Neurologic Disorders	12,329	11,492	23,821	1.30%	1.24%	1.27%	9.03	8.40	8.71
Respiratory Disease	10,530	11,126	21,656	1.11%	1.20%	1.15%	7.71	8.13	7.92
Nutrition/Metabolic D/O	8,940	11,515	20,455	0.94%	1.24%	1.09%	6.55	8.41	7.48
Homicide	13,140	4,043	17,183	1.39%	0.43%	0.92%	9.63	2.95	6.29
Hypertension	6,365	10,320	16,685	0.67%	1.11%	0.89%	4.66	7.54	6.10
Parkinson's Disease	7,828	6,130	13,958	0.83%	0.66%	0.74%	5.74	4.48	5.11
Chemical Pneumonitis	6,736	6,431	13,167	0.71%	0.69%	0.70%	4.94	4.70	4.82
HIV Disease	9,190	2,615	11,805	0.97%	0.28%	0.63%	6.73	1.91	4.32
Psychiatric/Drug D/O	6,586	5,152	11,738	0.70%	0.55%	0.63%	4.83	3.76	4.29
Blood/Endocrine D/O	4,059	5,774	9,833	0.43%	0.62%	0.52%	2.97	4.22	3.60
Benign Tumors	4,676	4,497	9,173	0.49%	0.48%	0.49%	3.43	3.29	3.36
Autoimmune Disease	1,632	5,380	7,012	0.17%	0.58%	0.37%	1.20	3.93	2.57
Muscle/Bone Disorders	969	1,815	2,784	0.10%	0.20%	0.15%	0.71	1.33	1.02
Genitourinary Disorders	1,322	1,131	2,453	0.14%	0.12%	0.13%	0.97	0.83	0.90
Skin Disorders	736	1,325	2,061	0.08%	0.14%	0.11%	0.54	0.97	0.75
All Other Causes	12,097	12,365	24,462	1.28%	1.33%	1.30%	8.86	9.03	8.95

COPD – chronic obstructive pulmonary disease; Inf – infant; D/O – disorder

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.f Crude mortality rates per 100,000 population for all causes and the 33 leading causes of death, for males, females and combined, in ZIP code 76065, Ellis County, Public Health Region 3, and Texas, 1999-2010. Data source: TDSHS CHS.

Cause of Death	ZIP Code 76065			Ellis County			Public Health Region 3			Texas		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
All Causes	525.17	504.76	514.94	707.83	734.23	721.03	601.70	616.37	609.02	693.37	679.06	686.21
Heart Disease	138.09	119.07	128.55	187.63	188.17	187.90	158.69	157.20	157.94	181.36	174.68	178.02
Cancer	129.27	121.99	125.62	170.83	155.06	162.95	140.40	132.11	136.26	160.63	141.40	151.00
Stroke	30.85	37.25	34.06	36.64	53.20	44.92	29.75	48.42	39.08	34.34	52.16	43.27
Accidents	35.26	17.53	26.37	47.51	26.79	37.15	41.53	21.12	31.34	48.96	25.88	37.41
COPD/Asthma	25.71	35.79	30.76	36.52	41.83	39.17	30.41	35.04	32.72	34.93	35.15	35.04
Diabetes	19.10	9.50	14.28	23.50	19.84	21.67	16.66	17.31	16.98	22.02	24.03	23.02
Alzheimer's Disease	8.08	25.57	16.85	15.92	45.75	30.83	10.69	27.26	18.97	11.19	26.38	18.80
Senility/Dementia	8.08	19.72	13.92	13.39	30.96	22.18	10.28	26.12	18.19	10.17	24.52	17.35
Flu/Pneumonia	8.08	7.30	7.69	15.16	16.05	15.61	11.14	14.41	12.77	13.55	16.75	15.15
Liver Disease	10.28	4.38	7.32	12.64	8.09	10.36	12.65	7.41	10.03	17.60	9.45	13.52
GI Tract Disorders	10.28	13.15	11.72	11.75	16.55	14.15	9.40	13.18	11.29	11.31	15.36	13.34
Kidney Disease	9.55	5.84	7.69	10.61	11.37	10.99	9.46	10.39	9.93	11.80	12.43	12.11
Other Infectious Disease	6.61	10.23	8.42	10.11	13.02	11.56	9.24	10.85	10.04	10.87	12.28	11.58
Septicemia	6.61	3.65	5.13	8.34	10.87	9.60	7.22	9.15	8.18	9.95	12.05	11.00
Suicide	10.28	3.65	6.96	15.67	4.68	10.17	15.61	4.29	9.95	16.68	4.37	10.52
Vascular Disease	4.41	6.57	5.49	9.86	10.87	10.36	7.88	8.78	8.33	9.02	9.71	9.37
Birth Def/Infant Mortality	8.81	10.23	9.52	9.48	10.87	10.17	11.45	9.30	10.38	10.50	8.59	9.54
Neurologic Disorders	8.08	6.57	7.32	10.87	8.97	9.92	8.20	7.75	7.97	9.03	8.40	8.71
Respiratory Disease	6.61	6.57	6.59	6.32	7.96	7.14	5.95	6.44	6.19	7.71	8.13	7.92
Nutrition/Metabolic Disorders	3.67	8.77	6.23	7.08	8.09	7.58	5.94	7.64	6.79	6.55	8.41	7.48
Homicide	7.35	NS	NS	7.83	2.15	4.99	10.11	2.92	6.52	9.63	2.95	6.29
Hypertension	NS	5.84	NS	3.79	8.97	6.38	4.05	6.76	5.40	4.66	7.54	6.10
Parkinson's Disease	5.14	5.11	5.13	5.81	5.31	5.56	5.52	4.46	4.99	5.74	4.48	5.11
Chemical Pneumonitis	5.14	NS	NS	5.94	5.05	5.50	4.55	4.49	4.52	4.94	4.70	4.82
HIV Disease	4.41	0.00	2.20	4.30	1.14	2.72	7.17	1.83	4.50	6.73	1.91	4.32
Psychiatric/Drug Disorders	4.41	NS	NS	3.92	2.91	3.41	4.13	3.25	3.69	4.83	3.76	4.29
Blood/Endocrine Disorders	NS	4.38	3.66	3.29	3.54	3.41	2.37	3.60	2.98	2.97	4.22	3.60
Benign Tumors	NS	NS	NS	2.91	3.03	2.97	2.92	2.85	2.89	3.43	3.29	3.36
Autoimmune Disease	0.00	NS	NS	1.14	4.04	2.59	0.98	3.26	2.12	1.20	3.93	2.57

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Cause of Death	ZIP Code 76065			Ellis County			Public Health Region 3			Texas		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Muscle/Bone Disorders	0.00	NS	NS	NS	1.64	NS	0.51	1.19	0.85	0.71	1.33	1.02
Genitourinary Disorders	NS	0.00	NS	1.14	NS	NS	0.81	0.64	0.72	0.97	0.83	0.90
Skin Disorders	NS	0.00	NS	0.63	NS	NS	0.38	0.72	0.55	0.54	0.97	0.75
All Other Causes	3.67	3.65	3.66	6.82	6.57	6.70	5.65	6.23	5.94	8.86	9.03	8.95

NS—Not shown. For confidentiality, number of deaths is suppressed when there are 1-4 deaths.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.g Standardized Mortality Ratios (SMR), for 33 Leading Causes of Death in Males, Females and combined for ZIP code 76065 with respect to Ellis County, Texas, with 95% confidence intervals, 1999-2010. Data source: TDSHS CHS.

Cause of Death	Males			Females			Total		
	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL
Heart Disease	0.90	0.77	1.04	0.98	0.83	1.14	0.93	0.84	1.04
Cancer	0.87	0.75	1.01	0.96	0.82	1.11	0.91	0.82	1.01
Stroke	1.09	0.79	1.48	1.11	0.82	1.45	1.10	0.89	1.35
Accidents	0.83	0.61	1.10	0.74	0.48	1.11	0.80	0.62	1.01
COPD/Asthma	0.82	0.57	1.15	1.09	0.81	1.44	0.96	0.77	1.19
Diabetes	0.97	0.63	1.42	0.67	0.36	1.14	0.84	0.60	1.15
Alzheimer's Disease	0.74	0.37	1.33	0.92	0.64	1.27	0.87	0.63	1.16
Senility/Dementia	0.92	0.46	1.64	1.12	0.74	1.64	1.05	0.75	1.45
Flu/Pneumonia	0.74	0.37	1.33	0.71	0.34	1.31	0.73	0.45	1.12
Liver Disease	0.86	0.47	1.43	0.60	0.22	1.31	0.76	0.46	1.17
GI Tract Disorders	1.23	0.67	2.07	1.21	0.72	1.92	1.22	0.84	1.73
Kidney Disease	1.34	0.71	2.28	0.80	0.34	1.57	1.06	0.66	1.63
Other Infectious Disease	0.76	0.35	1.44	1.10	0.60	1.85	0.94	0.59	1.41
Septicemia	0.96	0.44	1.83	0.49	0.16	1.15	0.72	0.39	1.20
Suicide	0.64	0.35	1.08	0.67	0.22	1.57	0.65	0.39	1.02
Vascular Disease	0.59	0.22	1.29	0.96	0.44	1.82	0.77	0.43	1.27
Birth Def/Inf Mortality	1.27	0.66	2.22	1.34	0.73	2.25	1.31	0.85	1.91
Neurologic Disorders	0.86	0.43	1.54	0.92	0.42	1.75	0.89	0.54	1.37
Respiratory Disease	1.28	0.59	2.43	1.22	0.56	2.32	1.25	0.74	1.98
Nutrition/Metabolic D/O	0.54	0.17	1.25	1.57	0.81	2.75	1.00	0.58	1.61
Homicide	1.19	0.57	2.20	1.11	0.23	3.25	1.17	0.63	2.01
Hypertension	0.55	0.07	1.99	1.09	0.47	2.14	0.91	0.44	1.68
Parkinson's Disease	1.14	0.46	2.35	1.59	0.64	3.28	1.33	0.73	2.23
Chemical Pneumonitis	1.20	0.48	2.47	0.85	0.23	2.17	1.04	0.52	1.86
HIV Disease	1.26	0.46	2.74	0.00	0.00	2.54	0.96	0.35	2.10
Psychiatric/Drug D/O	1.32	0.49	2.88	1.19	0.24	3.47	1.28	0.58	2.42
Blood/Endocrine D/O	1.16	0.32	2.97	1.77	0.65	3.85	1.46	0.70	2.69
Benign Tumors	0.62	0.07	2.23	0.65	0.08	2.36	0.63	0.17	1.62
Autoimmune Disease	0.00	0.00	4.01	1.04	0.28	2.66	0.84	0.23	2.15
Muscle/Bone Disorders	1.48	0.04	8.23	0.00	0.00	2.86	0.51	0.01	2.83
Genitourinary Disorders	0.89	0.02	4.94	0.00	0.00	11.83	0.69	0.02	3.87
Skin Disorders	2.12	0.05	11.81	0.00	0.00	10.88	1.23	0.03	6.87
All Other Causes	0.57	0.18	1.33	0.77	0.25	1.80	0.65	0.31	1.20

COPD – chronic obstructive pulmonary disease; Inf – infant; D/O – disorder

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.h Standardized Mortality Ratios (SMR), for 33 Leading Causes of Death in Males, Females and combined for ZIP code 76065 with respect to Public Health Region 3, Texas, with 95% confidence intervals, 1999-2010. Data source: TDSHS CHS.

Cause of Death	Males			Females			Total		
	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL
Heart Disease	0.93	0.81	1.08	1.02	0.87	1.18	0.97	0.87	1.08
Cancer	0.85**	0.73	0.99	0.94	0.80	1.09	0.89**	0.80	0.99
Stroke	1.14	0.82	1.55	0.98	0.73	1.29	1.05	0.85	1.29
Accidents	0.86	0.64	1.14	0.86	0.55	1.28	0.86	0.68	1.09
COPD/Asthma	0.87	0.60	1.21	1.14	0.85	1.51	1.01	0.81	1.25
Diabetes	1.25	0.82	1.83	0.73	0.39	1.25	1.01	0.72	1.38
Alzheimer's Disease	0.99	0.50	1.78	1.37	0.95	1.90	1.25	0.92	1.67
Senility/Dementia	1.08	0.54	1.93	1.14	0.75	1.66	1.12	0.79	1.54
Flu/Pneumonia	0.87	0.44	1.56	0.68	0.33	1.26	0.77	0.48	1.18
Liver Disease	0.75	0.41	1.27	0.60	0.22	1.30	0.70	0.43	1.08
GI Tract Disorders	1.23	0.67	2.06	1.28	0.76	2.03	1.26	0.86	1.78
Kidney Disease	1.28	0.68	2.19	0.83	0.36	1.63	1.06	0.65	1.62
Other Infectious Disease	0.77	0.35	1.46	1.20	0.65	2.01	0.98	0.62	1.47
Septicemia	1.06	0.48	2.00	0.51	0.17	1.19	0.76	0.42	1.28
Suicide	0.56**	0.31	0.94	0.68	0.22	1.58	0.59**	0.35	0.92
Vascular Disease	0.60	0.22	1.31	0.99	0.45	1.88	0.79	0.44	1.30
Birth Def/Inf Mortality	1.01	0.52	1.77	1.47	0.80	2.46	1.21	0.79	1.78
Neurologic Disorders	0.98	0.49	1.75	0.91	0.42	1.73	0.94	0.58	1.46
Respiratory Disease	1.17	0.54	2.22	1.22	0.56	2.31	1.19	0.71	1.89
Nutrition/Metabolic D/O	0.63	0.20	1.47	1.43	0.74	2.50	1.04	0.61	1.67
Homicide	1.22	0.59	2.25	0.94	0.19	2.73	1.14	0.61	1.95
Hypertension	0.48	0.06	1.73	1.33	0.57	2.61	0.98	0.47	1.80
Parkinson's Disease	1.10	0.44	2.27	1.51	0.61	3.12	1.28	0.70	2.14
Chemical Pneumonitis	1.40	0.56	2.89	0.91	0.25	2.33	1.17	0.59	2.10
HIV Disease	0.76	0.28	1.65	0.00	0.00	2.92	0.65	0.24	1.42
Psychiatric/Drug D/O	1.07	0.39	2.33	0.85	0.18	2.49	0.99	0.45	1.87
Blood/Endocrine D/O	1.47	0.40	3.77	1.69	0.62	3.67	1.59	0.76	2.93
Benign Tumors	0.54	0.07	1.95	0.64	0.08	2.33	0.59	0.16	1.50
Autoimmune Disease	0.00	0.00	3.12	1.14	0.31	2.91	0.85	0.23	2.18
Muscle/Bone Disorders	1.60	0.04	8.90	0.00	0.00	3.02	0.54	0.01	3.02
Genitourinary Disorders	1.12	0.03	6.27	0.00	0.00	5.66	0.65	0.02	3.62
Skin Disorders	2.48	0.06	13.79	0.00	0.00	6.18	1.00	0.03	5.56
All Other Causes	0.69	0.22	1.62	0.67	0.22	1.55	0.68	0.33	1.25

COPD – chronic obstructive pulmonary disease; Inf – infant; D/O – disorder

** Significantly lower than expected at the p<0.05 level.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.i Standardized Mortality Ratios (SMR), for 33 Leading Causes of Death in Males, Females and combined for ZIP code 76065 with respect to Texas, with 95% confidence intervals, 1999-2010. Data source: TDSHS CHS.

Cause of Death	Males			Females			Total		
	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL
Heart Disease	0.93	0.80	1.07	1.03	0.88	1.20	0.97	0.87	1.08
Cancer	0.89	0.77	1.04	1.02	0.87	1.19	0.95	0.85	1.06
Stroke	1.29	0.93	1.75	1.13	0.84	1.49	1.20	0.97	1.47
Accidents	0.72**	0.53	0.95	0.68	0.44	1.02	0.71**	0.55	0.89
COPD/Asthma	0.85	0.59	1.18	1.20	0.89	1.59	1.03	0.82	1.27
Diabetes	1.18	0.77	1.73	0.67	0.36	1.15	0.94	0.67	1.29
Alzheimer's Disease	1.13	0.57	2.03	1.58*	1.10	2.20	1.44*	1.06	1.92
Senility/Dementia	1.32	0.66	2.36	1.36	0.90	1.98	1.35	0.96	1.85
Flu/Pneumonia	0.86	0.43	1.53	0.67	0.32	1.23	0.75	0.47	1.15
Liver Disease	0.62	0.34	1.04	0.54	0.20	1.17	0.59**	0.36	0.92
GI Tract Disorders	1.16	0.64	1.95	1.24	0.73	1.95	1.20	0.82	1.70
Kidney Disease	1.24	0.66	2.12	0.82	0.35	1.61	1.04	0.64	1.58
Other Infectious Disease	0.71	0.33	1.35	1.17	0.64	1.96	0.93	0.59	1.40
Septicemia	0.92	0.42	1.75	0.46	0.15	1.08	0.68	0.37	1.14
Suicide	0.50**	0.28	0.85	0.60	0.20	1.41	0.53**	0.32	0.82
Vascular Disease	0.60	0.22	1.30	1.00	0.46	1.89	0.79	0.44	1.30
Birth Def/Inf Mortality	1.04	0.54	1.81	1.50	0.82	2.51	1.24	0.81	1.82
Neurologic Disorders	0.94	0.47	1.69	0.88	0.40	1.67	0.91	0.56	1.41
Respiratory Disease	1.06	0.48	2.01	1.13	0.52	2.15	1.09	0.65	1.73
Nutrition/Metabolic D/O	0.65	0.21	1.52	1.46	0.75	2.54	1.07	0.62	1.71
Homicide	1.18	0.57	2.18	0.86	0.18	2.52	1.09	0.58	1.86
Hypertension	0.49	0.06	1.76	1.39	0.60	2.74	1.02	0.49	1.87
Parkinson's Disease	1.27	0.51	2.62	1.73	0.70	3.57	1.47	0.80	2.46
Chemical Pneumonitis	1.57	0.63	3.24	1.01	0.28	2.59	1.31	0.65	2.34
HIV Disease	0.79	0.29	1.73	0.00	0.00	2.53	0.67	0.24	1.45
Psychiatric/Drug D/O	0.97	0.36	2.12	0.75	0.15	2.19	0.88	0.40	1.68
Blood/Endocrine D/O	1.34	0.37	3.43	1.58	0.58	3.44	1.48	0.71	2.71
Benign Tumors	0.53	0.06	1.92	0.63	0.08	2.27	0.58	0.16	1.48
Autoimmune Disease	0.00	0.00	2.69	1.04	0.28	2.66	0.77	0.21	1.96
Muscle/Bone Disorders	1.29	0.03	7.21	0.00	0.00	2.95	0.49	0.01	2.75
Genitourinary Disorders	1.06	0.03	5.92	0.00	0.00	4.78	0.58	0.01	3.25
Skin Disorders	2.25	0.06	12.54	0.00	0.00	5.06	0.85	0.02	4.75
All Other Causes	0.47	0.15	1.09	0.51	0.17	1.20	0.49**	0.23	0.90

COPD – chronic obstructive pulmonary disease; Inf – infant; D/O – disorder

* Significantly higher than expected at the p< 0.05 level.

** Significantly lower than expected at the p< 0.05 level.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.j Standardized Mortality Ratios (SMR) for 33 Leading Causes of Death in Males, Females and combined for Ellis County with respect to Public Health Region 3, Texas, with 95% confidence intervals, 1999-2010. Data source: TDSHS CHS.

Cause of Death	Males			Females			Total		
	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL
Heart Disease	1.03	0.97	1.08	1.06*	1.00	1.11	1.04*	1.00	1.08
Cancer	1.06*	1.01	1.12	1.05	0.99	1.11	1.06*	1.01	1.10
Stroke	1.10	0.98	1.24	0.98	0.88	1.08	1.03	0.95	1.11
Accidents	1.03	0.92	1.14	1.13	0.98	1.30	1.06	0.98	1.15
COPD/Asthma	1.03	0.91	1.16	1.03	0.92	1.15	1.03	0.95	1.12
Diabetes	1.29*	1.11	1.49	1.06	0.90	1.25	1.18*	1.05	1.31
Alzheimer's Disease	1.29*	1.07	1.54	1.46*	1.32	1.62	1.41*	1.29	1.55
Senility/Dementia	1.13	0.93	1.37	1.02	0.89	1.16	1.05	0.94	1.17
Flu/Pneumonia	1.21	1.00	1.45	0.97	0.80	1.15	1.07	0.94	1.22
Liver Disease	0.89	0.72	1.08	1.00	0.77	1.28	0.93	0.79	1.08
GI Tract Disorders	1.07	0.86	1.32	1.10	0.91	1.31	1.09	0.94	1.24
Kidney Disease	0.93	0.73	1.17	1.00	0.80	1.23	0.97	0.82	1.13
Other Infectious Disease	0.96	0.76	1.20	1.04	0.85	1.27	1.01	0.86	1.17
Septicemia	1.01	0.77	1.29	1.04	0.82	1.29	1.02	0.86	1.20
Suicide	0.87	0.72	1.04	0.97	0.68	1.34	0.89	0.76	1.05
Vascular Disease	1.03	0.81	1.30	1.05	0.84	1.31	1.05	0.89	1.23
Birth Def/Inf Mortality	0.84	0.65	1.06	1.17	0.93	1.46	0.99	0.83	1.16
Neurologic Disorders	1.17	0.93	1.45	1.00	0.77	1.27	1.09	0.92	1.28
Respiratory Disease	0.94	0.70	1.25	1.08	0.82	1.38	1.01	0.83	1.22
Nutrition/Metabolic D/O	1.01	0.75	1.32	0.92	0.70	1.18	0.96	0.79	1.15
Homicide	0.85	0.65	1.10	0.75	0.43	1.22	0.83	0.65	1.04
Hypertension	0.84	0.56	1.21	1.23	0.96	1.55	1.09	0.88	1.32
Parkinson's Disease	0.91	0.67	1.22	1.03	0.74	1.39	0.96	0.77	1.19
Chemical Pneumonitis	1.14	0.84	1.52	0.98	0.70	1.34	1.06	0.85	1.31
HIV Disease	0.64**	0.43	0.90	0.83	0.38	1.57	0.67**	0.48	0.91
Psychiatric/Drug D/O	0.88	0.60	1.25	0.82	0.52	1.22	0.85	0.64	1.11
Blood/Endocrine D/O	1.34	0.88	1.97	0.88	0.58	1.30	1.07	0.80	1.40
Benign Tumors	0.82	0.51	1.25	0.89	0.56	1.35	0.86	0.62	1.15
Autoimmune Disease	0.87	0.35	1.79	1.13	0.76	1.61	1.07	0.75	1.47
Muscle/Bone Disorders	0.90	0.25	2.32	1.24	0.66	2.12	1.14	0.66	1.82
Genitourinary Disorders	1.14	0.49	2.24	0.56	0.12	1.64	0.89	0.44	1.59
Skin Disorders	1.20	0.33	3.07	0.67	0.18	1.73	0.86	0.37	1.70
All Other Causes	1.13	0.84	1.49	0.89	0.65	1.19	1.00	0.81	1.22

COPD – chronic obstructive pulmonary disease; Inf – infant; D/O – disorder

* Significantly higher than expected at the p< 0.05 level.

** Significantly lower than expected at the p< 0.05 level.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.k Standardized Mortality Ratios (SMR) and 95% confidence intervals (95%CI) , for 33 Leading Causes of Death in Males, Females and combined for Ellis County compared to number of expected deaths in Texas, 1999-2010. Data source: TDSHS CHS.

Cause of Death	Males			Females			Total		
	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL
Heart Disease	1.02	0.97	1.08	1.08*	1.02	1.13	1.05*	1.01	1.09
Cancer	1.03	0.98	1.09	1.06	1.00	1.12	1.04*	1.00	1.08
Stroke	1.13	1.00	1.27	1.02	0.93	1.13	1.06	0.99	1.15
Accidents	0.88**	0.79	0.97	0.93	0.80	1.06	0.89**	0.82	0.97
COPD/Asthma	1.02	0.90	1.14	1.10	0.98	1.23	1.06	0.98	1.15
Diabetes	1.20*	1.04	1.39	0.97	0.82	1.13	1.08	0.97	1.21
Alzheimer's Disease	1.50*	1.24	1.78	1.70*	1.53	1.89	1.64*	1.50	1.80
Senility/Dementia	1.40*	1.14	1.70	1.23*	1.08	1.39	1.27*	1.14	1.42
Flu/Pneumonia	1.19	0.98	1.42	0.94	0.78	1.13	1.05	0.92	1.19
Liver Disease	0.72**	0.58	0.87	0.91	0.70	1.17	0.78	0.66	0.91
GI Tract Disorders	1.03	0.82	1.27	1.07	0.89	1.27	1.05	0.92	1.20
Kidney Disease	0.92	0.72	1.15	1.00	0.80	1.24	0.96	0.82	1.12
Other Infectious Disease	0.90	0.71	1.13	1.04	0.84	1.27	0.97	0.83	1.13
Septicemia	0.87	0.67	1.12	0.92	0.73	1.14	0.90	0.76	1.06
Suicide	0.78**	0.64	0.93	0.86	0.60	1.19	0.79**	0.67	0.93
Vascular Disease	1.02	0.80	1.29	1.07	0.85	1.33	1.05	0.89	1.23
Birth Def/Inf Mortality	0.89	0.69	1.13	1.24	0.98	1.54	1.05	0.88	1.23
Neurologic Disorders	1.14	0.90	1.41	0.97	0.75	1.24	1.06	0.89	1.24
Respiratory Disease	0.86	0.63	1.13	0.99	0.75	1.27	0.92	0.76	1.11
Nutrition/Metabolic D/O	1.03	0.77	1.34	0.92	0.70	1.19	0.97	0.80	1.16
Homicide	0.90	0.69	1.16	0.71	0.41	1.16	0.86	0.67	1.07
Hypertension	0.88	0.59	1.26	1.30*	1.01	1.64	1.14	0.93	1.39
Parkinson's Disease	1.06	0.77	1.41	1.17	0.84	1.59	1.11	0.89	1.37
Chemical Pneumonitis	1.28	0.94	1.71	1.10	0.78	1.50	1.19	0.95	1.47
HIV Disease	0.64**	0.44	0.91	0.71	0.32	1.34	0.66**	0.47	0.89
Psychiatric/Drug D/O	0.81	0.55	1.14	0.75	0.48	1.13	0.78	0.59	1.02
Blood/Endocrine D/O	1.20	0.79	1.76	0.83	0.54	1.22	0.98	0.73	1.29
Benign Tumors	0.81	0.50	1.23	0.87	0.55	1.32	0.84	0.61	1.13
Autoimmune Disease	0.77	0.31	1.59	1.04	0.70	1.49	0.98	0.69	1.35
Muscle/Bone Disorders	0.74	0.20	1.89	1.23	0.65	2.10	1.06	0.62	1.70
Genitourinary Disorders	1.13	0.49	2.22	0.49	0.10	1.44	0.83	0.42	1.49
Skin Disorders	1.06	0.29	2.71	0.57	0.16	1.47	0.74	0.32	1.47
All Other Causes	0.75**	0.56	0.98	0.65**	0.48	0.87	0.70**	0.57	0.85

COPD – chronic obstructive pulmonary disease; Inf – infant; D/O – disorder

* Significantly higher than expected at the p< 0.05 level.

** Significantly lower than expected at the p< 0.05 level.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.1 Standardized Mortality Ratios (SMR) and 95% confidence intervals for 33 Leading Causes of Death in Males, Females and combined, for Public Health Region 3 with respect to Texas, with 95% confidence intervals, 1999-2010. Data source: TDSHS CHS.

Cause of Death	Males			Females			Total		
	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL
Heart Disease	1.00	0.99	1.00	1.02*	1.01	1.02	1.01*	1.00	1.01
Cancer	0.98**	0.97	0.98	1.01*	1.00	1.02	0.99**	0.99	1.00
Stroke	1.03*	1.01	1.05	1.05*	1.04	1.07	1.04*	1.03	1.06
Accidents	0.85**	0.84	0.87	0.82**	0.80	0.84	0.84**	0.83	0.85
COPD/Asthma	0.99	0.97	1.00	1.06*	1.05	1.08	1.03*	1.01	1.04
Diabetes	0.93**	0.91	0.95	0.91**	0.89	0.93	0.92**	0.90	0.93
Alzheimer's Disease	1.16*	1.12	1.19	1.16*	1.14	1.19	1.16*	1.14	1.18
Senility/Dementia	1.24*	1.20	1.28	1.20*	1.18	1.23	1.21*	1.19	1.23
Flu/Pneumonia	0.98	0.95	1.01	0.98	0.95	1.00	0.98**	0.96	1.00
Liver Disease	0.81**	0.79	0.83	0.91**	0.88	0.95	0.84**	0.83	0.86
GI Tract Disorders	0.96**	0.93	0.99	0.98	0.95	1.00	0.97**	0.95	0.99
Kidney Disease	0.98	0.95	1.01	1.00	0.97	1.04	0.99	0.97	1.02
Other Infectious Disease	0.94**	0.91	0.97	1.00	0.97	1.03	0.97**	0.95	0.99
Septicemia	0.86**	0.83	0.90	0.88**	0.85	0.91	0.87**	0.85	0.90
Suicide	0.89**	0.86	0.91	0.87**	0.83	0.92	0.88**	0.86	0.90
Vascular Disease	0.99	0.96	1.03	1.01	0.97	1.04	1.00	0.98	1.03
Birth Def/Inf Mortality	1.08*	1.05	1.11	1.07*	1.03	1.10	1.07*	1.05	1.10
Neurologic Disorders	0.97	0.93	1.00	0.97	0.93	1.00	0.97**	0.94	0.99
Respiratory Disease	0.91**	0.87	0.95	0.92**	0.88	0.95	0.91**	0.89	0.94
Nutrition/Metabolic D/O	1.01	0.97	1.05	1.01	0.97	1.05	1.01	0.98	1.04
Homicide	1.07*	1.03	1.10	0.95	0.90	1.01	1.04*	1.01	1.07
Hypertension	1.04	0.99	1.09	1.05*	1.01	1.09	1.05*	1.01	1.08
Parkinson's Disease	1.16*	1.11	1.21	1.14*	1.09	1.20	1.15*	1.11	1.19
Chemical Pneumonitis	1.12*	1.07	1.17	1.11*	1.06	1.17	1.11*	1.08	1.15
HIV Disease	1.00	0.96	1.04	0.85**	0.79	0.92	0.97	0.93	1.00
Psychiatric/Drug D/O	0.91**	0.86	0.96	0.93**	0.88	0.98	0.92**	0.88	0.95
Blood/Endocrine D/O	0.89**	0.83	0.95	0.94**	0.89	0.99	0.92**	0.88	0.96
Benign Tumors	0.98	0.92	1.04	0.98	0.92	1.04	0.98	0.94	1.02
Autoimmune Disease	0.91	0.82	1.01	0.93**	0.87	0.98	0.92**	0.88	0.97
Muscle/Bone Disorders	0.81**	0.70	0.94	0.99	0.90	1.09	0.93	0.86	1.00
Genitourinary Disorders	0.99	0.88	1.11	0.88	0.77	1.00	0.94	0.86	1.02
Skin Disorders	0.86	0.72	1.01	0.86**	0.76	0.97	0.86**	0.78	0.95
All Other Causes	0.67**	0.64	0.70	0.74**	0.71	0.77	0.70**	0.68	0.72

COPD – chronic obstructive pulmonary disease; Inf – infant; D/O – disorder

* Significantly higher than expected at the p< 0.05 level.

** Significantly lower than expected at the p< 0.05 level.

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.3.m Standardized Mortality Ratios (SMR) and 95% confidence intervals (95% CI) for 33 Leading Causes of Death (Males and Females combined), for Midlothian ZIP code 76065, Ellis County, or Public Health Region 3 with relative to Ellis County, Public Health Region, or Texas, 1999-2010. Code: Green shading—statistically significantly lower than expected at p<0.05; pink shading—statistically significantly higher than expected at the p<0.05 for the respective comparison group. Data source: TDSHS CHS.

Cause of Death		Ellis County			Public Health Region 3			Texas		
		SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL	SMR	95% LCL	95% UCL
Heart Disease	ZIP Code 76065	0.93	0.84	1.04	0.97	0.87	1.08	0.97	0.87	1.08
	Ellis County				1.04	1.00	1.08	1.05	1.01	1.09
	Public Health Region 3							1.01	1.00	1.01
Cancer	ZIP Code 76065	0.91	0.82	1.01	0.89	0.80	0.99	0.95	0.85	1.06
	Ellis County				1.06	1.01	1.10	1.04	1.00	1.08
	Public Health Region 3							0.99	0.99	1.00
Stroke	ZIP Code 76065	1.10	0.89	1.35	1.05	0.85	1.29	1.20	0.97	1.47
	Ellis County				1.03	0.95	1.11	1.06	0.99	1.15
	Public Health Region 3							1.04	1.03	1.06
Accidents	ZIP Code 76065	0.80	0.62	1.01	0.86	0.68	1.09	0.71	0.55	0.89
	Ellis County				1.06	0.98	1.15	0.89	0.82	0.97
	Public Health Region 3							0.84	0.83	0.85
COPD/Asthma	ZIP Code 76065	0.96	0.77	1.19	1.01	0.81	1.25	1.03	0.82	1.27
	Ellis County				1.03	0.95	1.12	1.06	0.98	1.15
	Public Health Region 3							1.03	1.01	1.04
Diabetes	ZIP Code 76065	0.84	0.60	1.15	1.01	0.72	1.38	0.94	0.67	1.29
	Ellis County				1.18	1.05	1.31	1.08	0.97	1.21
	Public Health Region 3							0.92	0.90	0.93
Alzheimer's Disease	ZIP Code 76065	0.87	0.63	1.16	1.25	0.92	1.67	1.44	1.06	1.92
	Ellis County				1.41	1.29	1.55	1.64	1.50	1.80
	Public Health Region 3							1.16	1.14	1.18
Senility/Dementia	ZIP Code 76065	1.05	0.75	1.45	1.12	0.79	1.54	1.35	0.96	1.85
	Ellis County				1.05	0.94	1.17	1.27	1.14	1.42
	Public Health Region 3							1.21	1.19	1.23
Flu/Pneumonia	ZIP Code 76065	0.73	0.45	1.12	0.77	0.48	1.18	0.75	0.47	1.15
	Ellis County				1.07	0.94	1.22	1.05	0.92	1.19
	Public Health Region 3							0.98	0.96	1.00
Liver Disease	ZIP Code 76065	0.76	0.46	1.17	0.70	0.43	1.08	0.59	0.36	0.92
	Ellis County				0.93	0.79	1.08	0.78	0.66	0.91
	Public Health Region 3							0.84	0.83	0.86
GI Tract Disorders	ZIP Code 76065	1.22	0.84	1.73	1.26	0.86	1.78	1.20	0.82	1.70
	Ellis County				1.09	0.94	1.24	1.05	0.92	1.20
	Public Health Region 3							0.97	0.95	0.99
Kidney Disease	ZIP Code 76065	1.06	0.66	1.63	1.06	0.65	1.62	1.04	0.64	1.58
	Ellis County				0.97	0.82	1.13	0.96	0.82	1.12
	Public Health Region 3							0.99	0.97	1.02
Other Infectious Disease	ZIP Code 76065	0.94	0.59	1.41	0.98	0.62	1.47	0.93	0.59	1.40
	Ellis County				1.01	0.86	1.17	0.97	0.83	1.13
	Public Health Region 3							0.97	0.95	0.99

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Cause of Death		Ellis County			Public Health Region 3			Texas		
		SM R	95% LCL	95% UCL	SM R	95% LCL	95% UCL	SM R	95% LCL	95% UCL
Septicemia	ZIP Code 76065	0.72	0.39	1.20	0.76	0.42	1.28	0.68	0.37	1.14
	Ellis County				1.02	0.86	1.20	0.90	0.76	1.06
	Public Health Region 3							0.87	0.85	0.90
Suicide	ZIP Code 76065	0.65	0.39	1.02	0.59	0.35	0.92	0.53	0.32	0.82
	Ellis County				0.89	0.76	1.05	0.79	0.67	0.93
	Public Health Region 3							0.88	0.86	0.90
Vascular Disease	ZIP Code 76065	0.77	0.43	1.27	0.79	0.44	1.30	0.79	0.44	1.30
	Ellis County				1.05	0.89	1.23	1.05	0.89	1.23
	Public Health Region 3							1.00	0.98	1.03
Birth Def/Infant Mortality	ZIP Code 76065	1.31	0.85	1.91	1.21	0.79	1.78	1.24	0.81	1.82
	Ellis County				0.99	0.83	1.16	1.05	0.88	1.23
	Public Health Region 3							1.07	1.05	1.10
Neurologic Disorders	ZIP Code 76065	0.89	0.54	1.37	0.94	0.58	1.46	0.91	0.56	1.41
	Ellis County				1.09	0.92	1.28	1.06	0.89	1.24
	Public Health Region 3							0.97	0.94	0.99
Respiratory Disease	ZIP Code 76065	1.25	0.74	1.98	1.19	0.71	1.89	1.09	0.65	1.73
	Ellis County				1.01	0.83	1.22	0.92	0.76	1.11
	Public Health Region 3							0.91	0.89	0.94
Nutrition/Metabolic Disorders	ZIP Code 76065	1.00	0.58	1.61	1.04	0.61	1.67	1.07	0.62	1.71
	Ellis County				0.96	0.79	1.15	0.97	0.80	1.16
	Public Health Region 3							1.01	0.98	1.04
Homicide	ZIP Code 76065	1.17	0.63	2.01	1.14	0.61	1.95	1.09	0.58	1.86
	Ellis County				0.83	0.65	1.04	0.86	0.67	1.07
	Public Health Region 3							1.04	1.01	1.07
Hypertension	ZIP Code 76065	0.91	0.44	1.68	0.98	0.47	1.80	1.02	0.49	1.87
	Ellis County				1.09	0.88	1.32	1.14	0.93	1.39
	Public Health Region 3							1.05	1.01	1.08
Parkinson's Disease	ZIP Code 76065	1.33	0.73	2.23	1.28	0.70	2.14	1.47	0.80	2.46
	Ellis County				0.96	0.77	1.19	1.11	0.89	1.37
	Public Health Region 3							1.15	1.11	1.19
Chemical Pneumonitis	ZIP Code 76065	1.04	0.52	1.86	1.17	0.59	2.10	1.31	0.65	2.34
	Ellis County				1.06	0.85	1.31	1.19	0.95	1.47
	Public Health Region 3							1.11	1.08	1.15
HIV Disease	ZIP Code 76065	0.96	0.35	2.10	0.65	0.24	1.42	0.67	0.24	1.45
	Ellis County				0.67	0.48	0.91	0.66	0.47	0.89
	Public Health Region 3							0.97	0.93	1.00
Psychiatric/Drug Disorders	ZIP Code 76065	1.28	0.58	2.42	0.99	0.45	1.87	0.88	0.40	1.68
	Ellis County				0.85	0.64	1.11	0.78	0.59	1.02
	Public Health Region 3							0.92	0.88	0.95
Blood/Endocrine Disorders	ZIP Code 76065	1.46	0.70	2.69	1.59	0.76	2.93	1.48	0.71	2.71
	Ellis County				1.07	0.80	1.40	0.98	0.73	1.29
	Public Health Region 3							0.92	0.88	0.96
Benign Tumors	ZIP Code 76065	0.63	0.17	1.62	0.59	0.16	1.50	0.58	0.16	1.48
	Ellis County				0.86	0.62	1.15	0.84	0.61	1.13
	Public Health Region 3							0.98	0.94	1.02

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Cause of Death		Ellis County			Public Health Region 3			Texas		
		SM R	95% LCL	95% UCL	SM R	95% LCL	95% UCL	SM R	95% LCL	95% UCL
Autoimmune Disease	ZIP Code 76065	0.84	0.23	2.15	0.85	0.23	2.18	0.77	0.21	1.96
	Ellis County				1.07	0.75	1.47	0.98	0.69	1.35
	Public Health Region 3							0.92	0.88	0.97
Muscle/Bone Disorders	ZIP Code 76065	0.51	0.01	2.83	0.54	0.01	3.02	0.49	0.01	2.75
	Ellis County				1.14	0.66	1.82	1.06	0.62	1.70
	Public Health Region 3							0.93	0.86	1.00
Genitourinary Disorders	ZIP Code 76065	0.69	0.02	3.87	0.65	0.02	3.62	0.58	0.01	3.25
	Ellis County				0.89	0.44	1.59	0.83	0.42	1.49
	Public Health Region 3							0.94	0.86	1.02
Skin Disorders	ZIP Code 76065	1.23	0.03	6.87	1.00	0.03	5.56	0.85	0.02	4.75
	Ellis County				0.86	0.37	1.70	0.74	0.32	1.47
	Public Health Region 3							0.86	0.78	0.95
All Other Causes	ZIP Code 76065	0.65	0.31	1.20	0.68	0.33	1.25	0.49	0.23	0.90
	Ellis County				1.00	0.81	1.22	0.70	0.57	0.85
	Public Health Region 3							0.70	0.68	0.72

Table 4.5.a Behavioral Risk Factor Surveillance System (BRFSS) questions selected for data evaluation with corresponding labels, variable names, available years, and respondent options. Data Source: TDSHS Center for Health Statistics. http://www.dshs.state.tx.us/chs/brfss/query/ques_query.shtm

Label	Variable Name	Years Available*	Question	Responses**
Asthma	asthma2	2001-C,2002-C,2003-C,2004-C,2005-C,2006-C,2007-C,2008-C,2009-C,2010-C	Have you ever been told by a doctor, nurse or other health professional that you had asthma?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Adult Asthma History	asattack	2001-M,2002-M,2003-M,2004-M,2005-M	During the past 12 months, have you had an episode of asthma or an asthma attack?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Childhood Asthma Prevalence	castgdx2	2002-SA,2005-M,2006-C	Has a doctor, nurse, or other health professional ever said that the child has asthma?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Child Asthma History	casthdx2	2006-SA,2007-M,2008-M,2009-M,2010-M	Has a doctor, nurse, or other health professional ever said that the child has asthma?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Hypertension Awareness	bphigh2	2001-C	Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Hypertension Awareness	bphigh3	2003-C	Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?	1=Yes; 2=Yes, but female told only during pregnancy; 3=No; 7=DK/NS; 9=Refused
Hypertension Awareness	bphigh4	2005-C,2007-C,2009-C	Have you ever been told by a doctor, nurse, or other health professional that you have high blood pressure?	1=Yes; 2=Yes, but female told only during pregnancy; 3=No; 4=Told borderline high or pre-hypertensive; 7=DK/NS; 9=Refused
Cancer Survivors	cncrhve	2009-M,2010-M,	Have you ever been told by a doctor, nurse, or other health professional that you had cancer?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Cardiovascular Disease	cvdcrhd2	2001-M,2003-M	Has a doctor, nurse, or other health professional ever told you that you had angina or coronary heart disease?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Cardiovascular Disease	cvdcrhd3	2005-C,2006-C	Has a doctor, nurse, or other health professional ever told you that you had angina or coronary heart disease?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Cardiovascular Disease	cvdcrhd4	2007-C,2008-C,2009-C,2010-C	Has a doctor, nurse, or other health professional ever told you that you had angina or coronary heart disease?	1=Yes; 2=No; 7=DK/NS; 9=Refused

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Label	Variable Name	Years Available*	Question	Responses**
Cardiovascular Disease	cvdlnfr2	2001-M,2003-M	Has a doctor, nurse, or other health professional ever told you that you had a heart attack?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Cardiovascular Disease	cvdlnfr3	2005-C,2006-C	Has a doctor, nurse, or other health professional ever told you that you had a heart attack?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Cardiovascular Disease	cvdlnfr4	2007-C,2008-C,2009-C,2010-C	Has a doctor, nurse, or other health professional ever told you that you had a heart attack?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Cardiovascular Disease	cvdstrk2	2001-M,2003-M	Has a doctor, nurse, or other health professional ever told you that you had a stroke?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Cardiovascular Disease	cvdstrk3	2005-C,2006-C,2007-C,2008-C,2009-C,2010-C	Has a doctor, nurse, or other health professional ever told you that you had a stroke?	1=Yes; 2=No; 7=DK/NS; 9=Refused
COPD	COPD	2009-SA	Have you ever been told by a doctor or another health care professional that you have chronic obstructive pulmonary disease, also called COPD, emphysema, or chronic bronchitis?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Diabetes	diabete1	2001-M,2002-M,2003-M	Have you ever been told by a doctor that you have diabetes?	1=Yes; 2=Yes, but female told only during pregnancy; 3=No; 7=DK/NS; 9=Refused
Diabetes	diabete2	2004-C,2005-C,2006-C,2007-C,2008-C,2009-C,2010-C	Have you ever been told by a doctor that you have diabetes?	1=Yes; 2=Yes, but female told only during pregnancy; 3=No; 4=No, pre-diabetes or borderline diabetes; 7=DK/NS; 9=Refused
Arthritis	Havarth1	2001-C	Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?	1=Yes; 2=No; 7=DK/NS; 9=Refused
Arthritis Burden	havarth2	2003-C,2005-C,2007-C,2009-C	Have you ever been told by a doctor or other health professional that you have some form of arthritis, rheumatoid arthritis, gout, lupus, or fibromyalgia?	1=Yes; 2=No; 7=DK/NS; 9=Refused

* "C" is a core question, "M" is from a module, and "SA" is a state added question.

**"DK/NS" means that the respondent "Doesn't know or is Not Sure" of the answer.

Table A.4.5.b International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) Codes selected for data evaluation in this health consultation.

ICD-9-CM Code	Disease category	Includes
250 401 410	Diabetes mellitus Essential hypertension Acute myocardial infarction	
411-414	Other ischemic heart disease	411 Other acute and subacute forms of ischemic heart disease 412 Old myocardial infarction 413 Angina pectoris 414 Other forms of chronic ischemic heart disease
415 427 428	Acute pulmonary heart disease Cardiac dysrhythmias Heart failure	
430-438	Cerebrovascular disease	430 Subarachnoid hemorrhage 431 Intracerebral hemorrhage 432 Other and unspecified intracranial hemorrhage 433 Occlusion and stenosis of precerebral arteries 434 Occlusion of cerebral arteries 435 Transient cerebral ischemia 436 Acute, but ill-defined, cerebrovascular disease 437 Other and ill-defined cerebrovascular disease 438 Late effects of cerebrovascular disease
440-445, 447-448	Diseases of arteries, arterioles, and capillaries	440 Atherosclerosis 441 Aortic aneurysm and dissection 442 Other aneurysm 443 Other peripheral vascular disease 444 Arterial embolism and thrombosis 445 Atheroembolism 447 Other disorders of arteries and arterioles 448 Disease of capillaries
453.4	Venous embolism and thrombosis of deep vessels of lower extremity (deep vein thrombosis, DVT)	
490-492, 496	Chronic obstructive pulmonary disease (COPD) and allied conditions	490 Bronchitis, not specified as acute or chronic 491 Chronic bronchitis 492 Emphysema 496 Chronic airway obstruction, not elsewhere classified
493	Asthma	

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Table A.4.5.c Odds Ratio (OR) with lower and upper 95% Confidence Intervals (CI) and p values for Primary Hospital Discharge Data for various ICD-9-CM Codes for combined years 2000-2009 for Midlothian ZIP code 76065, Ellis County, or Public Health Region 3 compared to Ellis County, Public Health Region 3 (PHR 3), or Texas. Code: Green shading—significantly less; pink shading—significantly greater than the respective comparison group. Data Source: TDSHS Center for Health Statistics, Public Use Data File. Table 4.5.c.1 Diabetes mellitus

ICD-9-CM Description	ICD-9-CM Code(s)	Area	Ellis County				Public Health Region 3 (PHR 3)				Texas			
			OR	Lower 95% CI	Upper 95% CI	p Value	OR	Lower 95% CI	Upper 95% CI	p Value	OR	Lower 95% CI	Upper 95% CI	p Value
Diabetes mellitus	250	ZIP 76065	0.664	0.577	0.765	0.000	0.772	0.674	0.883	0.000	0.714	0.624	0.817	0.000
		Ellis County					1.112	1.066	1.160	0.000	1.026	0.984	1.070	0.229
		PHR 3									0.902	0.895	0.909	0.000

Table 4.5.c.2 Cardiovascular Diseases

ICD-9-CM Description	ICD-9-CM Code(s)	Area	Ellis County				Public Health Region 3 (PHR 3)				Texas			
			OR	Lower 95% CI	Upper 95% CI	p Value	OR	Lower 95% CI	Upper 95% CI	p Value	OR	Lower 95% CI	Upper 95% CI	p Value
Essential hypertension	401	ZIP 76065	0.578	0.397	0.842	0.004	0.488	0.342	0.697	0.000	0.459	0.322	0.654	0.000
		Ellis County					0.793	0.713	0.881	0.000	0.747	0.672	0.830	0.000
		PHR 3									0.920	0.905	0.935	0.000
Acute myocardial infarction	410	ZIP 76065	1.085	0.970	1.214	0.153	1.223	1.103	1.356	0.000	1.184	1.068	1.313	0.001
		Ellis County					1.143	1.098	1.190	0.000	1.105	1.062	1.149	0.000
		PHR 3									0.959	0.952	0.966	0.000

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

Other ischemic heart disease	411-414	ZIP 76065	1.037	0.954	1.129	0.393	1.299	1.202	1.405	0.000	1.118	1.034	1.209	0.005
		Ellis County					1.265	1.228	1.303	0.000	1.084	1.053	1.116	0.000
		PHR 3									0.823	0.818	0.827	0.000
Acute pulmonary heart disease	415	ZIP 76065	1.316	1.025	1.690	0.031	1.194	0.951	1.501	0.127	1.350	1.075	1.694	0.010
		Ellis County					0.945	0.859	1.040	0.248	1.070	0.973	1.177	0.163
		PHR 3									1.183	1.164	1.202	0.000
Cardiac dysrhythmias	427	ZIP 76065	1.092	0.968	1.231	0.152	1.087	0.973	1.215	0.139	1.038	0.929	1.159	0.514
		Ellis County					1.008	0.966	1.053	0.702	0.962	0.922	1.004	0.076
		PHR 3									0.940	0.933	0.947	0.000
Heart failure	428	ZIP 76065	0.784	0.707	0.870	0.000	0.873	0.791	0.963	0.007	0.781	0.708	0.861	0.000
		Ellis County					1.083	1.048	1.120	0.000	0.966	0.935	0.999	0.040
		PHR 3									0.863	0.858	0.868	0.000
Cerebrovascular disease	430-438	ZIP 76065	0.967	0.875	1.068	0.507	0.951	0.867	1.044	0.293	0.935	0.852	1.026	0.156
		Ellis County					0.979	0.946	1.013	0.230	0.963	0.931	0.996	0.027
		PHR 3									0.977	0.971	0.983	0.000
Diseases of arteries, arterioles, and capillaries	440-445, 447-448	ZIP 76065	0.867	0.727	1.034	0.112	1.011	0.857	1.193	0.893	0.856	0.726	1.010	0.065
		Ellis County					1.149	1.084	1.218	0.000	0.969	0.915	1.027	0.292
		PHR 3									0.805	0.796	0.813	0.000

Midlothian Area Air Quality Petition Response—Evaluation of Health Outcome Data – Final

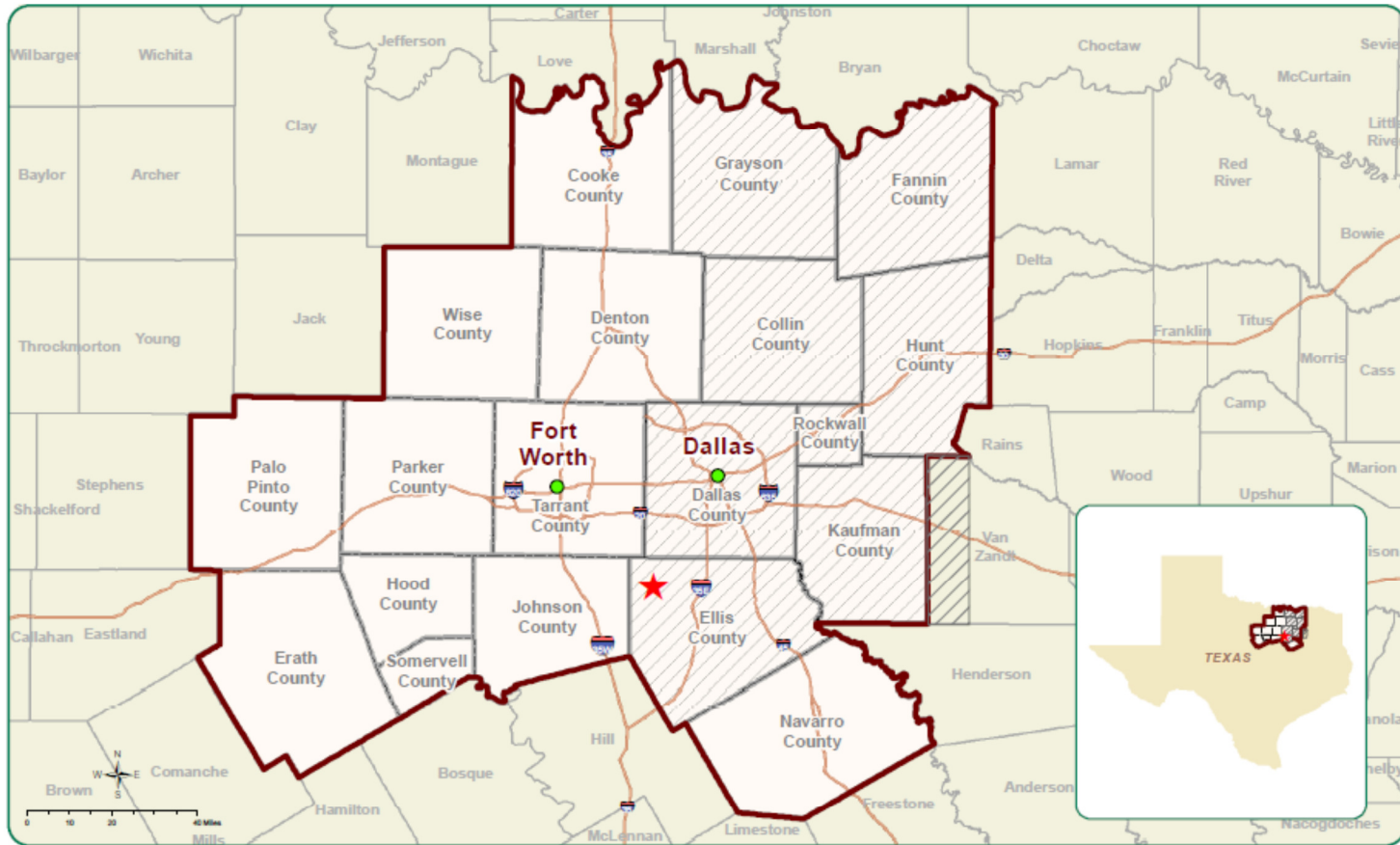
Venous embolism and thrombosis of deep vessels of lower extremity (deep vein thrombosis, DVT)	453.4	ZIP 76065	1.018	0.716	1.449	0.919	0.936	0.675	1.298	0.692	1.046	0.754	1.451	0.787
		Ellis County					0.920	0.813	1.040	0.184	1.030	0.911	1.164	0.638
		PHR 3									1.164	1.140	1.188	0.000

Table 4.5.c.3 Respiratory Diseases

ICD-9-CM Description	ICD-9-CM Code(s)	Area	Ellis County				Public Health Region 3 (PHR 3)				Texas			
			OR	Lower 95% CI	Upper 95% CI	p Value	OR	Lower 95% CI	Upper 95% CI	p Value	OR	Lower 95% CI	Upper 95% CI	p Value
Chronic obstructive pulmonary disease (COPD) and allied conditions	490-492, 496	ZIP 76065	0.909	0.789	1.048	0.189	0.796	0.697	0.909	0.001	0.756	0.662	0.863	0.000
		Ellis County					0.862	0.822	0.904	0.000	0.821	0.783	0.860	0.000
		PHR 3									0.934	0.927	0.941	0.000
Asthma	493	ZIP 76065	1.120	0.992	1.264	0.067	1.404	1.256	1.569	0.000	1.509	1.351	1.686	0.000
		Ellis County					1.280	1.225	1.338	0.000	1.372	1.314	1.433	0.000
		PHR 3									1.105	1.095	1.114	0.000

APPENDIX B
FIGURES

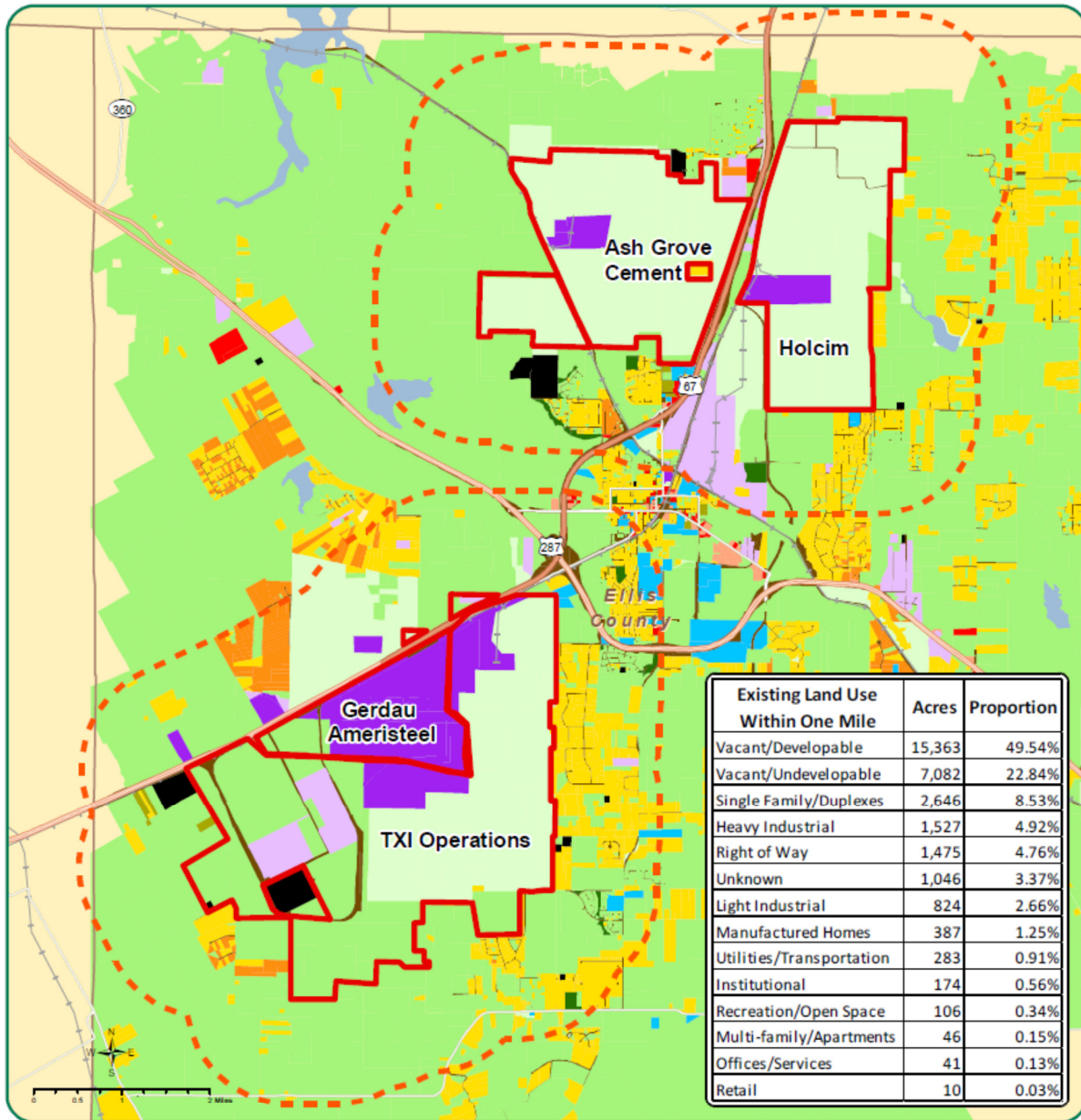
Figure B.2.1 Midlothian, TX Site Location



Legend

- Public Health Region 3
- County boundaries
- Education Service Center (ESC) Region 10
- Major cities
- Site location

Figure B.2.2 Existing Land Use, Midlothian, TX



Legend

- | | | | |
|----------------------|--------------------------|-------------------------|---------------------|
| Vacant/Developable | Heavy Industrial | Single-family/Duplexes | Retail |
| Vacant/Undevelopable | Utilities/Transportation | Multi-family/Apartments | Office/Services |
| Light Industrial | Right-of-Way | Manufactured Homes | Facility boundaries |
| | Recreation/Open Space | Institutional | One - mile buffer |

Data Source: Midlothian, TX, Planning Division (September 2012)

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Division of Community Health Investigations



Figure B.2.3 Facilities of Interest in Midlothian, TX and Extraterritorial Jurisdiction

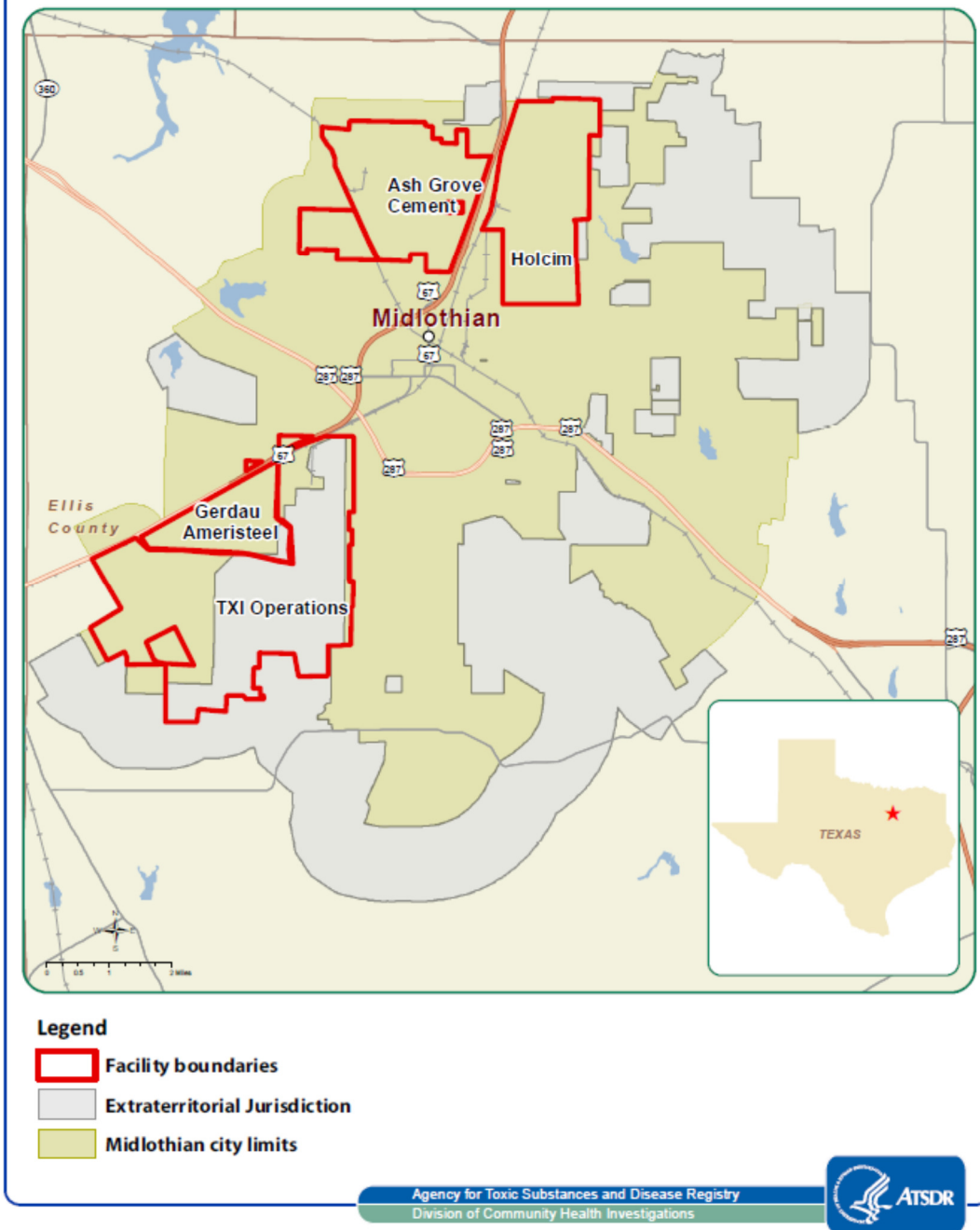
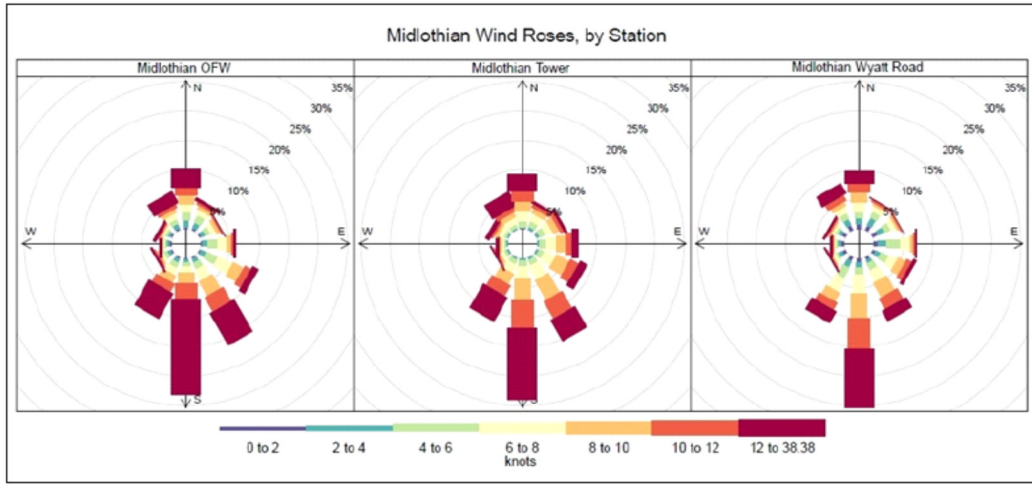
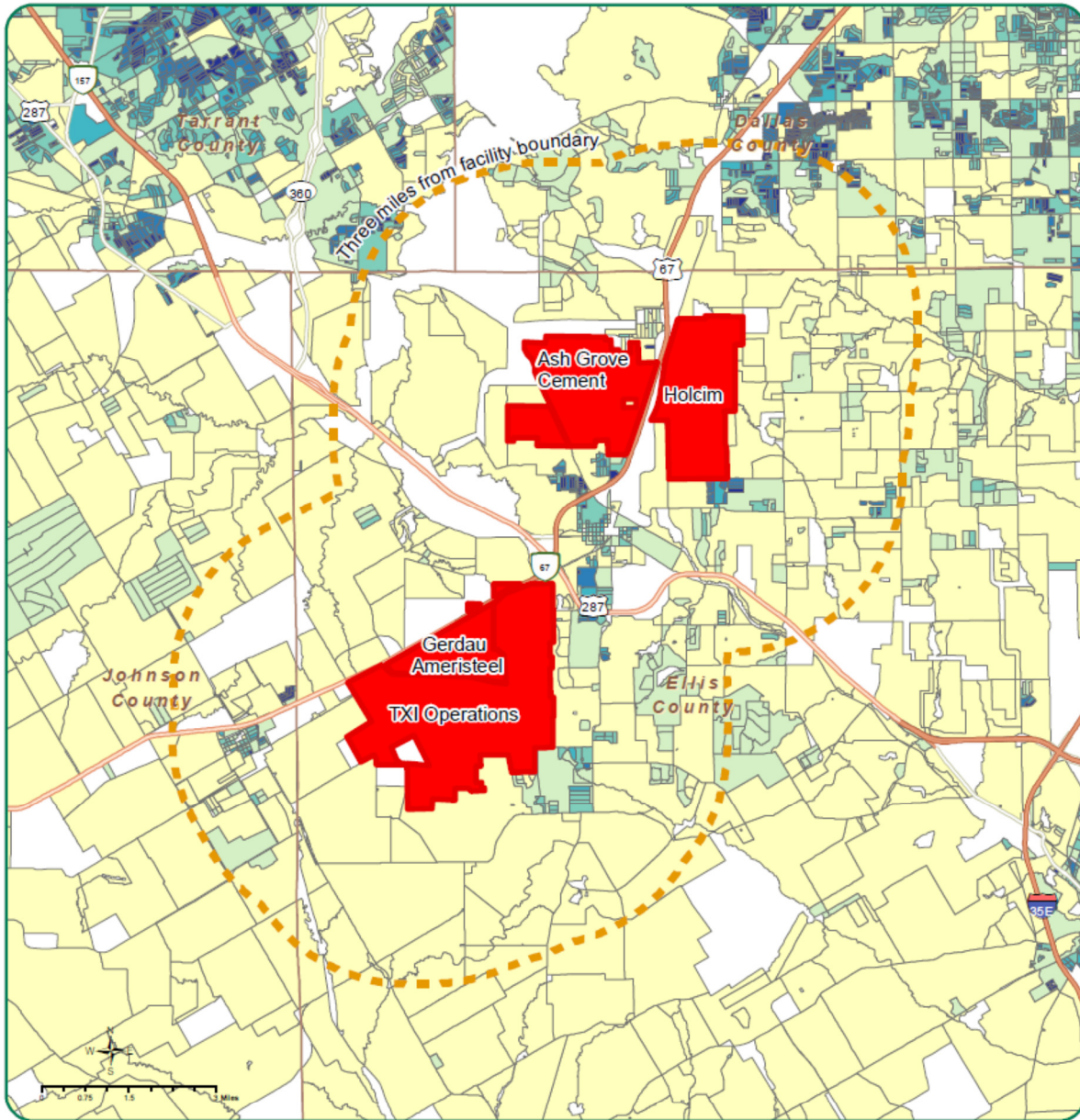


Figure B.2.4 Midlothian Wind Roses for the Old Fort Worth (OFW) Rd., Midlothian Tower, and Wyatt Rd. Stations (2001-2011)



Data source: TCEQ (<http://www.tceq.texas.gov/agency/data/download-data.html#airdata>)

Figure B.2.5 Demographics within Three Miles of Facilities, Midlothian, TX



Legend

Population density 0 0.7 - 663.5 663.6 - 2,418 2,418.1 - 4,675.4 4,675.5 - 6,593.4 6,593.5 - 8,705.8 >8,705.8
people per square mile

Three - mile buffer of facilities **Facility boundaries**

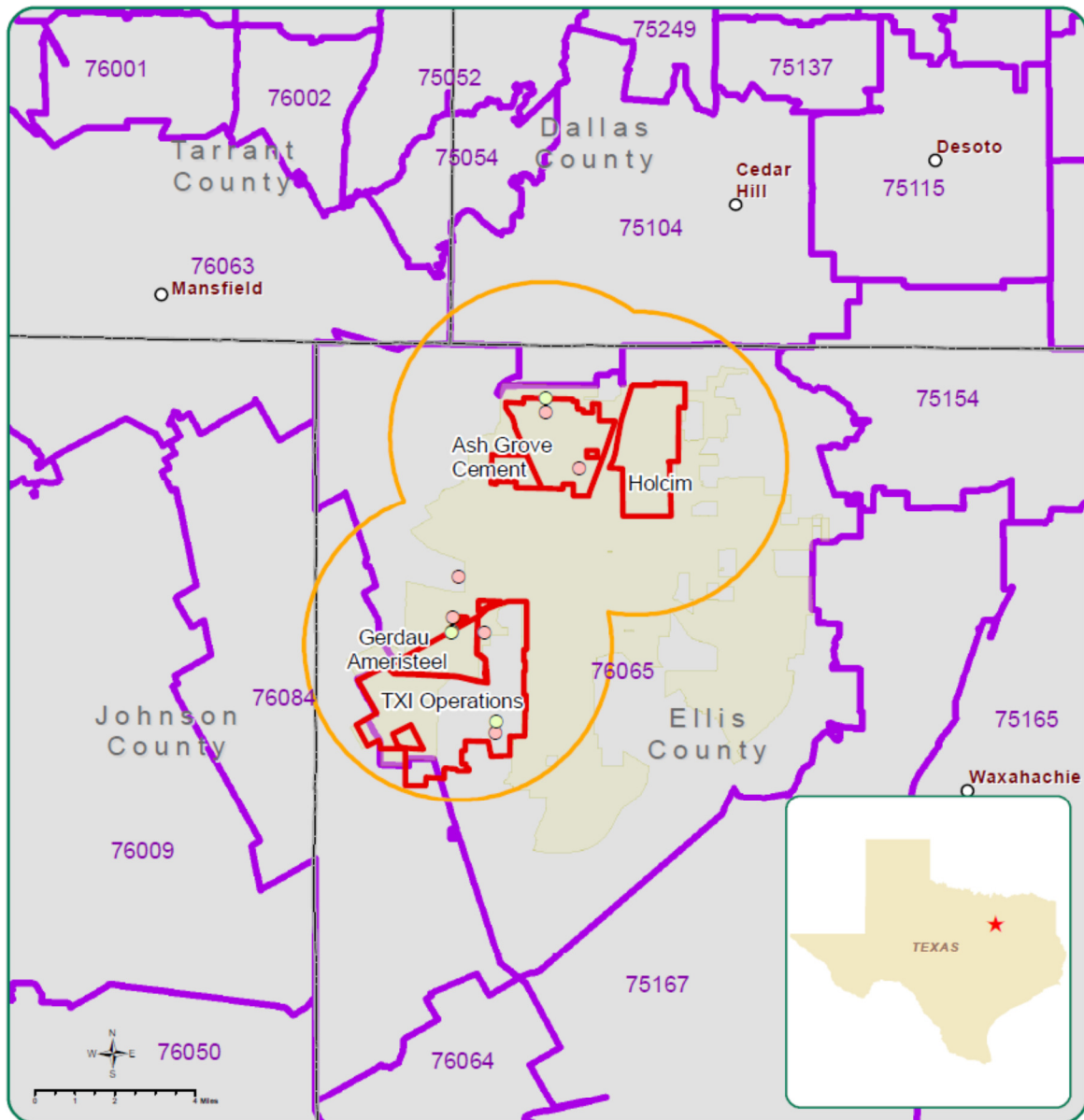
Census (2010) Block data for three - mile buffer of facilities

Total population	White	Black	Hispanic	Age<=6	Age<=18	Age>=65	Female 15-44
42,740	31,790 (74%)	6,716 (16%)	6,955 (16%)	4,354 (10%)	13,226 (31%)	3,256 (8%)	8,856 (21%)

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Figure B.3.1 Potential Area of Impact with Surrounding ZIP Codes



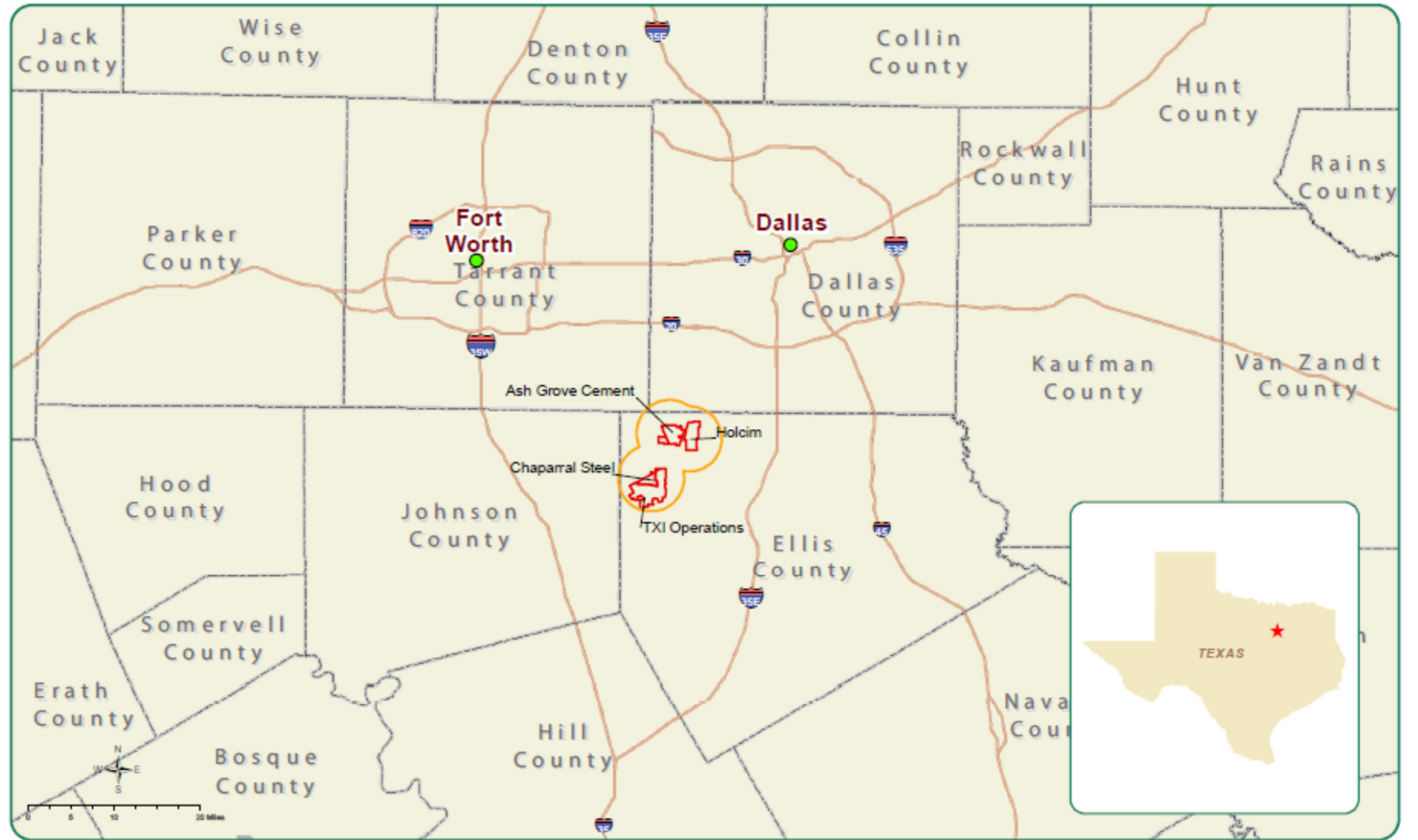
Legend

- | | |
|------------------------------|------------------------|
| EPA-derived points | Facility boundaries |
| Maximum combined deposition | Midlothian city limits |
| Maximum air concentration | ZIP codes |
| ATSDR-derived area of impact | Counties |

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Division of Community Health Investigations



Figure B.3.2 Potential Area of Impact with Surrounding Counties



- Legend**
- ATSDR-derived area of impact
 - Major cities
 - Facility boundaries
 - County boundaries

Appendix C – ATSDR Response to Public Comments

In this section we present verbatim comments received during the 90 day public comment period, from 8/26/15 through 11/23/15, for the Midlothian Area Air Quality Health Consultation titled, “Evaluation of Health Outcome Data”, and our responses to those comments. Section A includes general comments received and Section B contains comments received on specific health outcomes, organized by health outcome category. Comments are numbered by section letter, subsection number, and comment number. ATSDR responses directly follow each comment. All page numbers referenced in this section refer to the public comment version of this health consultation.

Section A. General Comments

Comments submitted from the public, industry, and other agencies that are general or overarching comments about our approach, findings, and requests for considering additional information are included in this section. General comments are organized into subsections Overarching Comments (A.1) and Comments on Background Information (A.2).

A.1 Overarching Comments

A.1.1 Comment:

As a general issue of concern in the draft health consultation, the reader is lead to believe the air quality may have caused adverse health effects in the past when air monitoring in the Midlothian area indicates acceptable air quality. Further, air quality in Midlothian is better than most monitored areas of the country. This could lead to undue anxiety for the citizens of Midlothian.

We also note that the level of any given screening value does not constitute a bright line where health effects are expected to occur. On the contrary, these screening values are set at a level that protects the general population as well as sensitive subpopulations, incorporating an adequate margin of safety. Therefore, the simple fact that ambient air at a community monitoring site or modeled value exceeded a given screening value does not indicate (1) that citizens were actually exposed to that concentration, (2) that the concentrations measured at that monitor constitute unsafe exposures, or (3) that health effects would be expected from exposure to that concentration.

As the state environmental agency, the role of TCEQ is to protect our state’s public health and natural resources. Therefore, TCEQ considers protection of public health not only when evaluating ambient air data, but also when issuing air (or other media) authorizations. We use methods and models that are protective of public health with an adequate margin of safety. The TCEQ looks forward to continuing to work with ATSDR to address the findings and recommendations made in this report and to sharing additional data and information that will produce the best possible product for the public and for policymakers.

Response to comment A.1.1: Comment noted. As pointed out in the health consultation, this health outcome data review does not provide a cause and effect evaluation related to the chemicals of concern identified at the site. This health consultation provides a comprehensive overview of the health status of the community based on available data.

A.2.1 Comment:

Next Steps (All conclusions)

All Health Outcome Data

“At this time, ATSDR will not be requesting additional health outcome data from DSHS. ... Based on the health outcome data presented, at this time, ATSDR and DSHS have no recommendations for additional epidemiologic studies.”

Really? This report has identified a substantial lack of available information for certain health conditions. It would seem to the public that additional epidemiologic study is warranted.

Response to comment A.1.2: This health consultation provided a comprehensive overview of the health status of the community based on available data. The databases used in this health consultation were validated, well-maintained and conformed to national standards. These data sources were established for the more general public health goals of tracking regional trends and identifying any need for regional public health interventions. With few exceptions, nationwide efforts for disease surveillance and reporting are not the purview of ATSDR. Overall, we found that there were few statistically significant findings that suggested the burden of disease was different in Midlothian as compared to other populations in Texas evaluated, so no additional epidemiological studies were recommended.

A.1.3 Comment:

According to the U.S. Centers for Disease Control, almost two million more children in the U.S. were diagnosed with developmental disabilities in the mid-oughts than in the mid-1990's. This same decade saw Autism (mostly developed in male children) climb nearly 300 percent, while that of Attention Deficit Hyperactivity Disorder increased 33 percent. Endometriosis appears only in females but not until their cycles begin. It is established that these conditions are caused by Dioxin and Furans. So much of the study is modeled and not conclusive. The school playgrounds should be looked at due to rashes.

I have lived in this community for 44 years and I remember when our personal and livestock problems began — the early fall of 1988.

Unfortunately, the study appears inconclusive and too hypothetical.

Response to comment A.1.3: Comment noted. ATSDR acknowledges that in the entire United States, there has been an increase of diagnoses of autism and attention deficit hyperactivity disorder (ADHD) over the last thirty years. Both autism and ADHD are more common in boys than in girls. About one in six children in the United States have a developmental disability. While the information available from publicly available school reporting systems for this health consultation did not allow for conclusions to be made on autism or ADHD specifically, the percent of students participating in special education programs in the Midlothian school district was comparable to that in the United States.

Endometriosis, a disorder that affects 6-10% of women in the United States, is a condition in which uterine tissue grows outside a woman's uterus. The condition is noted after puberty when female sex hormones activate uterine tissue; the misplaced tissue may result in pain and infertility. There is no known cause of endometriosis. Animal and cell studies have shown the role dioxins may play in this disorder. As noted in this health consultation, Midlothian fertility rates were higher as compared to rates in Texas. As reported in the health consultation that looked at VOCs and metal exposures from air emissions [ATSDR 2015b], the worst-case scenario of modeled dioxin and furan ambient air concentrations found that no health based comparison values were exceeded, it is highly unlikely that adverse health effects would occur as a result of exposure.

As discussed in the section on acute symptoms (section 4.6), there is no public health reporting system available that captures the prevalence of acute irritant symptoms, so an epidemiological evaluation was not possible. While cement kiln dust and sulfuric acid aerosols are known acute irritants, there are many causes of skin rashes.

In this health consultation, most of the databases covered the period from the late 1990's onward. We also summarized reports prepared by the Texas Department of Health that covered earlier periods. Overall, the burden of disease in Midlothian was no different than in Texas. This health consultation was not a research study and the methods used could not provide a cause and effect

evaluation. The information in this health consultation was not hypothetical or modelled. Reported number of cases and rates of multiple health outcomes from validated databases were evaluated and conclusions were made on the statistical findings of rates of specific health conditions in Midlothian as compared to other areas.

A.2 Background Information Comments

A.2.1.a Comment:

Page 5: Air Sampling from 1997-2008 (11 years) – the text suggests that there were concentrations of sulfur dioxide (SO₂) that could have harmed the health of sensitive individuals. The concentrations are not mentioned in the text and the location for these alleged concentrations is also not well defined – it appears to be primarily around the industries in the southern part of Midlothian. It would be informative if the document stated whether this occurred in an industrial or residential area. Contrary to this statement, as TCEQ stated previously in our February, 2013, comments on the Health Consult: *Assessing the Public Health Implications of the Criteria (NAAQS) Air Pollutants and Hydrogen Sulfide*, Midlothian has been, and continues to be, in compliance with the applicable SO₂ NAAQS (the following paragraphs are re-stated from the TCEQ Comments on the NAAQS and H₂S draft Health Consult).

The SO₂ NAAQS are set at a level that includes an adequate margin of safety to protect public health. The phrase margin of safety indicates that the NAAQS must include a safety factor to compensate for the inherent uncertainties in available scientific data, making the level conservative. During the most recent review of the SO₂ NAAQS, after extensive consideration of the exposure duration, EPA determined that a 1-h standard was most appropriate. This 1-h standard is considered protective of human populations that are particularly susceptible to health problems associated with breathing SO₂.

The Midlothian area has been, and continues to be, in compliance with the applicable SO₂ NAAQS (see Figure 2). Thus, SO₂ levels in the Midlothian area, as defined by the NAAQS, are not of concern to public health.

The document also states that PM_{2.5} “...could have resulted in cardiopulmonary problems for some people.” Again, the concentrations are not mentioned in the text and the location for these alleged concentrations is also not well defined. On the contrary, as TCEQ stated previously in our February, 2013, comments on the Health Consult: *Assessing the Public Health Implications of the Criteria (NAAQS) Air Pollutants and Hydrogen Sulfide*, Midlothian has been, and continues to be, in compliance with the applicable SO₂ NAAQS (the following paragraphs are re-stated from the TCEQ Comments on the NAAQS and H₂S draft Health Consult).

First, we note that the Midlothian area has been and continues to be in compliance with the PM NAAQS (see Figure 3), which is set at a level that protects public health (including sensitive subpopulations) with an adequate margin of safety. Therefore, we disagree with the conclusion that health effects were likely to occur as a result of potential exposure to these levels of PM_{2.5} on either an annual or a 24-hour basis.

Second, on page 30, concentrations of PM_{2.5} were estimated from PM₁₀ measurements, based on a conversion factor of 0.47-0.52, with an adjustment of 2 µg/m³, for data prior to 2005. We note that when assessing potential health effects following this conversion from PM₁₀ to PM_{2.5}, additional uncertainty is introduced into the analysis. This source of uncertainty should be acknowledged in the draft consultation. Furthermore, the available PM₁₀ and PM_{2.5} measurements were not taken from collocated monitors, but from different sites on the same day. These sites are much farther from potential PM sources than fence-line monitors, such as the one at Gerdau Ameristeel. Consequently, the ratio of PM_{2.5} to PM₁₀ should be lower nearer to a dust source. In high dust areas throughout Texas, it is not unusual to observe ratios of 0.3 or less.

Therefore, the ATDSR estimated PM_{2.5} levels are likely to be too high for some sites, such as the Gerdau Ameristeel fence-line site. Finally, dust concentrations decrease rapidly with distance from a source; fence-line measurements may significantly over-estimate concentrations that would occur even a relatively short distance away, on the order of a tenth of a mile or more.

A.2.1.b Comment: *(Note: the same comment was received from both TXI Operations, LP (a Martin Marietta Company) and Ash Grove Cement Company.)*

This ATSDR 2015 report relies on the flawed science reported in ATSDR’s previous draft 2012 Criteria Pollutant Health Consultation to incorrectly determine that Midlothian residents may have been exposed to short term irritant effects associated with sulfur dioxide, ozone, and particulate matter. TXI/Ash Grove has advised ATSDR of its scientific errors in prior correspondence with the Agency.

In addition, this current 2015 report compounds the flaws in ATSDR’s science beyond the incorrect conclusions reached in the 2012 report by appearing to extend the potential for irritant health effects to all Midlothian residents (see page xxiv) rather than the limited subset of individuals ATSDR incorrectly states may have experienced such health effects in its 2012 report. Finally, this 2015 report partly attributes the potential for irritant health effects to an air dispersion modeling analysis of sulfuric acid emissions, which is likewise severely flawed in both its methodology and analysis of results. A more detailed description of the flaws in ATSDR’s air dispersion modeling will be provided at a later date.

Response to comment A.2.1a and b: This section of the health consultation provides background information of the conclusions and findings from the three health consultations that evaluate environmental sampling data, but does not directly address environmental sampling. Because of the timing of the release of the various health consultations prepared for the site, the text in this health consultation reflects the summary and conclusions of the public comment version of the health consultation on criteria (NAAQS) air pollutants and hydrogen sulfide that was released in 2012 [ATSDR 2012b]. Based on comments received on that health consultation, the NAAQS health consultation was revised [ATSDR 2016a]. This report evaluating health outcome data incorporates the summary and conclusions from the revised NAAQS health consultation. Sulfur dioxide and sulfuric acid aerosols are known acute irritants, and the toxicological basis for our conclusions and recommendations on these pollutants can be found in the revised NAAQS health consultation [ATSDR 2016a] and the VOC and metal exposure from air emissions health consultation [ATSDR 2015b], respectively.

A.2.2. Comment:

Page 6: 1993-1998 – This section indicates that the area north of the Gerdau Ameristeel fence line “could have posed a risk in children”. Distance to the north from the fence line is not indicated, neither is it indicated if this is in a residential area or not.

Response to comment A.2.2: As stated in the previous response, this section of the health consultation provides background information on environmental sampling data evaluated in other health consultations prepared for this site. Because of the timing of the release of the various health consultations prepared for the site, the text in this health consultation reflects the summary and conclusions of the public comment version of the health consultation on criteria (NAAQS) air pollutants and hydrogen sulfide that was released in 2012 [ATSDR 2012b]. The text in this health consultation on health outcome data has been revised to incorporate the summary and conclusions found in the updated NAAQS health consultation. The commenter is referred to that revised document for a more detailed explanation on the environmental sampling evaluation.

Section B. Specific Comments on Health Outcomes

This section presents comments and responses for health outcomes, including: birth-related health outcomes (B.1), cancer (B.2), childhood lead exposures (B.3), chronic diseases (B.4), and other health concerns (B.5).

B.1 Birth-related Health Outcomes

B.1.1 Comment:

Summary pages xvii-xxiv: Analyzing all birth defects together (crude rates) has limited value. The epidemiology and causes of outcomes of specific birth defects are different so the logic of lumping them together may be questionable and misleading to the public.

Response to comment B.1.1: ATSDR disagrees and the category of “any monitored birth defect” remains included in the analyses. This health consultation provides a comprehensive overview of the health status of the community based on available data. Similarly, “total cancers” and total childhood cancers (age 0-19)” are categories evaluated under the cancer section. While both birth defects and cancers are groups of diseases, each with their own potential cause, the combined categories are shown to give readers an overall view of the incidence and prevalence of these types of diseases as a whole.

B.1.2 Comment:

Page 17: It is stated that 12 cases of Down syndrome were identified in Ellis County and were three times higher than expected; however, the comparison group for this is not stated (e.g., California’s Down Syndrome rates).

Response to comment B.1.2: In our summary of the Texas cluster investigation, the comparison group (California) used by the state is discussed (Page 17, paragraph 4), “Because of demographic similarities, California’s Down syndrome rates were used for comparison since Texas statewide data were not available at that time.”

B.1.3 Comment:

Page 18: It is stated that cases delivered between 1997-2001 to mothers residing in Midlothian, Venus, and Cedar Hill were compared to rates of Texas from 1999-2001 – why are there differences in the comparison dates? In order to make a proper comparison, dates should be the same, if the possible.

Response to comment B.1.3: This section summarizes cluster investigation number 2005.04. As explained in the TBDES report and earlier in the health consultation, the Texas birth defects registry did not cover the entire state of Texas until 1999, thus the period 1999 to 2001 was used for comparison. We have added a note of explanation.

B.1.4 Comment:

Page 24: It is not indicated whether the adjusted prevalence for ostium secundum type ASD was statistically significantly lower than the Texas adjusted prevalence. The Texas adjusted prevalence is not mentioned, but should be, or a reason given as to why it is not.

Response to comment B.1.4: The comparisons described in the health consultation are correct as stated. As explained in the Epidemiological Methods Used in this Health Consultation (Section 3.2), data from the entire state of Texas was used as a comparison or reference population and data from the smaller geographic entities were adjusted to this population, thus the Texas population remains as a crude rate. Because the data from the smaller geographic entities were directly standardized to data from the entire state of Texas, the adjusted prevalence rates for the smaller areas can be compared to the crude prevalence rates for the state of Texas.

B.1.5 Comment:

Page 25: The document states that, "After adjusting for maternal age and race, none of these five conditions remained significantly higher in the potential area of impact compared to Texas." Were the rates for Texas adjusted or crude?

Response to comment B.1.5: As explained in the response to comment B.1.4, data from the entire state of Texas was used as a comparison or reference population and data from the smaller geographic entities were adjusted to this population, thus the Texas population remains as a crude rate.

B.1.6 Comment:

Page 25: The following sentence in the same paragraph as above stated, “One condition (other specified anomalies of the ear (744.2)) remained significantly higher in Midlothian compared to the Texas crude prevalence (Table 4.1.5).” Were the rates for other specified anomalies of the ear for Midlothian adjusted or crude?

Response to comment B.1.6: As the paragraph describes (“After adjusting for maternal age and race...”), the rates provided for the smaller population areas are adjusted. As explained in the response to comment B.1.4, since data from the entire state of Texas was used as a comparison or reference population, the Texas population remains as a crude, or unadjusted rate.

B.1.7 Comment:

Page 29: Last sentence of the first paragraph states that there were 12 cases in the five year period (1997-2001), but this contradicts the previous sentence where it states of 102 cases per 10,000. Are the 12 cases adjusted?

Response to comment B.1.7: The document is correct as stated. There were 12 cases and the prevalence rate was 102 cases per 10,000 live births in this population. Cases are never adjusted; the rate was calculated by dividing the total number of cases in the five year period by the total number of live births in the same five year period. This rate was then multiplied by 10,000 (expressed as cases per 10,000 live births) to make the rate easier to understand and to facilitate comparisons. In this example, while saying 0.0102 cases per live birth, is equivalent to saying 102 cases per 10,000 live births, the latter is easier to grasp. As stated in this paragraph, the prevalence rate provided was a crude or unadjusted rate.

B.1.8 Comment:

Page 32: Table 4.1.11 should include Texas rates.

Response to comment B.1.8: Table 4.1.11 does include Texas rates in the upper left corner. The table has been revised to be more consistent with the other tables in this section.

B.1.9 Comment:

Conclusion 1, Birth Defects

“Although the crude prevalence of hypospadias (a birth defect in which the urinary opening is on the underside of the penis) for the potential area of impact, the city of Midlothian, Ellis County, and Public Health Region 3 were all significantly higher than the state of Texas, after adjusting for maternal age and race/ethnicity there was no statistically significant difference in hypospadias prevalence for the potential area of impact and Midlothian as compared to the state of Texas.”

The rate is significantly higher yet you adjusted it so that it wasn't. Did you adjust the rates you were comparing Ellis County to? Either both rates are “adjusted” or both are not. Citizens living in Midlothian report an awareness of this birth defect in their population where citizens living in other cities seem to have no knowledge of it. One Midlothian woman I met told me she knew of three baby boys born with this defect in recent months. That would seem to indicate a high number of cases for one person to be aware of in one community.

Response to comment B.1.9: This health consultation provided several comparison rates and ratios for looking at the prevalence of birth defects. As explained in the health consultation methods section, while for the first level of analysis crude (also known as unadjusted) rates were used, the comparison may be misleading if the underlying population is different in some significant way from the population to which it is being compared (in this case, the state of Texas). While many risk factors are unknown, the rates of some conditions are known to vary by sex, age, or race/ethnicity. Databases often include this information, and an adjusted rate can be calculated to capture this aspect of population variability. For hypospadias, several epidemiological studies have shown that maternal age and maternal race/ethnicity are risk factors. Thus, it is appropriate to use maternal age and race/ethnicity-adjusted prevalence rates for the areas of interest, in order to make more valid and informative comparisons between the prevalence estimates in these areas and the prevalence for the state of Texas. The Texas Birth Defects Registry, a population-based active surveillance system, provided the number of cases and prevalence ascertained by their surveillance system for hypospadias and other birth defects for the period 1999-2008.

As explained in the Epidemiological Methods Used in this Health Consultation (Section 3.2), data from the entire state of Texas was used as a comparison or reference population and data from the smaller geographic entities, including Midlothian and Ellis County, were adjusted to this population, thus the Texas population remains as a crude rate. Because the data from the smaller geographic entities were directly standardized to data from the entire state of Texas, the adjusted prevalence rates for the smaller areas can be compared to the crude prevalence rates for the state of Texas.

B.1.10 Comment:

“However when compared to the remainder of Public Health Region 3, the adjusted prevalence ratios for Down syndrome were statistically significantly higher for the potential area of impact and Ellis County.” It was explained in your meeting dated November 17 that the rate of Down syndrome was high in Ellis County but not in Midlothian proper. Air pollution knows no boundaries. If the rate of Down syndrome is especially high in Ovilla or Venus, that is a direct link to the air pollution coming from Midlothian.

Response to comment B.1.10: The crude and adjusted prevalence of Down syndrome was statistically similar in Ellis County when compared to either Public Health Region 3 or the state of Texas. The adjusted prevalence ratio, but not the crude prevalence ratio, was statistically significantly higher in Ellis County when compared to the remainder of Public Health Region 3. The known risk factors for Down syndrome are maternal age, having had one child with Down syndrome, and being a carrier of the genetic translocation for Down syndrome. This health outcome evaluation focused on Midlothian. No information was obtained on Ovilla, Texas; the TBDES cluster investigation in 2005 found no statistical difference between the prevalence rate for Down syndrome in Venus, Texas and the statewide prevalence.

ATSDR disagrees that there is a direct link between air pollution levels in Midlothian and Down syndrome in surrounding cities. The potential area of impact from air emissions has been identified and is presented in our Health Consultations on air quality [ATSDR 2015a,b, 2016a], and the area does not include surrounding cities. If correlated, disease rates from pollutants would be expected to be highest in the area with the highest ambient air concentrations of pollutants, and not in more distant locations.

B.1.11 Comment:

“...specified anomalies of the ear were statistically significantly higher than the state of Texas prevalence estimates.”

“...congenital hypertrophic stenosis were statistically significant for the potential area of impact and Midlothian with respect to the remainder of Public Health Region 3, indicating higher rates in these two areas relative to Public Health Region 3.”

How do you explain these anomalies? What should be done?

Response to comment B.1.11: The health outcome data presented in this report cannot be used to show cause and effect. This is true for these findings as well as for the findings that were statistically significantly lower. Some significant findings are expected based on chance alone, and some conditions are associated with known risk factors for which we had no information from the cases. For example, there are some links to microtia with some medications. Both microtia and congenital hypertrophic pyloric stenosis are more common in boy babies and there is a decreased risk with higher maternal educational levels.

B.1.12 Comment:

Birth Defects Registry Specific

“The prevalence of birth defects found in Public Health Region 3, which includes Ellis and 18 other counties, is approximately 30% higher than the remainder of Texas. ATSDR recommends that TBDES: (a) consider evaluating potential reasons behind this difference, and (b) consider including both Public Health Region 3 and Texas as reference populations when providing data to the public on birth defects prevalence estimates in communities within Public Health Region 3.

In their cluster investigation report 2005.04, TBDES stated that they will continue monitor the prevalence of the birth defect hypospadias in the Midlothian area. ATSDR recommends that TBDES consider including Ellis County and Public Health Region 3 in their future evaluations of the prevalence of the birth defect hypospadias.”

Is it possible for ATSDR to do more than recommend further investigation by TBDES? This would appear to be an epidemic of birth defects and TBDES should be required to do further investigation and study. Do you have the authority to demand action?

Response to comment B.1.12: In general, the prevalence of birth defects found in Public Health Region 3 was approximately 30% higher than the remainder of Texas. This suggests that there may be a difference in how the registry data is obtained or other reasons, and this was brought to TBDES’ attention. Given the size and population of Public Health Region 3, it is reasonable to use this area as a reference population. Citizens can request information on birth defects from the state. Based on the evaluation of birth defects prevalence data provided to ATSDR, no additional recommendations were made for epidemiological studies. ATSDR is a federal agency that makes public health recommendations and does not have regulatory authority. The Texas Birth Defects Registry was established under a state legislative act. While the Registry is a member of the National Birth Defects Prevention Network which provides guidance, there are no federally mandated regulations involving the registries.

B.2 Cancer

B.2.1 Comment:

Conclusion 3, Cancer

Although the report concludes there is no difference in cancer rates in Midlothian as compared to rest of Texas, please consider a Spanish epidemiological study. According to the researchers, a statistically significant increase in all cancer mortality was detected in the vicinity of these installations as a whole, but principally, in the vicinity of cement installations. Specifically, tumors of the colon–rectum in both sexes and of the pleura peritoneum, gallbladder, bladder and stomach in men were noticeably higher. In a summary of the results, the authors state they believe residents have *“an excess risk of dying from cancer, especially in colon–rectum, in towns near these industries.”* (<http://www.pubfacts.com/detail/25681568/Cancer-mortality-in-towns-in-the-vicinity-of-installations-for-the-production-of-cement-lime-plaster>)

Does ASTDR believe that what is true in Spain is not true in Midlothian? Further review is needed of cancer cases in Midlothian and Ellis County as a whole.

Response to comment B.2.1: The methodology used in the García-Pérez study mentioned above does not allow for a direct comparison with the findings in this health consultation. Furthermore, cancer mortality is impacted by stage and age at diagnosis, access to care, and type and completeness of treatment; this health consultation does not allow for comparison between the health care systems of Spain and the United States. In our evaluation of Texas Cancer Registry data, we did not find any statistically significantly higher number of deaths than expected for either men or women (99% confidence interval) for all cancers combined, total childhood cancers, total childhood leukemia, 5 leukemia sub-types, and 25 cancers grouped by site for the ten year period 2000-2009 in either Midlothian ZIP code 76095 or Ellis County as compared to the state of Texas. There were similar findings in previous mortality studies completed by DSHS for the Midlothian ZIP codes that covered the years 1984-1993, 1990-1996, and 1993-2002.

B.3 Childhood Lead Exposure

B.3.1 Comment:

Page 56: The document found that past lead exposures during the period of 1993-1998, in a localized area just north of the Gerdau Ameristeel fence line, were at concentrations that may have harmed the health of children who resided or frequently played in the area. The document does not state how far north. This information would be informative since just north of the fence line is undeveloped land. The document also does not state what the demographics were in this area at the time. This statement should be deleted if ATSDR is just “assuming” children were in the area.

It was predicted that 18-21% of the children (how many children) in the area (define the area sampled) from 1993-1998 had blood lead levels 5-10 micrograms per deciliter. The total number of children used for the prediction, and the specific area sampled need to be defined. The data presented in the section was collected from 1997-2009, where did the data for the years 1993-1996 come from?

Response to comment B.3.1: The introductory paragraph of the section on childhood lead exposures provides some background information from the evaluation and modelling performed in the health consultation on criteria air pollutants (NAAQS) that was released in 2012 [ATSDR 2012b]. That health consultation has been revised, and the text in this health consultation incorporates the updated findings. The commenter is referred to the revised NAAQS health consultation [ATSDR 2016a] for a more detailed explanation on the environmental sampling evaluation and lead modelling results. Data presented in this health consultation were clinical blood lead results from 1997-2009 for children tested who were between the ages of 0 and 14.

B.3.2 Comment:

Page 60: The summary contradicts the introduction paragraph – these should be consistent.

Response to comment B.3.2: We do not see any contradiction. The conclusion states the findings of the actual blood lead data. The introductory paragraph provides some background information from environmental sampling data evaluation and modelling performed in the health consultation on NAAQS [ATSDR 2016a].

B.4 Chronic Diseases

B.4.1 Comment:

Page 65 & 75 & 80 & 86: It should be noted that BRFSS data is self-reported data that may be subject to response bias and confounding issues.

Response to comment B.4.1: Agreed, the sub-section on databases for chronic diseases explains that BRFSS uses telephone survey methods to obtain information. Additionally, as explained in section 3, there are limitations on all the databases used in this health consultation, including the latency of some health outcomes of interest and the lack of information on additional risk factors that could be associated with the disease.

B.4.2 Comment:

Page 66 & 70 & 76-77: Since data cannot be used to determine prevalence or used to compare one area to the other, the efficacy of the Public Use Data File analysis is questionable.

Response to comment B.4.2: We disagree. We explain that no prevalence rates can be calculated from this data file, however, we generate odds ratios that provide some useful comparisons.

B.4.3 Comment:

Page 77: The data does not account for confounding issues in the document.

Response to comment B.4.3: As explained in section 3, there are limitations on all the databases used in this health consultation, including the latency of some health outcomes of interest and the lack of information on additional risk factors that could be associated with the disease. For these and other reasons, these databases cannot be used to determine cause and effect. Despite these limitations, the data does provide an overview of the health status of the community.

B.5 Other Health Concerns

B.5.1 Comment:

Page 84: It is stated that modeled emissions of sulfuric acid aerosols "...found concentrations that can be acutely irritating to the eyes, nose, and skin." The document refers to other Midlothian Health Consults (not the specific one(s)) and does not give the concentrations or when the concentrations were predicted to have occurred.

Response to comment B.5.1: This health consultation evaluated health outcome data from various surveillance systems and databases and incorporated the summary and conclusions from the VOC and metal exposures in air health consultation [ATSDR 2015b]. The commenter is referred to that health consultation for a more detailed explanation on the environmental sampling evaluation.

B.5.2 Comment:

Page 88: ALS is given as a concern of the citizens, but the fundamental question that should be answered is whether or not ALS would be expected to be associated with air quality.

Response to comment B.5.2: ATSDR addressed the health concerns raised by community members, regardless of whether a direct relationship with air pollutants was known. As stated in the section on ALS, the cause of ALS has not been determined.

B.5.3 Comment:

Conclusion 9, Other Health Concerns

"The information available from public health reporting systems was insufficient to allow for a definitive epidemiological evaluation of the occurrence of acute symptoms, autoimmune diseases, amyotrophic lateral sclerosis (ALS), and some other community health concerns in the Midlothian area. ...exposed individuals in Midlothian may experience these acute symptoms."

The report admits there is not enough information but Midlothian citizens are at risk. Who is responsible for following up and getting the necessary information to make a determination. Please make sure the report clearly states that there is no definitive answer on health effects. Do not let politicians and industry use the ATSDR report to state that their pollution has no effect on public health. You are admitting that you do not know for certain.

Response to comment B.5.3: For some health outcomes of interest, there were no databases available at the local, state, or national level to provide an epidemiologic evaluation. Information on some of these outcomes will require legislative acts and funding to put them in place. For other health conditions, surrogate measures such as prescription information might be used, but have problems with validation and making disease prevalence estimates. ATSDR’s ALS registry is voluntary, it is up to individuals to report their findings. As repeatedly stated in this health consultation, this health outcome data evaluation cannot be used to determine cause and effect, and no definitive answer on health effects is presented.

B.5.4 Comment:

Conclusion 10, Special Education

“The information available from publicly available school reporting systems did not allow for conclusions to be made on attention deficit hyperactivity disorder (ADHD), autism, or special education participation by Midlothian school children.

The percent of students participating in special education programs in the Midlothian ISD was consistently one to three percent higher than the percent in ESC Region 10 and Texas. The percent participation in the Midlothian ISD was lower than the U.S. Department of Education reported national average percent participation.

There are more than a dozen major categories of disabilities that fall into the special education category. The TEA website data did not distinguish among percent of students with ADHD, autism, or other disabilities.”

Scientists from the Harvard School of Public Health reported in December 2014 children whose mothers were exposed to high levels of fine particulate pollution in late pregnancy have up to twice the risk of developing autism as children of mothers breathing cleaner air. The greater the exposure to fine particulates emitted by fires, vehicles, and industrial smokestacks the greater the risk, found the study, published online in Environmental Health Perspectives. Read more at Reuters

<http://www.reuters.com/article/2014/12/18/us-autism-idUSKBN0JW0B020141218#YtmkJGCL3Z4bzyy4.99>

It does not appear that ATSDR has investigated this link between autism and particulate matter pollution in either the birth defects section or the special education section. Please conduct further study in this area since pregnant mothers in Ellis County are exposed to a substantial amount of particulate matter pollution.

Response to comment B.5.4: ATSDR has no plans to conduct a research study on pregnant mothers in Ellis County. The purpose of this health consultation was to use existing, validated health outcome data to determine the incidence or prevalence of health outcomes in Midlothian. While, comparison of these rates with the rates in the state of Texas or other geographic areas might suggest the need for further studies, no cause and effect relationship could be determined, and more specifically, no link between autism and pollutants was investigated. Autism is not considered a birth defect, so was not included in those analyses. Using the special education participation rates as a surrogate, the percent of participation in these programs was similar in Midlothian as in the United States. The health consultation on criteria air pollutants (NAAQS) that included evaluation of particulate matter [ATSDR 2016a], concluded that with the exception of infrequent, short-term exposures to PM_{2.5} that may be a concern to sensitive populations, long-term exposure to particulate matter concentrations in the Midlothian area was not likely to have harmed people’s health.

Appendix D – ATSDR Response to Peer Review Comments

Evaluation of Health Outcome Data as Part of the Midlothian Area Air Quality Petition Response Midlothian, Ellis County, Texas

HEALTH CONSULTATION

FEBRUARY 2016

GUIDE TO REVIEWERS:

The objective of peer review conducted by the Office of Science is to ensure the highest quality of science for NCEH/ATSDR studies and results of research; therefore, your comments should be provided with this goal in mind. Unlike other peer review processes in which you may have participated, the questions to be addressed for NCEH/ATSDR are broadly based so that each reviewer may have a wide latitude in providing his/her comments. Any remarks you wish to make that have not been specifically covered by the General Questions Section may be included under question # 2 in the Additional Questions Section. Please note that your unaltered comments will be sent to the investigator for a response. You should receive a copy of the response to the peer review comments when they are available.

This health consultation, which examines health outcome data in the Midlothian area, is one of a series of six health consultations being prepared by ATSDR for this site. For information on other health consultations, please visit http://www.atsdr.cdc.gov/sites/midlothian/health_consultations.html.

Reviewer #1

- 1. Does the health consultation adequately address the health conditions and concerns raised by community members?**

Reviewer Answer: It is a bit of mystery for the reader of this document why this huge investigation was undertaken, as there is no clear background ‘story’ of the community complaints which lead to this effort.

Also missing are any air pollution data which are to be the subject of another report, but which would be good to be included here if only briefly.

I get the general sense that the three plants in Midlothian caused community concerns about air pollution and health, but why these plants, in this city? Surely there are plants in a number of cities throughout Texas; what is special about this one?

ATSDR Response: For this petition response, ATSDR chose to provide a series of health consultations to address the petitioners’ concerns about the site. This health consultation addressed question related to their concerns about a perceived increased incidence of various health effects. The purpose of this and the other six health consultations can be found in Section 1. Other background information, including chemicals of concern that were identified in the companion health consultations that evaluate environmental sampling data, can be found in Section 2.

In addition to ATSDR conducting health assessments at national priority sites, which are mandated by law, anyone can petition ATSDR to perform a public health assessment. In this case, petitioners requested that ATSDR evaluate the cement industries and steel manufacturing plant because the petitioners felt that air emissions from these industries were harming their health.

- 2. Are the epidemiologic and statistical methods used in this health consultation adequately described and used appropriately?**

Reviewer Answer: For the most part, yes. However, I have some specific comments in the methods section, see text.

ATSDR Response: Specific comments in the methods section were reviewed and the health consultation was revised where appropriate.

3. Is the reviewer aware of additional validated databases on health conditions that could have been evaluated to address the health concerns presented in this health consultation?

Reviewer Answer: No.

ATSDR Response: None needed.

4. Are the conclusions and recommendations appropriate in view of the health outcome data evaluated in this health consultation?

Reviewer Answer: Yes. There are few apparent elevations of any disease in the affected area or Midlothian, and those which pop up are discussed with appropriate caution.

ATSDR Response: Comment noted.

5. Are there any other comments about the health consultation that you would like to make?

Reviewer Answer: This has been a huge amount of work and the authors are to be commended

ATSDR Response: Comment noted.

ADDITIONAL QUESTIONS:

6. Are there any comments on ATSDR's peer review process?

Reviewer Answer: No.

ATSDR Response: None needed.

7. Are there any other comments?

Reviewer Answer: See annotated text, attached.

ATSDR Response: Edits to the text and specific comments were reviewed and the health consultation was revised, as appropriate.

Reviewer #2

1. Does the health consultation adequately address the health conditions and concerns raised by community members?

Reviewer Answer: Yes, this is a very thorough evaluation of the health concerns raised by community members.

ATSDR Response: Comment noted.

2. Are the epidemiologic and statistical methods used in this health consultation adequately described and used appropriately?

Reviewer Answer: Yes. I would suggest to the authors not discuss causation and stick with association. Causal inference of observational data would have required not only a much larger longitudinal dataset but more advanced epidemiological methods such as James Robin’s G-estimation (e.g., J Robins. 1986. A new approach to causal inference in mortality studies with a sustained exposure period—application to control of the healthy worker survivor effect. *Mathematical Modelling* 7 (9), 1393-1512).

*Throughout the report there is mention that the authors did not adjust for multiple comparisons because of the exploratory nature of the analyses citing that traditional methods were too restrictive (e.g., familywise error rate). There are however other methods such as the False Discovery Rate that are less restrictive (Benjamini, Y. and Y. Hochberg. 1995. Controlling the false discovery rate: a practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society B* 57: 289-300). It may be useful to pursue this approach.*

I would suggest renaming section 3.2, Epidemiological and Statistical Methods Used in this Health Consultation, or split to include a statistical methods section (i.e., 3.3.). I suggest this because there is no current mention of the Student T-Test (one vs two-tailed test should also be explained) but a detailed explanation of the Poisson distribution. Also, the software package used for the analyses should be included here (e.g., SAS, JMP, Stata, R). SPSS is mentioned only on page 90 in the context of complex sampling the databases for chronic diseases.

I understand that this is one of six evaluations. However, exposure limited to zip code may be accurate but imprecise. I would suggest future analyses incorporate exposure data from the other analysis for more refined estimates and possible exploration of interactions.

ATSDR Response: ATSDR felt it was important to point out to the public, who typically have less familiarity with epidemiological studies, that the health outcome evaluations that were performed for this health consultation could not answer their questions on causation. Thus, this caution in interpretation of findings was presented when discussing statistical results.

The issue of correcting for the familywise error rate was discussed by ATSDR and TDSHS epidemiologists. ATSDR explored using the Bonferroni correction, the sequentially rejective Bonferroni test, and the Benjamin-Hochberg False Discovery Rate test. Combined with the fact that the assumption of independent analyses was not met, our analyses supported the decision not to include any statistical correction.

The title of Section 3.2 has been changed to include “statistical”. While we had chosen to include a discussion about the use of the Poisson distribution for the more informed reader who may have questions concerning our handling of the small number of cases for many of our health outcomes, we were aware that this discussion was not meaningful to the typical reader. We have chosen not to include an explanation of the Student-T test, other statistical operations, or list software packages. The target audience is the community, and the intended objective of this section was to provide some basic understanding of epidemiological terms and statistical significance.

ATSDR used existing databases to evaluate numerous health concerns. The geographic unit used for each outcome was selected based on the database’s geographic variables. Since the concern in the community was for air emissions from four large facilities, a large geographic area was the area

of interest (Figure B.2.3). Based on air modeling, for some databases (birth outcomes and some cancer information), we were able to use geocoded data for the modeled potential area of impact. As can be seen in Figure B.3.1, there is large overlap, especially for the modeled potential area of impact and the city of Midlothian. For some databases, the smallest geographic unit either available or with enough cases for evaluation, was at the ZIP code level.

3. **Is the reviewer aware of additional validated databases on health conditions that could have been evaluated to address the health concerns presented in this health consultation?**

Reviewer Answer: No. This was a very comprehensive utilization of the existing databases. BRFSS is limited in that it is a phone survey but it is used widely.

ATSDR Response: None needed.

4. **Are the conclusions and recommendations appropriate in view of the health outcome data evaluated in the health consultation?**

Reviewer Answer: Yes. However, the findings of a qualitative change in odds regarding cardiovascular disease for increased acute myocardial infarction or other ischemic heart disease and acute pulmonary heart disease compared to decreased odds of hypertension and heart failure is a concern. This may be due to a small number of cases. I would simply state that the odds ratio of hospital discharge were inconclusive.

ATSDR Response: The results of the analyses of odds ratios for the different heart related conditions were discussed independently for each condition. No attempt was made to discuss the relationship of these conditions to each other, and therefore no conclusion was made about possible causation or association. We agree that some conditions would be related (for example, high blood pressure is a risk factor for myocardial infarction) and while one might expect similar trends, the primary hospital discharge database is not the best tool to evaluate any possible relationship. The odds ratios in the Texas hospital inpatient data analysis were not adjusted for age, race, or sex. Since we looked at primary diagnosis code, other comorbidities were not studied. As a result, conditions of lesser severity than the primary diagnosis may be under-represented in the reported results.

5. **Are there any other comments about the health consultation that you would like to make?**

Reviewer Answer: The authors did an outstanding job on this elegant evaluation. The meticulous detailed explanations are very impressive.

ATSDR Response: Comment noted.

ADDITIONAL QUESTIONS:

6. **Are there any comments on ATSDR's peer review process?**

Reviewer Answer: No. I thought the succinct questions were very relevant.

ATSDR Response: None needed.

7. **Are there any other comments?**

Reviewer Answer: Thank you for this opportunity to review this very important work.

ATSDR Response: Comment noted.

Reviewer #3

- 1. Does the health consultation adequately address the health conditions and concerns raised by community members?**

Reviewer Answer: Yes. The health consultation addressed a wide range of health conditions and concerns, including birth defects, birth outcomes, cancer, and chronic diseases (including cardiovascular disease, respiratory diseases, other), and educational outcomes. The performed analyses provide a reasonable characterization of the health of the Midlothian population. The health consultation adequately recognizes the limitations of the existing data, including potential biases and uncertainty due to limited sample size for some outcomes.

ATSDR Response: Comments noted.

- 2. Are the epidemiologic and statistical methods used in this health consultation adequately described and used appropriately?**

Reviewer Answer: The overall epidemiologic and statistical methods are adequate. One major issue in this analysis was to find a population to which compare the rates and prevalence of disease in Midlothian. The authors' decision to perform separate analysis using the Ellis County, Public Health Region 3 and the entire state of Texas are helpful, allowing an assessment of the sensitivity of the results to the choice of comparator.

The authors make sure to explain the problems of traditional hypothesis testing (i.e. p-values) in the context of multiple exploratory analyses without well-defined a priori hypotheses.

A major issue that cannot be addressed is confounding by other variables beyond race, sex, and age distribution in the Midlothian population vs the comparator populations. Variables like socioeconomic factors, which are strong determinants of health outcomes, could confound the associations if they are different in Midlothian compared to the rest of Ellis County and the other comparator populations. A little more information on those variables could have been helpful. For example, information on educational level, some economic and labor force indicators, or markers of lower socioeconomic status (e.g. WIC or Medicaid eligibility) in Midlothian vs other areas may have helped to determine how different Midlothian is in that respect.

In the analysis of 'chronic conditions' using the Texas hospital inpatient discharge data, it was unclear whether the odds ratios were crude or adjusted for variables like age, sex, race, and maybe other variables (e.g. hospital-level characteristics, other comorbidities as denoted by other ICD codes). I expect that information would be available for each hospitalization and could have been used in the analysis.

Finally, the authors may consider whether use of more novel statistical tools for sparse data with multiple outcomes may have helped in their analysis.

ATSDR Response: Unfortunately, as noted in our discussion of limitations of health outcome data (section 3.1), other important variables that influence health outcomes were not known. For chronic conditions which used Texas hospital inpatient discharge data, odds ratios were not adjusted for age, sex, and race. A note of explanation has been added to the text on page 62, paragraph 2. As discussed in response Reviewer 2, Question 2, some statistical methods were evaluated for their

usefulness in evaluating multiple outcomes, however, since this evaluation was meant to be exploratory, we did not feel they were appropriate.

- 3. Is the reviewer aware of additional validated databases on health conditions that could have been evaluated to address the health concerns presented in this health consultation?**

Reviewer Answer: Two data sources that may have provided additional information on health outcomes would be Medicaid and Medicare claims databases (managed by the Centers for Medicare and Medicaid Services, CMS). These 2 data sets would be able to provide ZIP code-specific data on hospitalizations and outpatient healthcare utilization, as well as the denominators for calculations of rates. As with other databases, Medicare and Medicaid services have limitations, but may have complemented some of the analyses, particularly those related to ‘Chronic Diseases’ (e.g. respiratory and cardiovascular diseases, diabetes), for which the used databases have important limitations.

ATSDR Response: ATSDR considered using Medicare and Medicaid databases, but chose not to because the percent participation in this population was relatively low based on median income, per capita income, and the percent of people living below the poverty level in Midlothian, and so we felt that the results would be less representative of the community. Additionally, the hospitalization data from these databases were included in the primary hospital discharge data.

- 4. Are the conclusions and recommendations appropriate in view of the health outcome data evaluated in the health consultation?**

Reviewer Answer: Yes. As the health consultation’s authors nicely describe, the data does not provide strong evidence of a higher risk of a range of health outcomes in the population of interest. At the same time, the consultation shows the many limitations of the available data, which preclude any definitive answer.

ATSDR Response: Comment noted.

- 5. Are there any other comments about the health consultation that you would like to make?**

Reviewer Answer: I would like to commend the authors of this document for their thorough assessment of health outcomes, the various analyses that were performed, and the efforts put to facilitate the interpretation of the methods and results, including potential limitations of the data sources and the analytical approaches.

ATSDR Response: Comment noted.

ADDITIONAL QUESTIONS:

- 6. Are there any comments on ATSDR's peer review process?**

Reviewer Answer: No.

ATSDR Response: None needed.

- 7. Are there any other comments?**

Reviewer Answer: A suggestion for the authors is to use logarithmic scale in Figures reporting SMRs and odds ratios (and their 95% confidence intervals) (e.g. Fig 4.3.3). Also, consider adding “(95% CI)” to the y-axis label in figures presenting odds ratios (e.g. Fig 4.5.1)

In the mortality analysis, the authors may consider highlighting the limitations in the validity of death certificates to identify the underlying cause of death, particularly for some conditions like Alzheimer’s disease. Alzheimer’s disease identified from death certificates is a gross underestimate of the true underlying incidence / prevalence of this type of dementia. Therefore, differences in Alzheimer’s disease mortality rates across regions and over time may be more related to differences in coding practices than to true differences.

When summarizing the analyses that use the hospital discharge database, the interpretation can be more accurate. For example, in the second summary point for the ‘Asthma’ section, the report says: “there were significantly more asthma primary hospital discharges for people living in ZIP code 76065.” However, since the hospital database does not use the actual population, but all hospitalizations as the denominator, I believe it would be more correct to say: “the proportion of asthma primary hospital discharges relative to all hospital discharges was higher for people living in ZIP code 76065”. If I understand correctly, the analysis cannot say whether there were more hospitalizations or not, but only whether the odds of asthma hospitalization among all hospitalizations was higher in ZIP code 76065 than in the comparison group (in fact, asthma hospitalization rates may be lower in 76065 than in Ellis County, but the OR could be still 1 if the relative proportion of asthma hospitalizations in 76065 is the same as in Ellis County).

A statement that the report makes numerous times is that these analyses cannot establish cause and effect. Though I agree that the performed analyses alone cannot establish cause and effect, they could be used in the context of other information to support or refute a possible causal association. Results from observational studies, when adequately conducted, have a role in helping to establish causal effects (though I agree with the authors that given the limitations of the data sources, it would be difficult to give much weight to the performed analysis in decisions about causality).

ATSDR Response: ATSDR chose to keep a linear scale on these figures to make it simpler for the public to review; “with 95% CI” was added to their respective chart titles. As suggested, a note of explanation about the limitations in determining underlying causes of death have been added to the health consultation, including deaths attributed to Alzheimer’s disease (page 51, paragraph 4). Also as recommended, the odds ratio discussions for primary hospital discharges have been revised to make the interpretation clearer (conclusions on pages xxi, xxii, 69, 101, and 102). Finally, we are in concurrence with the reviewer that these analyses could not establish cause and effect, are exploratory, and are potentially hypothesis generating for some other studies.