March 27, 2019

Hi Thad,

I apologize for the delay in responding to you—I appreciate your patience. The software we use (SEER*Stat) does not directly calculate rates for smaller geographic areas, so I needed to manually calculate the requested information.

Unfortunately, I cannot provide age-adjusted rates by zip codes as you request. At CRGC, we use census tracts, as is consistent with guidelines from the California Cancer Registry and the Council for State and Territorial Epidemiologists. We do not have reliable population data for zip codes, but we do for census tracts. This population data is essential to determining rates. In addition, census tracts provide more specific geographic values and do not cross county lines. Zip codes only exist where mail service is provided, and there are many zip codes that represent P.O. boxes or cross county lines. Census tracts have a larger and richer set of more reliable demographic data, as they can be associated with census blocks. This helps us to better adjust for the age, race, and sex distribution in an area.

The minimum numerator necessary to calculate adjusted rates is 15 cases. This is the standard that the cancer registries follow in California, and I believe in many other states. This does limit the ability to calculate yearly rates for small geographic areas, so we may combine several years of data and/or neighboring census tracts to ensure there are enough cases.

The zip codes in which you are interested cover multiple census tracts, so I included them in my analysis. Because we use decennial census data to estimate population sizes, and your request of 1996-2016 rates spans two census years, I separated analyses into 1996-2005 and 2006-2016. For 1996-2005, the 2000 Census was used to obtain population counts from census tracts 102.00, 103.00, 104.00, 105.00, and 110.00. For 2006-2016, the 2010 Census was used to obtain population counts from tracts 102.00, 103.00, 104.00, 105.00, and 110.02. Please note, the 2000 census tract 110.00 split into tracts 110.01 and 110.02 in the 2010 Census. All other tracts remained the same. These were obtained from the US Census website: https://www2.census.gov/geo/maps/dc10map/tract/st06_ca/c06045_mendocino/

For 1996-2015, I first determined the crude rate by dividing the observed number of cancer cases in Westport/Fort Bragg by the estimated 10-year population (population reported in the 2000 Census * 10). I then used the U.S. 2000 Standard Populations to create the age-adjusted rates (https://seer.cancer.gov/seerstat/tutorials/aarates/step1.html. I repeated this for the 2006-2016 data.

These are the results:

Table 1. Observed cases and age-adjusted incidence rates of cancer in Westport and Fort Bragg, California, 1996-2016

Cancer Site	Gender	1996-2005 Observed Cases	1996-2005 Age-Adjusted Rate*	2006-2016 Observed Cases	2006-2016 Age-Adjusted Rate*
All	All	1410	487.5	1519	445.4
	Male	777	578.5	831	499.5
	Female	633	410.8	688	407.3
Breast	Female	197	127.7	209	122.1
Leukemia	All	36	13.4	40	12.7
	Male	18	14.5	28	17.1
	Female	18	12.6	12	^
Urinary Bladder	All	85	29.0	101	29.3
	Male	71	53.0	74	47.5
	Female	14	^	27	14.7

*Rates are per 100,000; ^Could not be calculated due to <15 cases

As you can see, it appears rates have decreased in this area.

When investigating possible cancer clusters, we calculate standardized incidence ratios (SIRs), as recommended by the CDC and the Council for State and Territorial Epidemiologists. To do this, we apply age-, race-, and sex-specific rates from a larger referent population (e.g. Mendocino County) to determine the expected case counts in an area of interest (e.g. Westport/Fort Bragg). This estimates the number of cancer cases that would occur in the area of interest if the occurrence of cancer in that population was the same as the reference population. This expected count is then compared to the observed number of cases to determine whether or not there is a statistical excess of cases in the area of interest (SIR = Observed/Expected).

A SIR of < 1.0 indicates that observed counts are less than expected counts, while a value > 1.0 indicates that observed counts are higher than expected counts. A value equal to or approximately equal to 1.0 indicates that observed counts are the same or nearly the same as what is expected. This indicates a nominal or null finding that neither represents a cancer excess or deficit. The 95% CIs represent a range of values that one can be 95% certain contains the true SIR. If the value of 1.0 falls within this range, then the result is not statistically significant and indicates that the ratio of observed to expected counts of cancer cases is no greater or less than the level that can reasonably be attributed to random error.

I determined the SIRs of cancer in Westport/Fort Bragg using the most recent 21 years of data for all sites, female breast cancer, leukemia, and urinary bladder cancer. I used Mendocino County as the referent population. I again ran two sets of analyses, one for 1996-2005 and 2006-2016.

Table 2. Observed and expected numbers of cancer cases and standardized incidence ratios (SIRs) in Westport/Fort Bragg, California, 1996-2005.

Cancer Site	Gender	Observed Count	Expected Count (95% CI)	SIR (95% CI)
All	All	1410	1391 (1315, 1510)	1.0 (0.9, 1.1)
	Male	777	722.4 (707.1, 851.7)	1.1 (1.0, 1.2)
	Female	633	669.0 (570.1, 700.7)	0.9 (0.9, 1.0)
Breast	Female	197	206.0 (162.7, 236.1)	1.0 (0.8, 1.1)
Leukemia	All	36	39.5 (22.4, 54.5)	0.9 (0.6, 1.4)
	Male	18	17.9 (8.9, 32.1)	1.0 (0.5, 1.8)
	Female	18	21.7 (8.9, 32.1)	0.8 (0.4, 1.5)
Urinary Bladder	All	85	74.6 (63.1, 111.8)	1.1 (0.8, 1.5)
	Male	71	63.1 (51.2, 95.7)	1.1 (0.8, 1.5)
	Female	14	11.5 (6.2, 26.8)	1.2 (0.5, 2.3)

Between 1996-2005, 1,410 cancer cases were reported. This did not differ from the total expected number of 1,391 (SIR = 1.0 overall). There were no significant differences by gender. Similarly, there were no significant differences between the observed and expected case counts for female breast, leukemia, or urinary bladder cancers, overall or by gender.

Table 3. Observed and expected numbers of cancer cases and standardized incidence ratios (SIRs) in Westport/Fort Bragg, California, 2006-2016.

Cancer Site	Gender	Observed Count	Expected Count (95% CI)	SIR (95% CI)
All	All	1519	1588 (1420, 1622)	1.0 (0.9, 1.0)
	Male	831	858.4 (758.6, 908.2)	1.0 (0.9, 1.1)
	Female	688	729.4 (622.3, 758.5)	0.9 (0.9, 1.0)
Breast	Female	209	214.6 (173.6, 249.2)	1.0 (0.8, 1.2)
Leukemia	All	40	40.8 (25.6, 59.4)	1.0 (0.6, 1.5)
	Male	28	24.8 (16.2, 44.7)	1.1 (0.5, 2.3)
	Female	12	15.9 (4.9, 24.1)	0.8 (0.3, 1.5)
Urinary Bladder	All	101	93.7 (77.0, 129.9)	1.1 (0.8, 1.4)
	Male	74	70.9 (53.7, 99.2)	1.0 (0.8, 1.4)
	Female	27	22.8 (15.5, 43.5)	1.2 (0.7, 1.9)

Between 2006-2015, 1,519 cancer cases were reported. This did not differ from the total expected number of 1,588 (SIR = 1.0 overall). There were no significant differences by gender. Similarly, there were no significant differences between the observed and expected case counts for female breast, leukemia, or urinary bladder cancers, overall or by gender.

As you can see, none of the SIRs are significant. This indicates that, based on registry data, the observed number of cases in Westport/Fort Bragg is consistent with what we would expect. In other words, **there is no evidence of a statistical excess of cancer in Westport/Fort Bragg**.

The cancer registry has no information on environmental exposures or exposure levels to known or suspected carcinogens. We do not conduct environmental testing and do not currently study the correlation of herbicides with cancer. When I was initially contacted by Mendocino County Public Health regarding your concern, I reached out to the Environmental Health Investigations Branch (EHIB) at the California Department of Public Health to see if they had any information on herbicides and cancer. I asked them about these herbicides: atrazine, hexazinone, sulfometuron, imazapyr, Glyphosate, 2,4-D, and/or triclopyr. This was their response:

> "It seems your assessment is right that there's not evidence for strong causal links between these herbicides and cancer in humans. Here's some summary info:
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> **Glyphosate:**
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> Of the various herbicides mentioned, only glyphosate is considered by IARC to be a Class B2 chemical (probably carcinogenic to humans). California's EPA put it on the Prop 65 list of chemicals known by the State of California to cause cancer in 2017. This finding was based on cancer in mice and several epidemiological human studies showing non-Hodgkin's lymphoma in agricultural workers exposed to glyphosate. A number of other human cancers were NOT found to be significantly associated with glyphosate, including breast cancer, and also brain, esophagus, prostate, soft tissue sarcoma, lung, oral, colorectal, pancreas, kidney, bladder, and melanoma. IARC does not list leukemia as significant - the evidence for hematological tumors was mixed or insignificant.
>
> **2,4-Dichlorophenoxyacetic acid (2,4-D):**
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> 2-4D is considered by IARC to be "possibly carcinogenic in humans." They conclude there is insufficient evidence in humans and limited evidence in animals. The animal studies consisted of several studies in mice and rats; one study found an elevation of a type of lymphoma (histiocytic sarcoma/mixed cell malignant lymphoma) in female mice and another found increased lung tumors. A rat study found an increase in brain tumors (astrocytomas) in male rats. However, a UC Berkeley study from 2013 looked at associations between house dust 2,4-D levels and child leukemia but found no significant association (Metayer et al 2013). California considered listing 2-4D as carcinogenic but OEHHA withdrew the proposal due to insufficient evidence of carcinogenicity or reproductive harm. "

If you have additional questions for EHIB, their contact information can be found on their website: https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHIB/Pages/Contact.aspx.

Unfortunately, it is not unusual for several cases of leukemia, or any cancer, to occur in an area over 20 years. Leukemia is one of the most common cancer diagnoses and is the most common cancer diagnosis in children. To my knowledge there is no established link between leukemia and herbicide use. Similarly, other than skin cancer, breast cancer is the most commonly diagnosed cancer among women in Mendocino County, California, and the U.S. We would expect to see a number of breast cancer cases in any given area each year. Again, I am unaware of any definitive etiological association between herbicides and breast cancer.

As you may know, cancer is a general term for many diseases, and most cancers have very different environmental and genetic causes. Knowledge of several cases in a defined area does not always indicate a cancer cluster or a link to an environmental agent, as certain numbers and types of cancer are expected in any defined geographic area. Oftentimes it is difficult for epidemiologists to provide answers regarding cancer concerns and perceived cancer clusters. Although most cancer clusters occur by chance, it is not uncommon for people to be concerned that cancer clusters are caused by an exposure that occurred in their environment. However, it is extremely rare to prove that a suspected cancer cluster is associated with an environmental carcinogen. Unfortunately, most of the time individual diagnoses are unable to be linked to specific causes.

I understand your concern regarding cancer in your community, and I hope I was able to answer some of your questions. Please let me know if you have additional questions.

Best,

Amy

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