Disparities in Cancer within Ho-Chunk Contract Health Service Delivery Area, 2003-2012

Carbone Cancer Center
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Overview

This summary presents rates for new cancer cases (*incidence*) and deaths due to cancer (*mortality*) for the Ho-Chunk Contract Health Service Delivery Area (CHSDA) counties (referred to as "Ho-Chunk region" in this report). Analyzing American Indian and Alaska Native (AI/AN) cancer rates in CHSDA areas has become a national standard of practice because these rates provide the most accurate representation of AI/AN rates available.[1,2] In Wisconsin, there are 32 CHSDA counties[i] (of the 72 Wisconsin counties). The Ho-Chunk CHSDA counties include Adams, Clark, Columbia, Crawford, Dane, Eau Claire, Jackson, Juneau, La Crosse, Marathon, Monroe, Sauk, Shawano, Vernon, and Wood counties.

In the pages that follow, incidence and mortality bar graphs display rates for AI/ANs living in the Ho-Chunk CHSDA counties, Whites living in the Ho-Chunk CHSDA counties[ii] and all AI/ANs living in all CHSDA counties across the state (*see Foote et al.[2] for more information)*. These rates were calculated based on the sum of cases (or deaths, for mortality) over the period 2003-2012[iii], and age-adjusted to allow direct comparison between these groups. We first present rates for all invasive cancers combined (*all sites*[iv] cancer), and then rates specific to the four most common cancer sites: colorectal, lung, female breast, and prostate. For each graph, we provide a rate for men and women combined ("M and F"), and where the number of cases is sufficient[v], we present the rates for each sex.

Small Populations

When we look at local tribal data like this, the number of total cases is often quite small. The reason we convert this data into rates is that it makes it possible to compare the data across populations of different size. However, the lower the total number of cases in a small population the less stable the rate. When we say a rate is less stable we mean it can be more easily affected by random changes in the number of cases from year to year. This statement is not meant to minimize the importance of the rates in this report. The differences are real. Our purpose is to make readers aware of the limitations when working with small populations. We have chosen to highlight a few examples below to illustrate our point. We also recommend looking at the tables provided in the back of the summary to see the total number of new cases or deaths for particular cancers in your community.

Reading the Graphs

On each graph you will see bars whose heights represent rates (per 100,000 persons) for each group (pink for all AI/ANs residing in all 32 CHSDA counties across the state: “AI/AN State CHSDA”; red for AI/ANs residing in Ho-Chunk CHSDA counties: “AI/AN Tribal Region”; and grey for Whites residing in Ho-Chunk CHSDA counties: “Whites in Tribal Region”). An asterisk (*) above any two bars means that the rates for those two groups are significantly different from each other ($p \leq .05$). As a whole, there are a limited number of differences that are significant. This is expected with small populations. However, even non-significant differences are real and important to note since the data include *actual reported* cases rather than samples of populations[vi].

We summarize patterns that emerge from the data[vii], and highlight potential implications for your community. We know your experience with your community will allow you to enrich these interpretations and the possible implications. We hope these summaries help support planning with your tribal health team, communication with tribal leadership, grant procurement and external advocacy for additional resources.

All sites cancer incidence (figure 1) and mortality (figure 2), 2003-2012:

- *Incidence (figure 1)*
  - The Ho-Chunk AI/AN men and women have an all sites incidence rate (484) that is 6% higher than the rate for White men and women (456) living in the same counties and 17% ***lower*** than AI/AN men and women (585) across the state.
- *Mortality (figure 2)*
  - The Ho-Chunk AI/AN mortality rates for men and women combined and for women alone are lower than the associated rates for AI/ANs across the state.
  - The all sites mortality rate for Ho-Chunk AI/AN men and women (239) is 43% higher (statistically significant) than the rate for White men and women (167) living in the same counties and 11% ***lower*** than AI/AN men and women (267) across the state.
  - The Ho-Chunk AI/AN all sites mortality rate is influenced by particularly high rates among men. Ho-Chunk AI/AN men have a cancer rate (348) that is 70% higher (statistically significant) than the rate for White men (205) living in the same counties, and 6% higher than the rate for AI/AN men (328) across the state.

Figure 1: Incidence Rate, All Sites

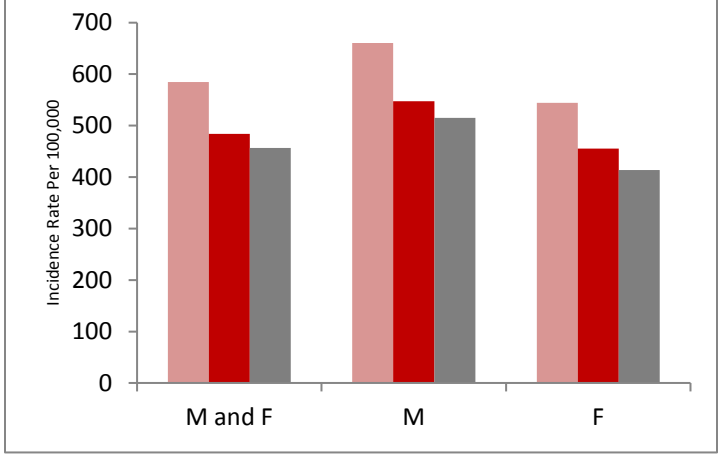
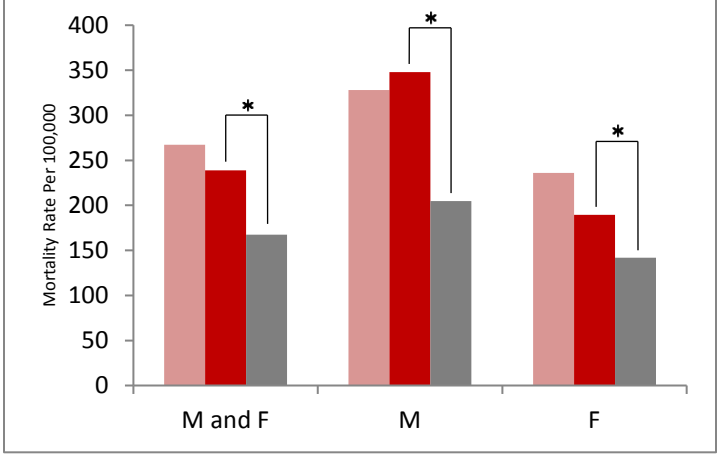


Figure 2: Mortality Rate, All Sites



AI/AN State CHSDA AI/AN Tribal Region Whites in Tribal

Rates are per 100,000 persons in each region of focus, and age-adjusted to the 2000 U.S. standard population.

Rates are significantly different $p \leq 0.05$ if marked by an asterisk (*)

Colorectal cancer incidence (figure 3) and colorectal cancer mortality (figure 4), 2003-2012:

- *Incidence (figure 3):*
    - The colorectal cancer incidence rate for Ho-Chunk AI/AN men and women (64) is 56% higher (statistically significant) than the rate for White men and women (41) living in the same counties and 8% ***lower*** than AI/AN men and women (69) across the state.
    - While combined colorectal cancer rates are lower between Ho-Chunk region AI/ANs and AI/ANs across the state, this average hides important patterns based on sex.
    - The incidence rate for Ho-Chunk AI/AN men (82) is 56% higher (statistically significant) than the rate for White men and women (46) living in the same counties and 13% ***lower*** than AI/AN men and women (69) across the state.
    - Ho-Chunk AI/AN women have an incidence rate (49) that is lower than the rate for AI/AN women (51) across the state.
- *Mortality* (figure 4):
    - The colorectal cancer mortality rate for Ho-Chunk AI/AN men and women (33) is more than double (statistically significant) the rate for White men and women (14) living in the same counties and 47% higher than the rate for AI/AN men and women (22) living across the state.
    - Importantly, Ho-Chunk AI/AN men have a mortality rate of (86) that is over 5 times higher than the rate for White men (17) living in the same counties and more than double the rate for AI/AN men statewide (39).
    - The number of Ho-chunk AI/AN deaths due to colorectal cancer is too low to be reported separately for women (to protect confidentiality).

Figure 3: Incidence Rate, Colorectal Cancer

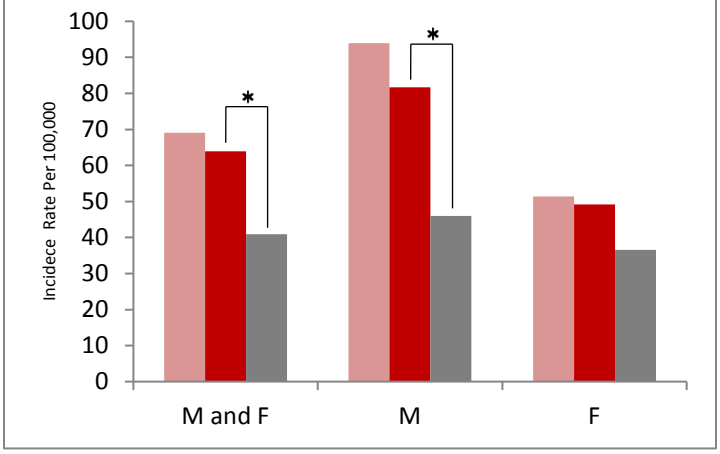
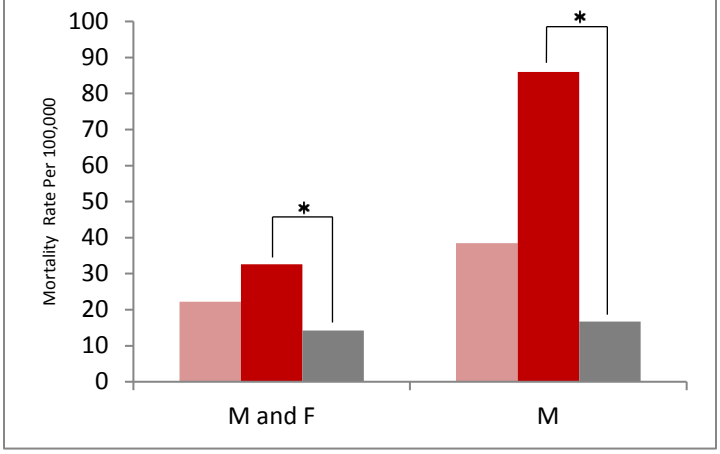


Figure 4: Mortality Rate, Colorectal Cancer



AI/AN State CHSDA AI/AN Tribal Region Whites in Tribal

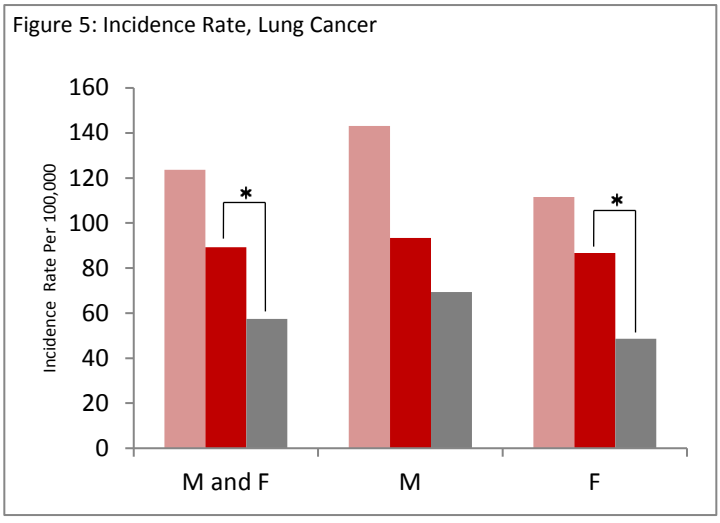
Rates are per 100,000 persons in each region of focus, and age-adjusted to the 2000 U.S. standard population.

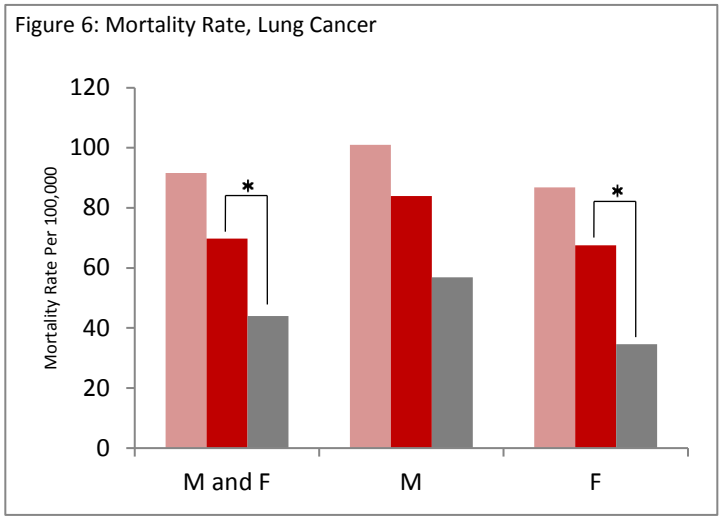
Rates are significantly different $p \leq 0.05$ if marked by an asterisk (*)

Lung cancer incidence (figure 5) and lung cancer mortality (figure 6), 2003-2012:

- *Incidence* (figure 5):
    - The lung cancer incidence rate for Ho-Chunk AI/AN men and women (89) is 55% higher (statistically significant) than the rate for White men and women (57) living in the same counties and 28% ***lower*** than AI/AN men and women (124) across the state.
    - Ho-Chunk AI/AN women (87) have a lung cancer incidence rate that is 78% higher (statistically significant) than the rate for White women (49) living in the same counties, and 22% ***lower*** than the rate for AI/ANs (112) across the state.
    - Importantly, each of the Ho-Chunk AI/AN lung cancer incidence rates is over 20% ***lower*** than its respective statewide AI/AN rate.

- *Mortality* (figure 6):
    - The lung cancer mortality rate for Ho-Chunk AI/AN men and women (70) is 59% higher (statistically significant) than the rate for White men and women (44) living in the same counties, and 24% ***lower*** than the rate for AI/ANs (92) across the state.
    - Ho-Chunk AI/AN women (68) have a lung cancer mortality rate that is 95% higher (statistically significant) than the rate for White women (35) living in the same counties, and 22% ***lower*** than the rate for AI/ANs (87) across the state.
    - All of the Ho-Chunk AI/AN lung cancer mortality rates are more than 17% lower than their respective statewide AI/AN rates as well.
    - During this ten year time period, there were a total of 14 lung cancer deaths for Ho-Chunk AI/AN men (Example of small number of cancer cases - refer to table 3).



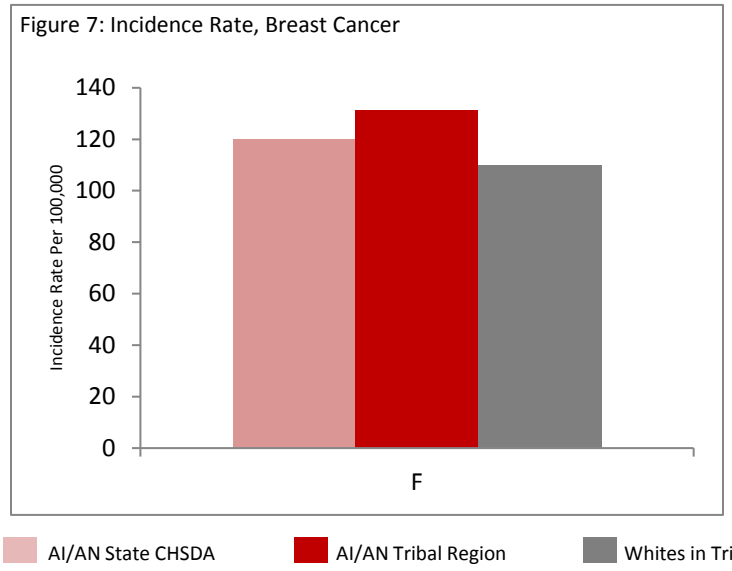


AI/AN State CHSDA | AI/AN Tribal Region | Whites in Tribal

Rates are per 100,000 persons in each region of focus, and age-adjusted to the 2000 U.S. standard population.
Rates significantly different at $p \leq 0.05$ are marked by an asterisk (*).

Female breast cancer incidence (figure 7), 2003-2012:

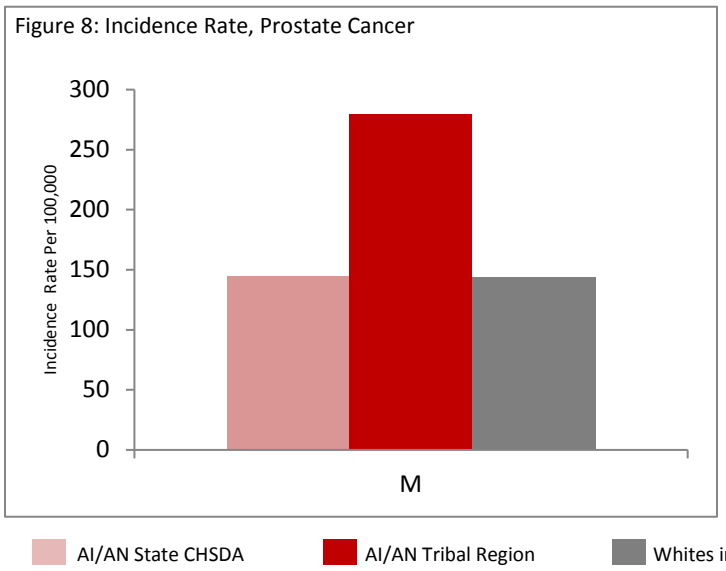
- The rate of new breast cancer cases for Ho-Chunk AI/AN women (131) is over 19% higher than the rate for White women (110) in the same counties, and 9% higher than the rate for AI/AN women (120) across the state. The number of Ho-Chunk AI/AN breast cancer deaths is too small to present mortality rate data (to protect confidentiality).
- During this ten year time period, there were a total of 9 breast cancer cases for Ho-Chunk AI/AN women (Example of small number of cancer cases - refer to table 1).



Rates are per 100,000 persons in each region of focus, and age-adjusted to the 2000 U.S. standard population.
Rates significantly different at $p \leq 0.05$ are marked by an asterisk (*).

Prostate cancer incidence (figure 8), 2003-2012:

- The rate of new prostate cancer cases for Ho-Chunk AI/AN men (280) is 95% higher than the rate for White men (144) in the same counties, and 94% higher than the rate AI/AN men (144) across the state. The number of Ho-Chunk AI/AN prostate cancer deaths is too small to present mortality rate data (to protect confidentiality).



Rates are per 100,000 persons in each region of focus, and age-adjusted to the 2000 U.S. standard population.
Rates significantly different at $p \leq 0.05$ are marked by an asterisk (*).

Discussion

Overall, American Indians and Alaska Natives in the Ho-Chunk region are similar to those across the state in that they experience a greater cancer burden than Whites living in the same region. Of note, colorectal cancer incidence and mortality rates appear to be more of an issue for men than women and prostate cancer rates are noticeably higher.

The colorectal mortality pattern seen among Ho-Chunk AI/AN men is something that can be addressed with increased screening efforts. Which may be an issue due to lack of access or male resistance to colorectal screening. However, increased screening will result in an increase in colorectal incidence rate. While programs that attempt to reduce the colorectal cancer incidence would be cancer prevention programs focusing on lifestyle modification.

The data suggest an encouraging pattern of lower lung cancer incidence for AI/ANs in the Ho-Chunk region compared to AI/ANs statewide (see Figure 5). This pattern may reflect initial positive outcomes of Ho-Chunk's public health efforts in smoking cessation and health promotion. Ho-Chunk's lung cancer mortality is also a positive. Ho-Chunk AI/AN lung cancer mortality rates are lower than rates for AI/ANs across the state (see Figure 6).

The encouraging lung cancer mortality pattern is something to keep watching. A key factor is the delayed impact that smoking can have in terms of lung cancer death. The positive effects of a smoking cessation programs tend to appear much later in mortality rates than incidence rates. Continued support of screening, early detection, and prompt follow-up and treatment – in addition to smoking cessation programs – are needed in order to prevent and limit excess deaths due to lung cancer.

Conclusion

Most cancers take many years to develop. This makes ongoing preventative programs especially important to reduce excess cancer burden. In general, efforts to reduce incidence rates are most efficiently spent targeting evidence-based public health strategies for: (1) improving health behaviors that also honor cultural values (such as choosing healthy foods, staying physically active, limiting harmful tobacco and alcohol use[3]); (2) reducing stress associated with historical and current traumatic experiences; and (3) improving socioeconomic status and reducing structural barriers to promote healthful environments and limit exposure to environmental toxins and pollutants. Lowering mortality rates also require promoting cancer screening, early detection and prompt follow-up and treatment as necessary.

***For your information**, we have attached incidence and mortality tables that contain the 10-year aggregated numerical data we used to prepare this report (counts, rates, confidence intervals, rate ratios and p-values). We do not provide 5-year tables because these data are less reliable for the small population of focus, but please contact us if you would like to see these.*

The data were provided by the Wisconsin Cancer Reporting System (WCRS), Office of Health Informatics, Department of Health Services. We would like to thank Mary Foote, WCRS Epidemiologist, for help obtaining these data and understanding how to interpret data for small populations.

***For questions about this report**, please contact the Spirit of EAGLES program at the UW Cancer Health Disparities Initiative: chdi@uwcarbone.wisc.edu or (608) 262-0072.*

Appendix: 10-year regional aggregated numerical data (counts, rates, confidence intervals, rate ratios and p-values)

Table 1. *Ho-Chunk Nation CHSDA (Adams, Clark, Columbia, Crawford, Dane, Eau Claire, Jackson, Juneau, La Crosse, Marathon, Monroe, Sauk, Shawano, Vernon, and Wood) Cancer Incidence (10 yr) 2003-2012*

		AI/AN CHSDA		White CHSDA		AI/AN: White RR (95% CI)	Ratio P-Value
		Count	Incidence Rate (95% CI)	Count	Incidence Rate (95% CI)		
All Sites	Total	347	483.7 (429, 543)	58,799	456.3 (452.6, 460.1)	1.06 (0.9397, 1.1902)	0.3432
	Male	161	547.4 (449.2, 658.7)	30,489	515 (509.2, 520.9)	1.0629 (0.8718, 1.2795)	0.5519
	Female	186	455.3 (388.7, 529.3)	28,310	414 (409.1, 419)	1.0996 (0.9384, 1.279)	0.2398
Colon	Total	41	**63.9* (44.1, 88.7)**	5,321	40.9 (39.8, 42)	**1.5627 (1.0768, 2.1721)**	**0.0196**
	Male	23	**81.7* (46.9, 130)**	2,664	46 (44.2, 47.8)	**1.7762 (1.0188, 2.8319)**	**0.0431**
	Female	18	49.2 (28.2, 78.4)	2,657	36.6 (35.2, 38.1)	1.3417 (0.7684, 2.1441)	0.299
Lung	Total	53	**89.2* (64.8, 118.7)**	7,400	57.4 (56.1, 58.7)	**1.5534 (1.1283, 2.0695)**	**0.0076**
	Male	22	93.4 (52.4, 150)	4,042	69.4 (67.3, 71.6)	1.3463 (0.7544, 2.1642)	0.3122
	Female	31	**86.7* (57.6, 124.1)**	3,358	48.6 (46.9, 50.3)	**1.7845 (1.1837, 2.5591)**	**0.0065**
Breast	Female	9	131.2	641	109.9	1.1941 (0.5191, 2.3369)	0.7126
Prostate	Male	16	279.6	874	143.7	1.9453 (0.9875, 3.4127)	0.0542

Table 2. *Wisconsin American Indian/Alaska Native All CHSDA Cancer Incidence (10 yr) 2003-2012*

		AI/AN Statewide	
		Count	Rate (95% CI)
All Sites	Total	1,473	584.7 (552.2, 618.3)
	Male	699	660.3 (602.7, 721.3)
	Female	774	544.3 (504.4, 586.3)
Colon	Total	167	69.1 (58.1, 81.4)
	Male	96	93.9 (73.2, 118.2)
	Female	71	51.4 (39.5, 65.5)
Lung	Total	272	123.6 (108.1, 140.5)
	Male	130	143.1 (115.8, 174.2)
	Female	142	111.6 (93.1, 132.4)
Breast	Female	184	119.9 (102.5, 139.3)
Prostate	Male	146	144.1 (117, 175)

Notes for Tables 1 and 2

Rates are per 100,000 and age-adjusted to the 2000 US Std Population (19 age groups - Census P25-1130) standard; Confidence intervals (Tiwari mod) are 95% for rates and ratios.

~ Statistic could not be calculated.
^ Statistic not displayed due to fewer than 6 cases.
* The rate is significantly different than the rate for White ($p<0.05$).

Sources:
Data were provided by the Wisconsin Cancer Reporting System (WCRS), Office of Health Informatics, Department of Health Services.
Data were analyzed by Cancer Health Disparities Initiative, UW Carbone Cancer Center.

Appendix: 10-year regional aggregated numerical data (counts, rates, confidence intervals, rate ratios and p-values)

Table 3. *Ho-Chunk Nation CHSDA (Adams, Clark, Columbia, Crawford, Dane, Eau Claire, Jackson, Juneau, La Crosse, Marathon, Monroe, Sauk, Shawano, Vernon, and Wood) Cancer Mortality (10 yr) 2003-2012*

		AI/AN CHSDA		White CHSDA		AI/AN: White RR (95% CI)	Ratio P-Value
		Count	Mortality Rate (95% CI)	Count	Mortality Rate (95% CI)		
All Sites	Total	139	**238.7* (197.1, 285.5)**	22,371	167.4 (165.2, 169.6)	1.4261 (1.177, 1.7065)	0.0004
	Male	73	**347.9* (255.2, 458.1)**	11,741	204.9 (201.1, 208.7)	1.6979 (1.2448, 2.2374)	0.0011
	Female	66	**189.6* (144.7, 242.8)**	10,630	142 (139.2, 144.8)	1.3355 (1.0185, 1.7117)	0.0367
Colon	Total	16	**32.6* (17.8, 53.3)**	1,940	14.2 (13.6, 14.9)	2.2965 (1.2511, 3.757)	0.0086
	Male	14	**86.0* (40.1, 152.7)**	955	16.7 (15.6, 17.8)	5.1507 (2.3958, 9.1852)	0.0001
	Female	^	^	985	12.2 (11.5, 13.1)	~	~
Lung	Total	37	**69.8* (47.8, 97.3)**	5,808	44 (42.8, 45.1)	1.588 (1.0858, 2.2156)	0.018
	Male	14	84 (42.1, 143.9)	3,303	56.9 (54.9, 58.9)	1.477 (0.7394, 2.5338)	0.2648
	Female	23	**67.5* (41.8, 101.7)**	2,505	34.6 (33.3, 36.1)	1.9489 (1.2052, 2.9429)	0.0075

Table 4. *Wisconsin American Indian/Alaska Native All CHSDA Cancer Mortality (10 yr) 2003-2012*

		AI/AN Statewide	
		Count	Rate (95% CI)
All Sites	Total	548	267.3 (243.1, 293)
	Male	270	328.2 (280.7, 380.4)
	Female	278	235.9 (207.5, 266.8)
Colon	Total	41	22.2 (15.4, 30.6)
	Male	27	38.5 (22.3, 60)
	Female	14	13.7 (7.3, 22.9)
Lung	Total	190	91.6 (78, 106.8)
	Male	87	101.0 (76.9, 129.2)
	Female	103	86.8 (70.2, 106)
Breast	Female	36	30.5 (20.8, 42.6)
Prostate	Male	19	44 (24.7, 69.8)

Notes for Tables 3 and 4

Rates are per 100,000 and age-adjusted to the 2000 US Std Population (19 age groups - Census P25-1130) standard; Confidence intervals (Tiwari mod) are 95% for rates and ratios.

~ Statistic could not be calculated.
^ Statistic not displayed due to fewer than 6 cases.
* The rate is significantly different than the rate for White ($p<0.05$).

Sources:
Data were provided by the Wisconsin Cancer Reporting System (WCRS), Office of Health Informatics, Department of Health Services.
Data were analyzed by Cancer Health Disparities Initiative, UW Carbone Cancer Center.

References

1. Espey DK, Jim MA, Richards T, et al. Methods for improving the quality and completeness of mortality data for American Indians and Alaska Natives. *Am J Pub Health* 2014;104 Suppl 3:S286-94.

2. Foote M, Strickland R, Lucas-Pipkorn S, Williamson A, Lamers L. The High Burden of Cancer Among American Indians/Alaska Natives in Wisconsin*. Wisconsin Medical Journal*, February, 2016;115 (link is external) (1);11-16.

3. American Indian Cancer Foundation. *American Indian Cancer Burden: Cancer Facts for American Indians and Alaska Natives*. 2016.

Notes

[i] CHSDA counties do not include Milwaukee, Racine, and Kenosha counties, and thus the population of urban Indians is excluded from CHSDA-level statewide rates.

[ii] The White Ho-Chunk CHSDA rates are approximately the same as the associated statewide White rates, but where they are different, this fact is explicitly stated.

[iii] AI/AN cancer incidence diagnosis and mortality death counts are relatively small (due to the small population subsets from which they originate). These small counts lead to limitations in statistical analyses (i.e., large confidence intervals). To partially address this issue, it is customary to aggregate cancer diagnosis and death counts across five and ten year spans of time. Associated incidence and mortality rates are then calculated for these spans of time. We urge caution when evaluating and making interpretations using the five-year data (provided in appendices) due to statistical limitations.

[iv] "All sites" refers to refers to all invasive cancers. All analyses of incident cancer cases were restricted to individuals with malignant disease; benign and in situ cases were excluded from all analyses, with the exception of in situ bladder cases which, by convention, are included with analyses of malignant tumors.

[v] The Wisconsin Cancer Reporting System cannot provide data where incidence case counts are between 0 and 6, and deaths were less than 10 in any cell, regardless of the number of years. This data suppression is intended to protect confidentiality.

vi We chose not to show confidence intervals or error bars on the graphs. 95% confidence intervals do appear in the tables in the appendices. It is important to note that these confidence intervals do not represent random sampling error with these data as in traditional population sampling research. Instead they represent how actual true rates randomly vary from year to year across the 10-year span presented, and across communities. Thus the 95 percent confidence intervals convey the stability of the rates over time. Presenting as 10-year rates compensates for variability in rates for small populations such as AI/ANs within CHSDA regions. This approach is considered "gold standard" for small populations.

[vii] Rates and percentages are rounded to the nearest whole number.