Cancer Assessment of 14 Census Tracts in Bernalillo and Sandoval Counties

Assessment by the

New Mexico Cancer Concerns Work Group

A Collaboration between the

New Mexico Department of Health and New Mexico Tumor Registry

NMHealth

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Contents

Executive Summary

Residents near the Intel manufacturing plant in Rio Rancho, New Mexico, expressed concerns about potential links between plant emissions and the burden of cancer in their community. The New Mexico Cancer Concerns Workgroup has responded by conducting two assessments. The first was in 2019 and the most recent was in 2024.

The current assessment focused on an analysis of cancer cases (13 specific cancer types) diagnosed between 2000-2019 in 14 census tracts within Bernalillo and Sandoval counties using age-adjusted incidence rates to compare cancer rates in the target area with the rest of New Mexico. The assessment also examined rates for all types of cancer, combined. Statewide cancer incidence rates, excluding the defined area of interest, were calculated for comparison.

Incidence rates for specific cancer types in the target area were broadly similar in magnitude to their corresponding rates in the statewide comparison population. The values for observed rate ratios ranged from 0.83 for liver cancer to 1.23 for non-Hodgkin lymphoma, which represents a relatively modest variation in rate ratios in this population-based setting. Incidence rates for female breast cancer, prostate cancer and non-Hodgkin lymphoma were statistically significantly higher in the target area compared to the statewide comparison population. Rates for all cancers combined were also statistically significantly higher in the target area compared to the statewide comparison population, but the difference was modest.

There are two primary limitations for this assessment. First, population-based incidence rates, including those in the present assessment, do not necessarily provide the same insight into risk factors as rates derived from participants in a formal cohort study (a type of research study). Unlike a cohort study, population-based incidence rates are founded on observations from a dynamic population whose members may come and go.

Second, demonstrating elevated cancer rates may be sufficient to warrant public health intervention in some, but not all circumstances. As an example, all cervical cancer cases arise in individuals infected with carcinogenic types of Human Papilloma Virus (HPV). An observation of high

cervical cancer rates would most likely result in public health efforts to increase Pap/HPV screening and/or HPV vaccination. Because there are multiple, well-established risk factors for female breast cancer, prostate cancer and non-Hodgkin lymphoma, the findings of modestly elevated incidence rates for these three types of cancer, alone, do not provide insight into the specific risk factors that may underlie these cancers in the target population of this assessment.

Thus, findings of elevated rates of cancer cannot be readily or credibly interpreted in the absence of additional information concerning relevant exposures of concern. The New Mexico Cancer Concerns Workgroup has concluded that the cancer rates in the target area are not elevated to a degree that warrants further assessment.

Section 1: Introduction

The New Mexico Cancer Concerns Workgroup (CCW) conducted an assessment of cancer incidence rates in a defined geographic area comprised of 14 census tracts within Bernalillo and Sandoval Counties, New Mexico, for the time period 2000-2019. The assessment focused on 13 specific types of cancer and also examined rates for all types of cancer, combined. Statewide cancer incidence rates, excluding the defined area of interest, were calculated for comparison. This document summarizes the methods and results from this assessment and provides interpretation of results.

Section 2: Background

This assessment and a previous assessment (released in 2019) were undertaken in response to ongoing community concerns that emissions from the Intel manufacturing plant in Rio Rancho, New Mexico, may be influencing the burden of cancer in nearby areas. In collaboration with representatives of Corrales Residents for Clean Air and Water (CRCAW), CCW identified a geographic area of interest, comprised of 8 census tracts in Sandoval County and 6 census tracts in Bernalillo County that were adjacent to or in close proximity to the manufacturing plant. CRCAW and CCW also collaborated to identify 12 specific cancers of concern. Results from the 2019 assessment documented modest but statistically significant elevations in the expected number of cases of prostate cancer and myeloid/monocytic leukemia. The conclusion was that the overall burden of cancer in the assessment area was generally similar to that observed elsewhere in New Mexico.

In response to community input after the 2019 assessment, the present (2024) assessment was conducted with a different measure of disease frequency (i.e., age-adjusted incidence rates and corresponding rate ratios replaced ratios of observed-to-expected case numbers) and pharyngeal cancers were added to the list of cancers of interest.

Section 3: Methods

3.A Overview of METHODS section

The geographic area and specific cancers that are the focus of this assessment are defined in this section. Data sources and methods are also summarized herein.

3.B Geographic Area

The geographic area of interest for this assessment is comprised of 14 census tracts in New Mexico, 8 in Sandoval County and 6 in Bernalillo County. These 14 census tracts were selected because they are adjacent to or in close proximity to the Intel manufacturing plant in Sandoval County. These census tracts are listed in Table 3.B.1 along with estimates of the respective resident population for each tract in calendar year 2019. Maps of the assessment area are displayed in Appendix 1.

Table 3.B.1
Selected characteristics of the target geographic area

New Mexico County	Census Tract*	2019 Estimated Population
Sandoval	**0106.01**	**4,559**
	0106.02	**4,206**
	0107.05	**6,381**
	0107.14	**5,067**
	0107.15	**3,783**
	0107.16	**6,207**
	0107.19	**4,140**
	0107.20	**8,570**
Bernalillo	**0036.00**	**6,103**
	0047.16	**1,985**
	0047.17	**7,732**
	0047.23	**7,309**
	0047.52	**3,758**
	0047.53	**3,541**
	TOTAL	**73,341**

** Census tract boundary definitions are from the 2010 US Decennial Census*

3.C Data Sources

Cancer Cases

This assessment was conducted with existing records that were collected for the purposes of routine public health surveillance for cancer in New Mexico. Cancer is a reportable disease in New Mexico and the New Mexico Department of Health (NMDOH) has identified the New Mexico Tumor Registry (NMTR) as its designee for collecting, maintaining and utilizing cancer surveillance data on behalf of the NMDOH. The NMTR is a population-based cancer registry that was established in 1966 and is a founding member of the National Cancer Institute's (NCI) Surveillance, Epidemiology, and End Results (SEER) Program [01]. Highly trained NMTR staff members and local hospital-based cancer registrars collaborate to identify incident cases of cancer among New Mexico residents through routine and systematic review of pathology reports, medical records, radiation therapy records, hospital discharge lists, and vital records. Registry records contain information for each cancer case, including histology, behavior, grade, and primary anatomic site. The Registry also documents patient characteristics, including age at diagnosis, sex, race/ethnicity, and place of residence at diagnosis. Most information is ascertained from specific statements in medical records, reports from private pathology laboratories and radiotherapy units, and death certificates. Cancer surveillance in New Mexico is conducted in accordance with standards set by the SEER Program [02], the North American Association of Central Cancer Registries [03], and the American College of Surgeons [04].

Population Estimates

Denominators for rate calculations were developed by the Geospatial and Population Studies Program at the University of New Mexico under contract to the New Mexico Department of Health [05].

3.D Measures of Cancer Incidence

Incidence rates and corresponding confidence intervals

Average annual, age-adjusted incidence rates were calculated by the direct method [06] using the distribution of the 2000 United States population as the adjustment standard [07] and, consistent with standard convention, are reported per 100,000 population. Corresponding 95% confidence intervals (CI) for each rate were calculated using the Tiwari method [08].

Two sets of incidence rates were calculated for each of the 13 types of cancer that were included in this assessment. First, incidence rates were calculated for the target area (defined in Section 3.B of this document). Numerators for the incidence rates for the target area included cancer cases that were newly diagnosed among residents of the target area during the designated study period (i.e., 2000-2019). Denominators for incidence rates in the target area were based on estimates of the resident population within that geographic area during the designated study period.

For comparison purposes, incidence rates were also calculated for residents of the remaining geographic areas in New Mexico (i.e., excluding the target area). Numerators for the comparison incidence rates were newly diagnosed cancer cases diagnosed among New Mexico residents who lived outside of the target area during the designated study period. Denominators for comparison incidence rates were based on estimates of the resident New Mexico population that lived outside of the target area.

Incidence Rate Ratios and Corresponding Confidence Intervals

Rate Ratios (RR) were used to compare target area incidence rates with the corresponding modified statewide incidence rates. A RR was calculated for each type of cancer by dividing the target area incidence rate by the corresponding modified statewide rate, and 95% confidence intervals were calculated for each RR using standard methods [09].

Measures of Precision and Statistical Significance

Confidence intervals for individual rates and rate ratios were calculated with an alpha level of 0.05, in accordance with prevailing standards. For the purposes of this assessment, RRs were considered to achieve statistical significance when null value of 1.00 was outside of the range of the respective 95% CI.

3.E Types of Cancer

This assessment focused on incident cancer cases that were diagnosed during the 20-year time period from January 1, 2000, through December 31, 2019, which represents the most recent twenty-year period of complete surveillance data prior to the COVID-19 pandemic. Analyses were conducted for the following thirteen types of cancer: 1) colorectal; 2) liver; 3) lung and bronchus; 4) female breast; 5) prostate; 6) testicular; 7) kidney and renal pelvis; 8) brain; 9) non-Hodgkin lymphoma; 10) myeloma; 11) lymphocytic leukemia; 12) myeloid and monocytic leukemia; and 13) pharynx. The definition of each cancer category was based on combinations of cancer primary anatomic site and histology codes from the International Classification of Diseases of Oncology-Third Edition (ICD-O-3) [10] and are consistent with categories commonly used by the NCI's SEER Program (Table 3.E.1) [11]. Rates were also calculated for all types of cancers combined (i.e., all types of cancer, including – but not limited to - the 13 individual types of cancer that are the focus of this assessment).

Table 3.E.1
Cancers included in this assessment

Type of Cancer	ICD-O-3 Anatomic Site Codes[1]	ICD-O-3 Histology (Type) Codes[2]
Colorectal	C18.0-C18.9, C19.9, C20.9, C26.0	All ICD-O-3 histologies, excluding 9050-9055, 9140, 9590-9992
Liver	C22.0	
Lung and Bronchus	C34.0-C34.9	
Female Breast	C50.0-C50.9 (Females Only)	
Prostate	C61.9	
Testis	C62.0-C62.9	
Kidney and Renal Pelvis	C649, C659	
Brain	C710-C719	
Non-Hodgkin Lymphoma	C024, C098, C099, C111, C142, C379, C422, C770-C779	9590-9597, 9670-9671, 9673, 9675, 9678-9680, 9684, 9687-9691, 9695, 9698-9702, 9705, 9708-9709, 9712, 9714-9719, 9724-9729, 9735, 9737-9738, 9811-9818, 9823, 9827, 9837
	All sites except C024, C098-C099, C111, C142, C379, C422, C770-C779	9590-9597, 9670-9671, 9673, 9675, 9678-9680, 9684, 9687, 9688, 9689-9691, 9695, 9698-9702, 9705, 9708-9709, 9712, 9714-9719, 9724-9729, 9735, 9737, 9738
	All sites except C02.4, C09.8-C09.9, C11.1, C14.2, C37.9, C42.0-C42.2, C42.4, C77.0-C77.9	9811-9818, 9823, 9827, 9837
Myeloma	Any site code	9731-9732, 9734
Lymphocytic Leukemia	Any site code	9826, 9835-9836, 9820, 9832-9834, 9940
	C42.0, C42.1, C42.4	9811-9818, 9837, 9823
Myeloid/Monocytic Leukemia	Any site code	9840, 9860, 9861, 9863, 9865-9867, 9869, 9871-9874, 9875-9876, 9891, 9895-9897, 9898, 9910-9911, 9920, 9930, 9945-9946
Pharynx	C10.0-C10.9, C11.0-C11.9, C12.9, C13.0-C13.9	All ICD-O-3 histologies, excluding 9050-9055, 9140, 9590-9992

[1] This column displays the anatomic site codes that were used to define the cancer category that is shown in the corresponding row of this table. Anatomic site codes are defined by the International Classification for Diseases for Oncology-Third Edition (ICDO-3) [10].

[2] This column displays the histology codes that were used to define the cancer category that is shown in the corresponding row of this table. Histology codes are defined by the International Classification for Diseases for Oncology-Third Edition (ICDO-3) [10].

Section 4: Results

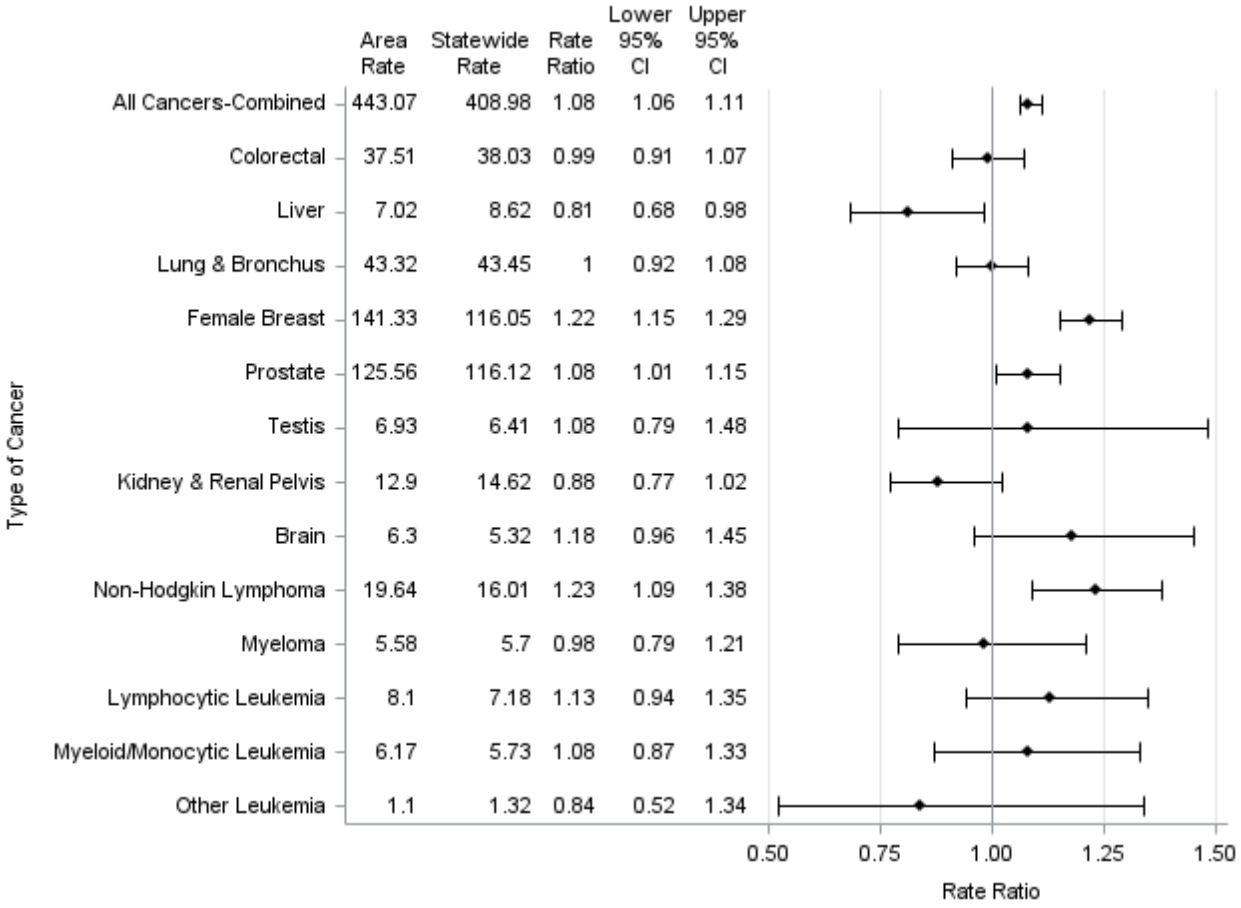
A total of 177,863 incident cancers were diagnosed among New Mexico residents during the time period from 2000-2019. Of these, 6,881 (3.87 percent) were diagnosed among residents of the target area (14 census tracts). Incidence rates in the target and comparison areas, along with corresponding rate ratios and confidence intervals are summarized in Figure 4.1. A detailed summary of results from this analysis, including case counts, incidence rates and corresponding CIs, is contained in the table in Appendix 2.

The age-adjusted incidence rate for all types of cancer (combined) in the target area was 443.07 per 100,000 population (95% CI 432.50-453.85), approximately 8 percent higher than the comparable incident rate for the state of New Mexico (408.98 per 100,000 population; 95% CI 407.02-410.95). The RR comparing rates for all types of cancer-combined in the target and comparison areas was 1.08 with a 95% CI of 1.06-1.11.

For three of the 13 types of cancer examined in this assessment, incidence rates in the target area exceeded statewide comparison rates and the respective RRs achieved statistical significance. The rate of female breast cancer in the target area was 141.33 per 100,000 population (95% CI 133.30-149.79) and the statewide comparison rate was 116.05 per 100,000 population (95% CI 114.60-117.52), yielding a RR of 1.22 (95% CI 1.15-1.29). The prostate cancer incidence rate in the target area (125.56 per 100,000 population; 95% CI 117.53-134.05) also exceeded the statewide comparison rate (116.12 per 100,0000; 95% CI 114.62-117.62), for a RR of 1.08 (95% CI 1.01-1.15). The incidence rate of 19.64 per 100,000 population (95% CI 17.45-22.07) for non-Hodgkin Lymphoma in the target area was higher than the statewide comparison rate (16.01 per 100,0000 population; 95% CI 15.62-16.40) and the corresponding RR was 1.23 (95% CI 1.09-1.38).

Figure 4.1

Summary of Incidence Rates and Rate Ratios for Selected Cancers



Rates for four additional types of cancer (testicular, brain, lymphocytic leukemia and myeloid/monocytic leukemia) in the target area exceeded the corresponding statewide comparison rates, but the respective RRs did not achieve statistical significance.

Incidence rates for three types of cancer (colon and rectum, lung and bronchus, and myeloma) were very similar in both the target and statewide comparison areas (the respective RRs were not statistically significant). Incidence rates for the remaining three types of cancer (liver, kidney and renal pelvis, and pharynx) were lower in the target area than in the statewide comparison area. Of the latter three types of cancer, only the RR for liver cancer achieved statistical significance (0.81; 95% CI 0.68-0.98).

Section 5: Summary

Incidence rates for cancers in the target area were broadly similar in magnitude to their corresponding rates in the statewide comparison population. The values for observed RRs ranged from 0.83 for liver cancer to 1.23 for non-Hodgkin lymphoma, which represents a relatively modest variation in RR in this population-based setting.

Incidence rates for female breast cancer, prostate cancer and non-Hodgkin lymphoma were statistically significantly higher in the target area than in the statewide comparison population. Rates for all cancers combined were also statistically significantly higher in the target area than in the statewide comparison population. The latter observation may be attributed, at least in part, to the elevated rates of female breast cancer, prostate cancer and non-Hodgkin lymphoma in the target area.

In contrast, there are multiple, well-established risk factors for female breast cancer [13, 14] prostate cancer [15, 16] and non-Hodgkin lymphoma [17]. The findings of modestly

elevated incidence rates for these three types of cancer – alone - provides no insight into the risk factors that may underlie these cancers in the target population of this assessment.

In conclusion:

- Results from two assessments have now documented statistically significant, but modest, elevations in cancer incidence for a limited number of cancer types relative to the comparison population.
- Findings of elevated rates of cancer cannot be readily nor credibly interpreted in the absence of additional information concerning relevant exposures of concern.
- The majority of cancers develop as a result of many exposures (risk factors). The exception is in cases like cervical cancer, where there is one known risk factor: exposure to the Human Papilloma Virus.
- Unfortunately, cancer is common and this community's risk of cancer is not dissimilar to other communities in New Mexico. Based on this and the above bullet points, the CCW has concluded that the cancer rates in this community are not elevated to a degree that any further assessments are warranted.

Section 7: References

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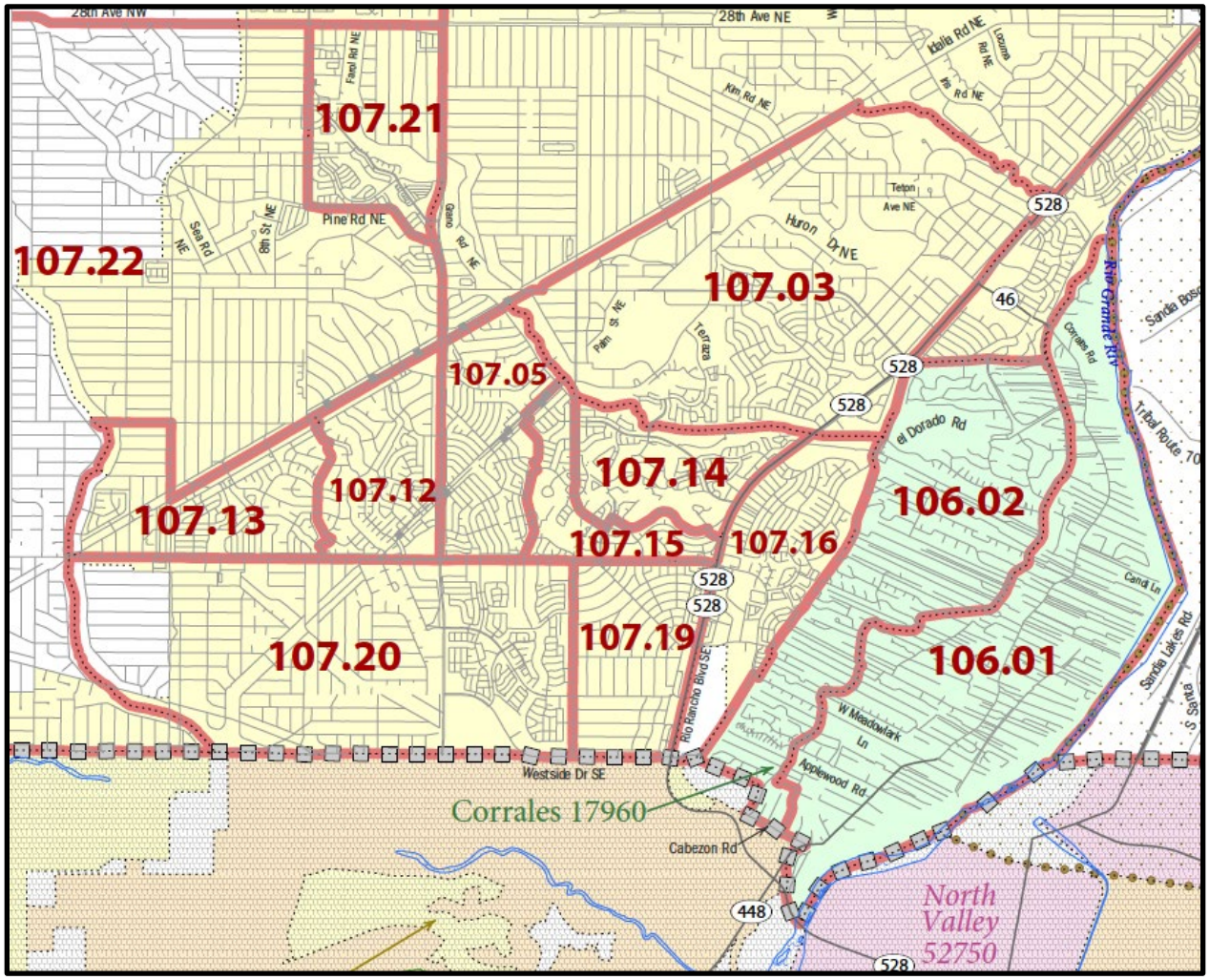
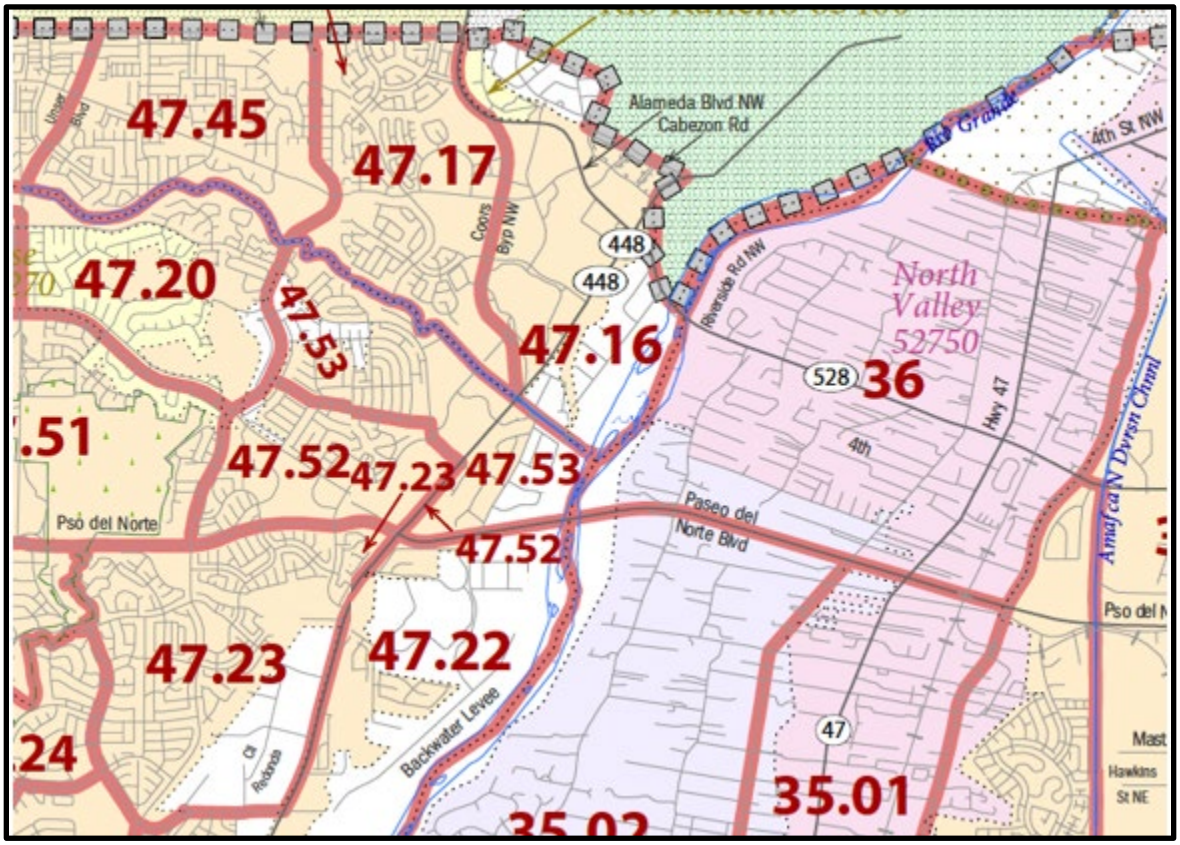
APPENDIX 1

Maps of the Geographic Area of Interest

Appendix 1.A Map of Target Census Tracts in Sandoval County



Appendix 1.B Map of Target Census Tracts in Bernalillo County



APPENDIX 2

Table of Incidence Rates and Rate Ratios

Appendix 2
Summary of age-adjusted incidence rates and corresponding rate ratios

Type of Cancer	Geographic Area	Case Count	Incidence Rate (95% Confidence Interval)	Rate Ratio (95% Confidence Interval)
All Cancers-Combined	Target Area	6,881	443.07 (432.50-453.85)	1.08 (1.06-1.11)
	Other New Mexico, excluding target area	170,982	408.98 (407.02-410.95)	1.00 (Reference)
Colorectal	Target Area	581	37.51 (34.48-40.76)	0.99 (0.91-1.07)
	Other New Mexico, excluding target area	15,850	38.03 (37.43-38.63)	1.00 (Reference)
Liver	Target Area	113	7.02 (5.77-8.50)	0.81 (0.68-0.98)
	Other New Mexico, excluding target area	3,720	8.62 (8.34-8.91)	1.00 (Reference)
Lung and Bronchus	Target Area	673	43.32 (40.07-46.78)	1.00 (0.92-1.08)
	Other New Mexico, excluding target area	18,342	43.45 (42.82-44.09)	1.00 (Reference)
Female Breast	Target Area	1,198	141.33 (133.30-149.79)	1.22 (1.15-1.29)
	Other New Mexico, excluding target area	25,324	116.05 (114.60-117.52)	1.00 (Reference)

Appendix 2
Summary of age-adjusted incidence rates and corresponding rate ratios
(Continued)

Type of Cancer	Geographic Area	Case Count	Incidence Rate (95% Confidence Interval)	Rate Ratio (95% Confidence Interval)
Prostate	Target Area	941	125.56 (117.53-134.05)	1.08 (1.01-1.15)
	Other New Mexico, excluding target area	23,853	116.12 (114.62-117.63)	1.00 (Reference)
Testis	Target Area	40	6.93 (4.93-9.48)	1.08 (0.79-1.48)
	Other New Mexico, excluding target area	1,157	6.41 (6.04-6.79)	1.00 (Reference)
Kidney and Renal Pelvis	Target Area	202	12.90 (11.16-14.87)	0.88 (0.77-1.02)
	Other New Mexico, excluding target area	6,108	14.62 (14.25-15.00)	1.00 (Reference)
Brain	Target Area	95	6.30 (5.08-7.77)	1.18 (0.96-1.45)
	Other New Mexico, excluding target area	2,156	5.32 (5.10-5.56)	1.00 (Reference)
Non-Hodgkin Lymphoma	Target Area	299	19.64 (17.45-22.07)	1.23 (1.09-1.38)
	Other New Mexico, excluding target area	6,650	16.01 (15.62-16.40)	1.00 (Reference)

Appendix 2
Summary of age-adjusted incidence rates and corresponding rate ratios
(Continued)

Type of Cancer	Geographic Area	Case Count	Incidence Rate (95% Confidence Interval)	Rate Ratio (95% Confidence Interval)
Myeloma	Target Area	88	5.58 (4.46-6.93)	0.98 (0.79-1.21)
	Other New Mexico, excluding target area	2,390	5.70 (5.47-5.93)	1.00 (Reference)
Lymphocytic Leukemia	Target Area	121	8.10 (6.70-9.74)	1.13 (0.94-1.35)
	Other New Mexico, excluding target area	2,957	7.18 (6.93-7.45)	1.00 (Reference)
Myeloid/Monocytic Leukemia	Target Area	91	6.17 (4.95-7.63)	1.08 (0.87-1.33)
	Other New Mexico, excluding target area	2,301	5.73 (5.49-5.97)	1.00 (Reference)
Pharynx	Target Area	18	1.10 (0.65-1.80)	0.84 (0.52-1.34)
	Other New Mexico, excluding target area	564	1.32 (1.21-1.43)	1.00 (Reference)