

Summary of Investigation into the Occurrence of Cancer
Zip Codes 77327/77328 (Cleveland), 77535 (Dayton), 77665 (Winnie), 77331 (Coldspring),
77073 (Houston), & Census Tracts 6929 and 6930 (Conroe, Cleveland, Cut and Shoot, and
Splendora)
Liberty, Chambers, San Jacinto, Harris, and Montgomery Counties, Texas
1998–2007
June 19, 2010

Background:

Public concern about landfills and a possible excess of cancer prompted the Environmental Epidemiology & Disease Registries (EEDR) Section of the Texas Department of State Health Services (DSHS) to examine the occurrence of cancer in zip codes 77327/77328, 77535, 77665, 77331, 77073, and two census tracts combined. A previous cancer cluster investigation #08012 found an excess of lung cancer for zip codes 77327/77328 and 77535 using 1996–2005 cancer incidence data. The EEDR evaluated 1998–2007 incidence data for cancers of the lung and bronchus, bladder, Hodgkin’s lymphoma, non-Hodgkin’s lymphoma, and selected leukemia subtypes. The EEDR analyzed these cancers and zip codes at the request of the customer using our latest available cancer incidence data. Incidence data are the best indicator of the occurrence of cancer in an area because they more accurately show the number and types of cancer diagnosed each year than mortality data. Compared with previous investigations that included mortality data as a supplemental measure, the EEDR now solely uses incidence data for assessment of possible cancer clusters. This is due to the improved timeliness, quality, and availability of incidence data which meet national standards for high data quality. The rest of this report examines the investigative methods the EEDR used, the results of the investigation, recommendations, and general information on cancer risk factors.

Methodology:

According to the National Cancer Institute, a cancer cluster is a greater than expected number of cancers among people who live or work in the same area and who develop or die from the same cancer within a short time of each other. The cancer cluster investigation is the primary tool used by the EEDR to investigate the possibility of excess cancer in a community. The cancer cluster investigation cannot determine that cancer was associated with or caused by environmental or other risk factors. Instead, the cancer cluster investigation is specifically intended to address the question “Is there an excess of cancer in the area or population of concern?”

The EEDR follows guidelines recommended by the Centers for Disease Control and Prevention for investigating cancer clusters¹ and often works with the DSHS Texas Cancer Registry Branch, as well as other state and federal agencies. In order to determine if an excess of cancer is occurring and if further study is recommended, epidemiologic evidence is considered. Such evidence may include documented exposures; the toxicity of the exposures; plausible routes by which exposures can reach people (ingesting, touching, breathing); the actual amount of exposure to the people which can lead to absorption in the body; the time from exposure to development of cancer; the statistical significance of the findings; the magnitude of the effect observed; risk factors; and the consistency of the

findings over time. The occurrence of rare cancers or unlikely cancers in certain age groups may also indicate a cluster needing further study. Because excesses of cancer may occur by chance alone, the role of chance is considered in the statistical analysis.

If further study is indicated, the EEDR will determine the feasibility of conducting an epidemiologic study. If the epidemiologic study is feasible, the final step is to recommend an etiologic investigation to see if the cancer(s) can be related to the exposure of concern. Very few cancer cluster investigations in the United States proceed to this stage.

To determine whether a statistically significant excess of cancer existed in the geographic areas of concern, the number of observed cases was compared to what would be "expected" based on the state cancer rates. Calculating the expected number(s) of cancer cases takes into consideration the race, sex, and ages of people who are diagnosed with cancer. This is important because a person's race, sex, and age all impact cancer rates. If we are trying to determine if there is more or less cancer in a community compared to the rest of the state, we must make sure that the difference in cancer rates is not simply due to one of these factors.

The attached Tables 1–6 present the number of observed cases for males and females, the number of "expected" cases, the standardized incidence ratio (SIR), and the corresponding 99% confidence interval. The standardized incidence ratio (SIR) is simply the number of observed cases compared to the number of "expected" cases. When the SIR of a selected cancer is equal to 1.0, then the number of observed cases is equal to the expected number of cases, based on the incidence in the rest of the state. When the SIR is less than 1.0, fewer people developed cancer than we would have expected. Conversely, an SIR greater than 1.0 indicates that more people developed cancer than we would have expected. To determine if an SIR greater than 1.0 or less than 1.0 is statistically significant or outside the variation likely to be due to chance, confidence intervals are also calculated.

A 99% confidence interval is used for statistical significance and takes into account the likelihood that the result occurred by chance. It also indicates the range in which we would expect the SIR to fall 99% of the time. If the confidence interval contains a range that includes 1.0, no statistically significant excess of cancer is indicated. The confidence intervals are particularly important when trying to interpret small numbers of cases. If only one or two cases are expected for a particular cancer, then the report of three or four observed cases will result in a very large SIR. As long as the 99% confidence interval contains 1.0, this indicates that the SIR is still within the range one might expect and, therefore, not statistically significant.

Results:

The analysis of incidence data for zip codes 77327/77328 and 77535, Cleveland and Dayton, Texas, from January 1, 1998–December 31, 2007, found cancers of the bladder, Hodgkin's lymphoma, non-Hodgkin's lymphoma, and selected leukemia subtypes to be within expected ranges in both males and females. Lung cancer in males was found to be statistically significantly elevated (SIR=1.7, SIR=1.9), respectively. A statistically significant elevation of lung cancer was also found for zip code 77535 females (SIR=1.6). Analysis summaries are presented in Tables 1–2.

During the same time period, the analysis of incidence data for zip codes 77665, 77331, and 77073, Winnie, Coldspring, and Houston, Texas, found cancers of the lung, bladder, Hodgkin's lymphoma, non-Hodgkin's lymphoma, and selected leukemia subtypes to be within expected ranges in both males and females. Analysis summaries are presented in Tables 3–5.

The analysis of incidence data during the time period 1998 to 2007 for census tracts 6929 and 6930 combined, for parts of the cities Conroe, Cleveland, Cut and Shoot, and Splendora, Texas, found cancers of the bladder, Hodgkin's lymphoma, non-Hodgkin's lymphoma, and selected leukemia subtypes to be within expected ranges in both males and females. Lung cancer in males was found to be statistically significantly elevated (SIR=2.1). Analysis summaries are presented in Table 6.

Discussion:

We do not know why the lung and bronchus cancer elevations are present in zip codes 77327/77328, 77535, and combined census tracts 6929 and 6930, nor may we ever know why. Determining the cause of any excess is beyond the scope of the cancer cluster investigation. However, it is important to note that we were not able to separate out the possible effects of tobacco use in the population under study. According to the American Cancer Society, smoking accounts for 87% of all lung cancer. In addition, the expected number of cases is based on 2000 census data. Because of the large population growth in Houston and the surrounding areas since 2000, calculations of expected cases tend to be underestimated and this can be magnified for more common cancers, such as lung cancer.

Like other studies, this cancer cluster investigation had limitations. The incidence data did not include data for the most recent years. Also, cancer incidence data are based on residence at the time of diagnosis. It is possible that some residents who developed cancer no longer lived in the area at the time of diagnosis, so were not included in the analyses. However, it is also possible that people may have moved into the area and then developed cancer because of an exposure from a prior residential location or other factors. These cases are included in the investigation.

Recommendations:

Based on the findings and the information discussed above, it is not recommended at this time to further examine the cancers in zip codes 77327/77328, 77535, 77665, 77331, 77073, or the combined census tracts 6929 and 6930. As new data or additional information become available, consideration will be given to updating or re-evaluating this investigation.

Information on Cancer and Cancer Risk Factors:

Overall, the occurrence of cancer is common, with approximately two out of every five persons alive today predicted to develop some type of cancer in their lifetime.² In Texas, as in the United States, cancer is the leading cause of death for people under the age of 85.³ Also, cancer is not one disease, but many different diseases. Different types of cancer are generally thought to have different causes. If a person develops cancer, it is probably not due to one factor but to a combination of factors such as heredity; diet, tobacco use, and other lifestyle factors; infectious agents; chemical exposures; and radiation exposures. Although cancer may impact individuals of all ages, it primarily is a disease of older persons with over

one-half of cancer cases and two-thirds of cancer deaths occurring in persons 65 and older. Finally, it takes time for cancer to develop, between 10–40 years can go by between the exposure to a carcinogen and a diagnosis of cancer.⁴

The chances of a person developing cancer as a result of exposure to an environmental contaminant are slight. Most experts agree that exposure to pollution, occupational, and industrial hazards account for fewer than 10% of cancer cases.⁵ The Harvard Center for Cancer Prevention estimates 5% of cancer deaths are due to occupational factors, 2% to environmental pollution and 2% to ionizing/ultraviolet radiation.⁶ In contrast, the National Cancer Institute estimates that lifestyle factors such as tobacco use and diet cause 50 to 75 percent of cancer deaths.⁷ Eating a healthy diet and refraining from tobacco are the best ways to prevent many kinds of cancer. It is estimated that one-third of all cancer deaths in this country could be prevented by eliminating the use of tobacco products. Additionally, about 25 to 30 percent of the cases of several major cancers are thought to be associated with obesity and physical inactivity.⁸

Known Risk Factors for Cancers Examined in This Investigation:

The following is a brief discussion summarized from the American Cancer Society and the National Cancer Institute about cancer risk factors for the specific cancers studied in this investigation.^{9,10}

The occurrence of cancer may vary by race/ethnicity, gender, type of cancer, geographic location, population group, and a variety of other factors. Scientific studies have identified a number of factors for various cancers that may increase an individual's risk of developing a specific type of cancer. These factors are known as risk factors. Some risk factors we can do nothing about, but many are a matter of choice.

Lung and Bronchus Cancer:

The greatest single risk factor for lung cancer is smoking. The American Cancer Society estimates that 87% of lung cancer is due to smoking. Several studies have shown that the lung cells of women have a genetic predisposition to develop cancer when they are exposed to tobacco smoke. Other risk factors include secondhand smoke, asbestos exposure, radon exposure, other carcinogenic agents in the workplace such as arsenic or vinyl chloride, marijuana smoking, recurring inflammation of the lungs, exposure to industrial grade talc, people with silicosis and berylliosis, personal and family history of lung cancer, and diet. In some cities, air pollution may slightly increase the risk of lung cancer. This risk is far less than that caused by smoking.

Bladder Cancer:

The greatest risk factor for bladder cancer is smoking. Men get bladder cancer at a rate four times that of women. Smokers are more than twice as likely to get bladder cancer as nonsmokers. Whites are two times more likely to develop bladder cancer than are African Americans. Other risk factors for bladder cancer include occupational exposure to aromatic amines such as benzidine and beta-naphthylamine, aging, chronic bladder inflammation, personal history of urothelial carcinomas, birth defects involving the bladder and umbilicus, infection with a certain parasite, high doses of certain chemotherapy drugs, and arsenic in your drinking water.

Hodgkin's Lymphoma:

Some people who have reduced immune systems, for example, those with AIDS, and organ transplant patients, are at a higher risk of Hodgkin's lymphoma. Possible risk factors include being in young or late adulthood, being male, being infected with the Epstein-Barr virus, or having a first-degree relative with Hodgkin's lymphoma.

Non-Hodgkin's Lymphoma:

Risk factors for non-Hodgkin's lymphoma include infection with *Helicobacter pylori*, human immunodeficiency virus (HIV), human T-cell leukemia/lymphoma virus (HTVL-1), or the Epstein-Barr virus and malaria. Other possible risk factors include aging, certain genetic diseases, radiation exposure, immuno-suppressant drugs after organ transplantation, benzene exposure, the drug Dilantin, exposure to certain pesticides, a diet high in meats or fat, or certain chemotherapy drugs.

Acute Lymphocytic Leukemia (ALL):

Possible risk factors for ALL include the following: being male, being white, being older than 70 years of age, past treatment with chemotherapy or radiation therapy, exposure to atomic bomb radiation, or having a certain genetic disorder such as Down syndrome.

Chronic Lymphocytic Leukemia (CLL):

Possible risk factors for CLL include the following: being middle-aged or older, male, or white; a family history of CLL or cancer of the lymph system; having relatives who are Russian Jews or Eastern European Jews; or having exposure to herbicides or insecticides including Agent Orange, an herbicide used during the Vietnam War.

Acute Myeloid Leukemia (AML):

Possible risk factors for AML include the following: being male; smoking, especially after age 60; having had treatment with chemotherapy or radiation therapy in the past; having had treatment for childhood ALL in the past; being exposed to atomic bomb radiation or the chemical benzene; or having a history of a blood disorder such as myelodysplastic syndrome.

Chronic Myeloid Leukemia (CML):

Most people with CML have a gene mutation (change) called the Philadelphia chromosome. The Philadelphia chromosome is not passed from parent to child.

For additional information about cancer, visit the "Resources" link on our web site at <http://www.dshs.state.tx.us/tcr/>.

Questions or comments regarding this investigation may be directed to Ms. Brenda Mokry, Epidemiology Studies & Initiatives, at 1-800-252-8059 or brenda.mokry@dshs.state.tx.us.

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Table 1

Number of Observed and Expected Cancer Cases and Race Adjusted Standardized Incidence Ratios, Selected Cancers, Zip Code 77327/77328, Cleveland, TX, 1998–2007

Males				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	197	117.9	1.7*	1.4 – 2.0
Bladder	47	38.9	1.2	0.8 – 1.7
Hodgkin’s Lymphoma	3	4.3	0.7	0.1 – 2.5
Non-Hodgkin’s Lymphoma	27	28.8	0.9	0.5 – 1.5
Acute Lymphocytic Leukemia	5	2.7	1.9	0.4 – 5.3
Chronic Lymphocytic Leukemia	8	7.9	1.0	0.3 – 2.4
Acute Myeloid Leukemia	5	5.6	0.9	0.2 – 2.5
Chronic Myeloid Leukemia	6	2.8	2.2	0.6 – 5.7
Aleukemic, Subleukemic, & NOS	2	0.9	2.2	0.1 – 10.3
Females				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	110	83.4	1.3	1.0 – 1.7
Bladder	12	11.6	1.0	0.4 – 2.1
Hodgkin’s Lymphoma	4	3.3	1.2	0.2 – 3.8
Non-Hodgkin’s Lymphoma	30	23.6	1.3	0.8 – 2.0
Acute Lymphocytic Leukemia	1	2.0	0.5	0.0 – 3.7
Chronic Lymphocytic Leukemia	4	5.2	0.8	0.1 – 2.4
Acute Myeloid Leukemia	7	4.4	1.6	0.5 – 3.9
Chronic Myeloid Leukemia	3	2.0	1.5	0.2 – 5.6
Aleukemic, Subleukemic, & NOS	4	0.8	4.9	0.8 – 15.5

Note: The SIR (standardized incidence ratio) is defined as the number of observed cases divided by the number of expected cases. The latter is based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1998–2007. The SIR has been rounded to the first decimal place.

*Significantly higher than expected at the $p < 0.01$ level.
 **Significantly lower than expected at the $p < 0.01$ level.

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 06/19/2010

Table 2

Number of Observed and Expected Cancer Cases and Race Adjusted Standardized Incidence Ratios, Selected Cancers, Zip Code 77535, Dayton, TX, 1998–2007

Males				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	143	75.8	1.9*	1.5 – 2.3
Bladder	20	24.4	0.8	0.4 – 1.4
Hodgkin’s Lymphoma	8	3.8	2.1	0.7 – 4.9
Non-Hodgkin’s Lymphoma	17	20.7	0.8	0.4 – 1.5
Acute Lymphocytic Leukemia	2	2.2	0.9	0.1 – 4.3
Chronic Lymphocytic Leukemia	5	5.1	1.0	0.2 – 2.8
Acute Myeloid Leukemia	1	3.9	0.3	0.0 – 1.9
Chronic Myeloid Leukemia	2	2.0	1.0	0.1 – 4.7
Aleukemic, Subleukemic, & NOS	0	0.6	0.0	0.0 – 9.2
Females				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	86	54.6	1.6*	1.2 – 2.1
Bladder	9	7.3	1.2	0.4 – 2.7
Hodgkin’s Lymphoma	2	3.3	0.6	0.0 – 2.8
Non-Hodgkin’s Lymphoma	22	17.0	1.3	0.7 – 2.2
Acute Lymphocytic Leukemia	0	1.7	0.0	0.0 – 3.2
Chronic Lymphocytic Leukemia	5	3.2	1.6	0.3 – 4.5
Acute Myeloid Leukemia	3	3.3	0.9	0.1 – 3.3
Chronic Myeloid Leukemia	2	1.5	1.3	0.1 – 6.1
Aleukemic, Subleukemic, & NOS	0	0.5	0.0	0.0 – 10.4

Note: The SIR (standardized incidence ratio) is defined as the number of observed cases divided by the number of expected cases. The latter is based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1998–2007. The SIR has been rounded to the first decimal place.

*Significantly higher than expected at the $p < 0.01$ level.
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Table 3

Number of Observed and Expected Cancer Cases and Race Adjusted Standardized Incidence Ratios, Selected Cancers, Zip Code 77665, Winnie, TX, 1998–2007

Males				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	34	29.8	1.1	0.7 – 1.8
Bladder	8	9.7	0.8	0.3 – 1.9
Hodgkin’s Lymphoma	1	1.0	1.0	0.0 – 7.5
Non-Hodgkin’s Lymphoma	2	7.0	0.3	0.0 – 1.3
Acute Lymphocytic Leukemia	0	0.6	0.0	0.0 – 9.1
Chronic Lymphocytic Leukemia	3	2.0	1.5	0.2 – 5.6
Acute Myeloid Leukemia	1	1.4	0.7	0.0 – 5.5
Chronic Myeloid Leukemia	0	0.7	0.0	0.0 – 7.9
Aleukemic, Subleukemic, & NOS	0	0.2	0.0	0.0 – 23.5
Females				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	26	20.4	1.3	0.7 – 2.1
Bladder	3	2.8	1.1	0.1 – 3.9
Hodgkin’s Lymphoma	1	0.7	1.3	0.1 – 10.0
Non-Hodgkin’s Lymphoma	7	5.7	1.2	0.4 – 3.0
Acute Lymphocytic Leukemia	1	0.4	2.5	0.0 – 18.4
Chronic Lymphocytic Leukemia	2	1.3	1.6	0.1 – 7.4
Acute Myeloid Leukemia	0	1.0	0.0	0.0 – 5.1
Chronic Myeloid Leukemia	0	0.5	0.0	0.0 – 11.4
Aleukemic, Subleukemic, & NOS	0	0.2	0.0	0.0 – 27.4

Note: The SIR (standardized incidence ratio) is defined as the number of observed cases divided by the number of expected cases. The latter is based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1998–2007. The SIR has been rounded to the first decimal place.

*Significantly higher than expected at the $p < 0.01$ level.
 **Significantly lower than expected at the $p < 0.01$ level.

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Table 4

Number of Observed and Expected Cancer Cases and Race Adjusted Standardized Incidence Ratios, Selected Cancers, Zip Code 77331, Coldspring, TX, 1998–2007

Males				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	60	41.7	1.4	1.0 – 2.0
Bladder	20	13.2	1.5	0.8 – 2.6
Hodgkin’s Lymphoma	1	0.9	1.1	0.0 – 8.0
Non-Hodgkin’s Lymphoma	11	8.8	1.3	0.5 – 2.6
Acute Lymphocytic Leukemia	0	0.5	0.0	0.0 – 11.7
Chronic Lymphocytic Leukemia	4	2.7	1.5	0.3 – 4.6
Acute Myeloid Leukemia	0	1.7	0.0	0.0 – 3.1
Chronic Myeloid Leukemia	0	0.8	0.0	0.0 – 6.6
Aleukemic, Subleukemic, & NOS	0	0.3	0.0	0.0 – 19.6
Females				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	22	25.4	0.9	0.5 – 1.5
Bladder	3	3.3	0.9	0.1 – 3.3
Hodgkin’s Lymphoma	0	0.6	0.0	0.0 – 8.2
Non-Hodgkin’s Lymphoma	4	6.5	0.6	0.1 – 2.0
Acute Lymphocytic Leukemia	0	0.3	0.0	0.0 – 17.7
Chronic Lymphocytic Leukemia	1	1.5	0.7	0.0 – 5.0
Acute Myeloid Leukemia	3	1.1	2.6	0.3 – 9.7
Chronic Myeloid Leukemia	0	0.5	0.0	0.0 – 10.3
Aleukemic, Subleukemic, & NOS	0	0.2	0.0	0.0 – 24.4

Note: The SIR (standardized incidence ratio) is defined as the number of observed cases divided by the number of expected cases. The latter is based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1998–2007. The SIR has been rounded to the first decimal place.

*Significantly higher than expected at the $p < 0.01$ level.

**Significantly lower than expected at the $p < 0.01$ level.

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Table 5

Number of Observed and Expected Cancer Cases and Race Adjusted Standardized Incidence Ratios, Selected Cancers, Zip Code 77073, Houston, TX, 1998–2007

Males				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	24	26.2	0.9	0.5 – 1.5
Bladder	12	8.2	1.5	0.6 – 2.9
Hodgkin’s Lymphoma	1	1.8	0.6	0.0 – 4.2
Non-Hodgkin’s Lymphoma	15	7.9	1.9	0.9 – 3.6
Acute Lymphocytic Leukemia	2	1.1	1.8	0.1 – 8.5
Chronic Lymphocytic Leukemia	2	1.7	1.2	0.1 – 5.4
Acute Myeloid Leukemia	2	1.5	1.3	0.1 – 6.2
Chronic Myeloid Leukemia	1	0.8	1.3	0.0 – 9.4
Aleukemic, Subleukemic, & NOS	0	0.2	0.0	0.0 – 25.0
Females				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	15	18.7	0.8	0.4 – 1.5
Bladder	6	2.4	2.5	0.6 – 6.4
Hodgkin’s Lymphoma	2	1.4	1.4	0.1 – 6.7
Non-Hodgkin’s Lymphoma	8	6.3	1.3	0.4 – 3.0
Acute Lymphocytic Leukemia	2	0.8	2.4	0.1 – 11.0
Chronic Lymphocytic Leukemia	0	1.1	0.0	0.0 – 5.0
Acute Myeloid Leukemia	1	1.3	0.8	0.0 – 5.8
Chronic Myeloid Leukemia	0	0.6	0.0	0.0 – 9.2
Aleukemic, Subleukemic, & NOS	0	0.2	0.0	0.0 – 29.8

Note: The SIR (standardized incidence ratio) is defined as the number of observed cases divided by the number of expected cases. The latter is based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1998–2007. The SIR has been rounded to the first decimal place.

*Significantly higher than expected at the $p < 0.01$ level.
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Table 6

Number of Observed and Expected Cancer Cases and Race Adjusted Standardized Incidence Ratios, Selected Cancers, Census Tracts 6929 & 6930, Montgomery County, TX, 1998–2007

Males				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	66	31.5	2.1*	1.5 – 2.9
Bladder	11	10.9	1.0	0.4 – 2.1
Hodgkin’s Lymphoma	1	1.4	0.7	0.0 – 5.3
Non-Hodgkin’s Lymphoma	7	8.5	0.8	0.2 – 2.0
Acute Lymphocytic Leukemia	1	1.0	1.0	0.0 – 7.1
Chronic Lymphocytic Leukemia	1	2.2	0.5	0.0 – 3.4
Acute Myeloid Leukemia	1	1.6	0.6	0.0 – 4.5
Chronic Myeloid Leukemia	0	0.8	0.0	0.0 – 6.5
Aleukemic, Subleukemic, & NOS	0	0.3	0.0	0.0 – 21.1
Females				
Site	Observed	Expected	SIR	99% CI
Lung and Bronchus	37	23.0	1.6	1.0 – 2.4
Bladder	4	3.1	1.3	0.2 – 4.0
Hodgkin’s Lymphoma	1	1.1	0.9	0.0 – 6.8
Non-Hodgkin’s Lymphoma	6	6.8	0.9	0.2 – 2.3
Acute Lymphocytic Leukemia	2	0.8	2.6	0.1 – 12.0
Chronic Lymphocytic Leukemia	2	1.4	1.5	0.1 – 6.7
Acute Myeloid Leukemia	1	1.3	0.8	0.0 – 5.7
Chronic Myeloid Leukemia	1	0.6	1.8	0.0 – 13.2
Aleukemic, Subleukemic, & NOS	0	0.2	0.0	0.0 – 24.9

Note: The SIR (standardized incidence ratio) is defined as the number of observed cases divided by the number of expected cases. The latter is based on race-, sex-, and age-specific cancer incidence rates for Texas during the period 1998–2007. The SIR has been rounded to the first decimal place.

*Significantly higher than expected at the $p < 0.01$ level.

**Significantly lower than expected at the $p < 0.01$ level.

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