TEXAS Health and Human Services | Texas Department of State Health Services

Assessment of the Occurrence of Cancer
Supplemental Assessment

Houston, Texas

2000-2016

January 4, 2021

Prepared by the
Texas Department of State Health Services

Investigation# 19002, 19004, 20001

Background

In response to community concerns and at the request of the Houston Health Department, the DSHS Environmental and Surveillance and Toxicology Branch (ESTB) and Texas Cancer Registry (TCR) examined the occurrence of cancer in an area of the city of Houston northeast of downtown. The study area included 21 census tracts located within approximately a two mile-radius of a former railroad creosote treatment facility, a site of concern for nearby communities including Kashmere Gardens, Denver Harbor, and Greater Fifth Ward neighborhoods.

That report, "Assessment of the Occurrence of Cancer, Houston, Texas, 2000-2016," was published in March of 2020. It and two previous assessments for this site of concern are available at www.dshs.texas.gov/epitox/CancerClusters.shtm.

At the request of the Harris County Attorney, and in accordance with the Centers for Disease Control and Prevention (CDC) and Council of State Territorial and Epidemiologists (CSTE) 2013 guidelines, DSHS convened a group of thirteen subject matter experts, including four community member representatives, to review the results of these assessments and evaluate the feasibility of an epidemiologic study. DSHS facilitated a meeting on August 17, 2020 to determine the feasibility of an epidemiologic study of the associations between specific cancer(s) and environmental contaminants in the area.

The group determined that an epidemiologic study of the associations between specific cancer(s) and environmental contaminants in the area assessed is not feasible. However, it suggested that DSHS consider performing additional analyses, including investigating numbers of childhood cancers and adult urinary system cancers. Therefore, DSHS staff calculated standardized incidence ratios (SIRs) for kidney and renal pelvis cancers among adults (ages 20 years and older) (Table 1), as well as SIRs for the most common childhood cancer type, acute lymphoblastic leukemia (ALL),[1] among children and adolescents 0-19 years of age (Tables 2 and 3).

DSHS followed the CDC and CSTE 2013 guidelines and agency protocol to evaluate the occurrence of these cancers in the same study area, which was

[1] American Cancer Society, Leukemia in Children. Available online from: https://www.cancer.org/cancer/leukemia-in-children.html.

selected in collaboration with subject matter experts, including community member representatives.[2,3]

The purpose of this supplemental assessment was to determine whether the observed number of cancer cases is statistically significantly different than expected based on cancer rates in Texas. It was not intended to determine the cause of the observed cancers or identify possible associations with any specific risk factors. Observed numbers of some of the types of childhood and adult cancers analyzed were statistically significantly greater than expected, while others were within the range of what is expected based on cancer rates in Texas.

Methods

Consistent with the CDC and CSTE 2013 guidelines, DSHS collaborated with scientific experts and community members to select the geographic area, time frame, and cancers to be included in this analysis. DSHS evaluated 17 years of available cancer data. Subject matter experts and community member chose to evaluate the entire area of concern. The 21 census tracts comprising the area investigated are shown in Figure 1.

Adult (ages 20 years and older) kidney and renal pelvis cancer and childhood (0-19 years of age) acute lymphoblastic leukemia (ALL) were included in the analysis. Scientific experts and community members recommended analyzing additional adult urinary system cancer(s) (ureter and other urinary organs) and childhood acute myeloid leukemia. However, these cancer types had fewer than six cases across the entire study area and entire time frame. Per agency protocol, cancers with fewer than six cases are not included in analyses because dealing with such small numbers makes it unreliable to calculate standardized incidence ratios and determine whether any variance is truly statistically significant. Further, since childhood cancers are so rare, it is unlikely that there would be enough cases to analyze any additional childhood cancer types within the 21-census tract area.

This document outlines the results from step two of the CDC and CSTE guidelines, and only addresses the question, "Is there a statistically significant excess of cancer in the area of investigation?"

[2] Centers for Disease Control and Prevention, Investigating Suspected Cancer Clusters and Responding to Community Concerns. MMWR, 2013. 62: p. 22. Available from: https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6208a1.htm.
[3] Texas Department of State Health Services, Protocol for Responding to Community Cancer Cluster Concerns. Updated January 15, 2016. Available from: http://www.dshs.texas.gov/epitox/CancerClusters/Protocol-for-Responding-to-Community-Cancer-Cluster-Concerns.pdf.

Data Sources

For each cancer type, the number of cases observed from 2000 through 2016 in the area included in the investigation was obtained from the Texas Cancer Registry (Incidence – Texas, 1995-2017, SEER*Prep 2.5.3). The TCR is responsible for the collection, maintenance, and dissemination of high quality Texas population-based cancer data and meets timeliness and data quality standards set by the CDC and the North American Association of Central Cancer Registry. Adult (ages 20 years and older) cancers were defined according to Site Recode ICD-O-3/WHO 2008 Definitions.[4] Childhood cancers (0-19 years of age) were defined according to ICCC recode ICD-O-3/WHO 2008 Definitions.[5,6] Statewide cancer rates for the same time period were also obtained from the TCR.

Population estimates for 2000 through 2016 were calculated using linear interpolation based on population counts obtained from the United States Decennial Census[7] for the years 2000 and 2010. This method, outlined by the United States Census Bureau,[8] assumed population growth occurred in a linear manner.

Statistical Analysis

To determine if a statistically significant excess of cancer existed in the area investigated, the number of observed cancer cases was compared with what would be expected for the area based on cancer rates in Texas. Characteristics such as race, sex, and age are closely related to cancer. To ensure that differences between the numbers of observed and expected cancer cases are not simply due to differences in these demographic characteristics, the expected numbers of cancer cases were calculated by multiplying the age-, sex-, and race-specific cancer incidence rates of Texas residents (reference population) by the number of people in the corresponding demographic groups in the area of investigation.

Standardized incidence ratios (SIRs) were calculated to determine if an excess of cancer exists in the area. The SIR is the number of observed cases compared with (divided by) the number of expected cases for each cancer type. A SIR greater than 1.00 indicates that the observed number of cases

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[4] National Cancer Institute, Surveillance, Epidemiology and End Results Program. Site Recode ICD-O-3/WHO 2008 Definition. Available online: https://seer.cancer.gov/siterecode/index.html.

[5] National Cancer Institute, Surveillance, Epidemiology and End Results Program. ICCC Recode ICD-O-3/WHO 2008 Definition. Available online: https://seer.cancer.gov/iccc/iccc-who2008.html.

[6] ICCC recode ICD-O-3/WHO 2008 defines "Acute Lymphoblastic Leukemia" as "Lymphoid Leukemia".

[7] United States Census Bureau. *American FactFinder*. 2012; Available from: http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml.

[8] US Census Bureau. *Methodology for the Intercensal Population and Housing Unit Estimates: 2000 to 2010*. 2012; Available from: https://www2.census.gov/programs-surveys/popest/technical-documentation/methodology/intercensal/2000-2010-intercensal-estimates-methodology.pdf.

of a specific cancer type is higher than expected and a SIR less than 1.00 indicates that the observed number of cases of a specific cancer type is lower than expected.

Few, if any, communities will have exactly the same rate as the average state rate for a similar population; most will be higher or lower. Therefore, 95 percent confidence intervals (CI) were calculated for the SIRs to determine if the observed number of cases was statistically significantly different than expected. If a 95 percent CI (range) includes 1.00, no statistically significant excess (or reduction) of cancer is indicated. If a 95 percent CI does not contain 1.00, the SIR is outside the expected range and is statistically significant. When using a 95 percent CI, 5 percent of SIR values calculated is expected to be statistically significantly higher or lower than the state average due to random chance alone.

In all cases, when results are described as significant or not significant, DSHS is referring only to statistical significance, with the understanding that all cases of cancer are significant to the individual, the family, and friends of the individuals who are affected.

Results

Table 1 presents the number of observed cases, the number of expected cases, the SIRs, and the corresponding 95 percent confidence intervals (CIs) for kidney and renal pelvis cancer evaluated in the area with all 21 census tracts analyzed together. The number of kidney and renal pelvis cancers was within the range of what is expected based on cancer rates in Texas.

Table 2 presents the number of observed cases, the number of expected cases, the SIRs, and the corresponding 95 percent CIs for childhood acute lymphoblastic leukemia (ALL) evaluated in the area with all 21 census tracts analyzed together. The number of ALL cases was statistically significantly greater than what is expected based on cancer rates in Texas.

Table 3 presents the number of observed childhood ALL cases, the number of expected cases, the SIRs, and the corresponding 95 percent CIs for each of the 21 census tracts separately. The number of ALL cases was statistically significantly greater than expected based on cancer rates in Texas in census tract 2111, the only census tract that had enough ALL cases to be evaluated separately. All other individual census tracts had too few childhood ALL cases (fewer than six) to be able to calculate reliable SIRs.

Table 1. Standardized Incidence Ratios (SIRs) and 95 percent Confidence Intervals (CIs) for Selected Adult (≥20 years) Cancers in Houston, Texas, 2000-2016.

Cancer Type	Observed	Expected	SIR	95% CI
Kidney and Renal Pelvis	253	270.4	0.94	(0.82, 1.06)

Table 2. Standardized Incidence Ratios (SIRs) and 95 percent Confidence Intervals (CIs) for Selected Childhood (0-19 years) Cancers in Houston, Texas, 2000-2016.

Cancer Type	Observed	Expected	SIR	95% CI
Acute Lymphoblastic Leukemia[6]*	28	16.2	1.73	(1.15, 2.50)

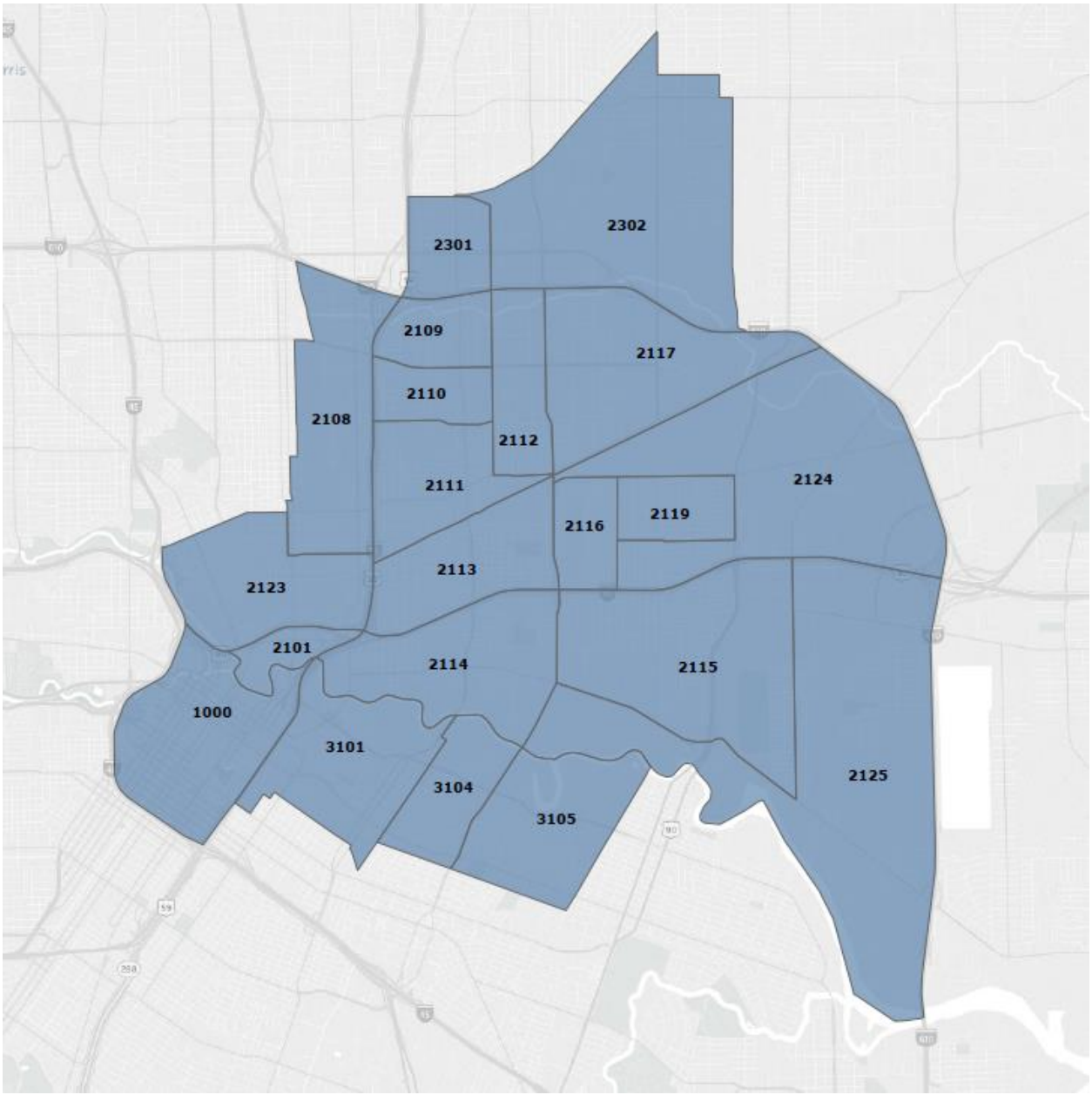
*Indicates observed number of cancer cases is statistically significantly higher than expected.

Table 3. Standardized Incidence Ratios (SIRs) and 95 percent Confidence Intervals (CIs) for Selected Childhood (0-19 years) Cancers by Census Tract in Houston, Texas, 2000-2016.

Cancer Type	Census Tract	Observed	Expected	SIR	95% CI
Acute Lymphoblastic Leukemia[6]	2111	6	1.3	4.74*	(1.74, 10.31)

*Indicates observed number of cancer cases is statistically significantly higher than expected.

Figure 1. Selected Census Tracts (2010) for Houston, Texas.



Discussion

The purpose of this supplemental assessment was to determine whether the observed number of cancer cases examined is statistically significantly different than expected. It is not intended to determine the cause of the observed cancers or identify possible associations with any risk factors.

The assessment has several inherent limitations, and results should be interpreted with these limitations in mind. Cancer is not a single disease, but rather many different diseases. Different types of cancers vary in causes or origins and may not share the same risk factors. Cancers may be associated with a variety of factors such as genetics, lifestyle, and socioeconomic status. Because cancer is common, cases might appear to occur with alarming frequencies within a community even when the number of cases is within the expected rate for the population.

Additionally, cancer incidence data are based on residence at the time of diagnosis. As people move, it becomes more difficult to determine whether living in the area of investigation is associated with an excess of cancers, because residential history is not tracked. Latency (the time period elapsed between exposure and illness onset) adds to the complexity of this step in the investigation. For most adult cancers, a period of 10 to 40 years can elapse between the beginning of an exposure to a cancer-causing agent and the development of a clinically diagnosable case of cancer. It is possible that former residents who developed cancer no longer lived in the area at the time of diagnosis, and these cases would not be included in this assessment. It is also possible that new people have moved into the area and then were diagnosed with cancer; these cases are included in this assessment.

Childhood cancers, like acute lymphoblastic leukemia, have a genetic component which cannot be accounted for in this assessment. Certain genetic syndromes and immune system conditions increase a child's risk of developing leukemia.[9] Additionally, exposure to radiation has been identified as a risk factor for the development of childhood leukemia.[9]

For this assessment, DSHS analyzed cancer types for both the 21 census tracts together and separately, as requested by subject matter experts. However, the results of the individual census tracts analyses should be interpreted with caution. The numbers of observed and expected cases were small. SIRs based on small numbers often yield wide confidence intervals, which reduces the reliability of SIR estimates.

[9] American Cancer Society, Risk Factors for Childhood Leukemia. Available online from: https://www.cancer.org/cancer/leukemia-in-children/causes-risks-prevention/risk-factors.html.

Conclusion

The observed number of adult kidney and renal pelvis cancer cases was within the range of what is expected based on cancer rates in Texas, when all 21 census tracts were evaluated together from 2000-2016.

The observed number of childhood acute lymphoblastic leukemia (ALL) cases was greater than expected based on cancer rates in Texas, when all 21 census tracts were evaluated together from 2000-2016. The observed number of childhood ALL cases was also greater than expected for the only census tract (2111) able to be analyzed on its own.

The limitations mentioned above must be taken into account when interpreting these results. The SIR estimates for some of the cancer types were based upon small numbers of cases observed over a long period of time (17 years). As mentioned above, reliability is reduced for estimates based on small numbers, even if the SIRs exceed 1.0. DSHS will continue to collaborate with community members and will update this analysis upon request when new years of data become available.

Additional Information

For additional information about cancer clusters, visit the Centers for Disease Control and Prevention, "About Cancer Clusters," web page at www.cdc.gov/nceh/clusters/about.htm.

For additional information on cancer risk factors, visit the American Cancer Society, "What Causes Cancer?" web page at www.cancer.org/cancer/cancercauses/index.

Questions or comments regarding this investigation may be directed to the Environmental Surveillance and Toxicology Branch, at 1-800-588-1248 (email: epitox@dshs.texas.gov).