Quantifying Cancer Burden Attributable to Obesity in Arkansas

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BACKGROUND

Obesity is a modifiable risk factor for various chronic diseases.[1] It is a complex, multifactorial disease, and increases the risk of several cancers.[2] The incidence of many of these cancers has been increasing, possibly due to the increasing prevalence of obesity.[3] Continuing increases in obesity prevalence over time suggest that the burden will likely increase in the decades to come.[5] Data are needed to identify among whom the burden is highest in a rural, racially diverse, and high-poverty southern state (Arkansas) with a high obesity and cancer burden.[8] One method to estimate the burden of cancers likely due to (attributable to) obesity is using the population attributable fraction (PAF). **The purpose of this study is to calculate the percent of cancers that are likely due to obesity calculating the PAF by sex, race, and ethnicity in Arkansas.**

LEARNING OBJECTIVES

✓ Describe the use and application of population attributable fraction for cancers associated with obesity.

✓ Identify Arkansas groups by race, ethnicity, and sex at high risk of obesity attributable cancers using the PAF%.

✓ Recognize the importance of obesity prevention as a primary prevention strategy for associated cancers.

METHODS

Data were obtained from the Arkansas Central Cancer Registry among adults (≥ 18 years). Cancers were identified according to the CDC's definitions of obesity-associated cancers. Data were evaluated by sex and two major racial groups (non-Hispanic [NH] Black and White). Age-adjusted incidence rates (AAIR) were computed with SEER*Stat.

The PAF (%) formula was calculated using published, global relative risks for each cancer and obesity prevalence by sex, race, and ethnicity group. Global relative risks for each obesity-associated cancer were gathered from large-scale epidemiological studies, meta-analyses, and systematic reviews where body mass index (BMI) was ≥ 30 kg/m2. Obesity prevalence for each group was obtained from the 2011 Arkansas Behavioral Risk Factor Surveillance System (BRFSS). Counts with less than 15 cases were excluded.
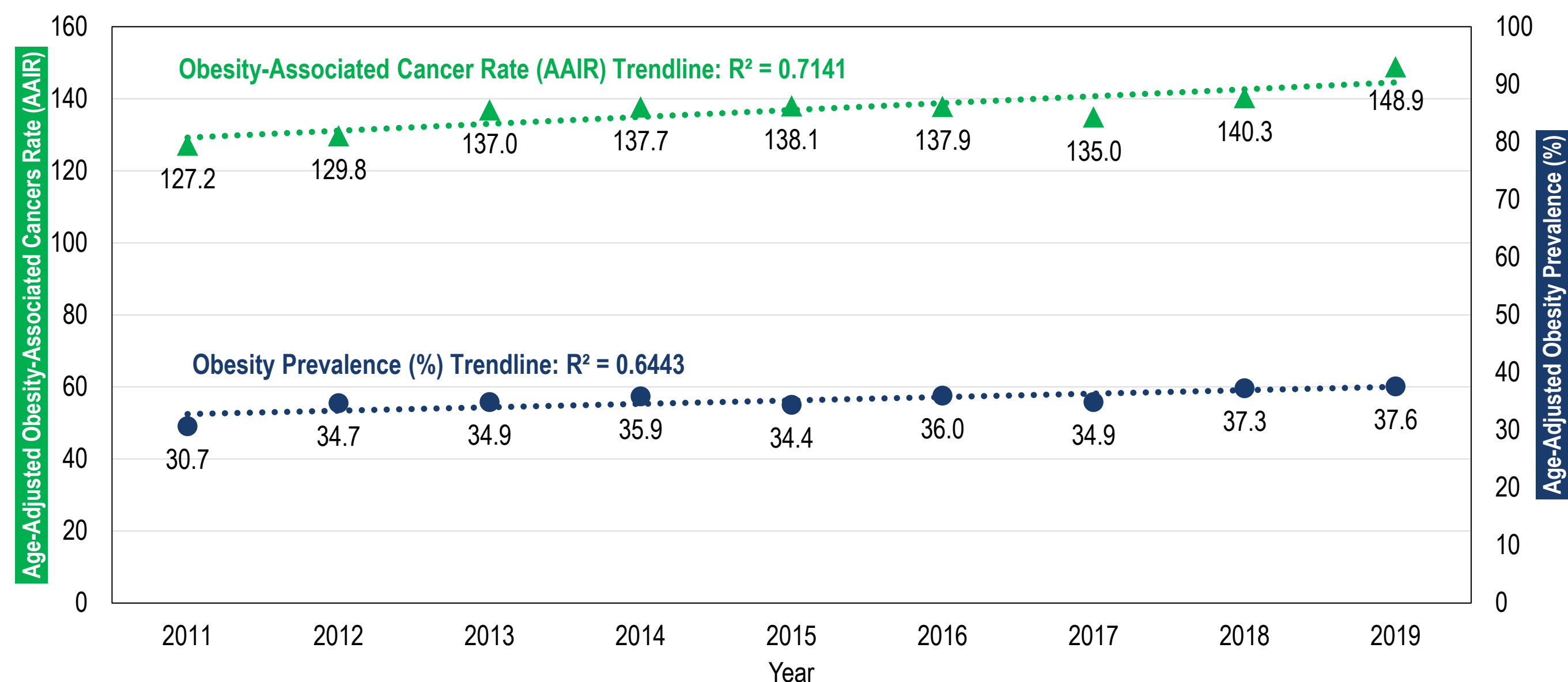
RESULTS

From 2010 through 2019, Dallas, Poinsett, Randolph, Monroe, and Drew counties had the highest obesity-associated cancer rates (**Figure 1**). The overall trend for both obesity-associated cancer rate and obesity prevalence in Arkansas increased from 2011 through 2019 (**Figure 2**). In Arkansas, postmenopausal breast cancer had the highest incidence rate (NH Black females = 317.3; NH White females = 319.3). Colorectal cancer had the highest frequency of cancer, with NH Black adults having the highest incidence rate (NH Black males AAIR = 73.9; NH Black females = 60.7) (**Table 1**). Corpus uteri, EAC, gallbladder, kidney, liver, and pancreas had at least one group where the PAF was greater than 20%. NH Black females had a higher PAF than NH White females for breast, corpus uteri (endometrial), and ovarian cancer. EAC was more than 40% across all groups, excluding NH Black females (**Table 2**).

Figure 1. Age-Adjusted Incidence Rate (AAIR) of Obesity-Associated Cancer Rates by County, Arkansas, 2010-2019

Cases per 100,000 Legend
- 145 – 158
- 159 – 170
- 171 – 175
- 176 – 188
- 189 - 209
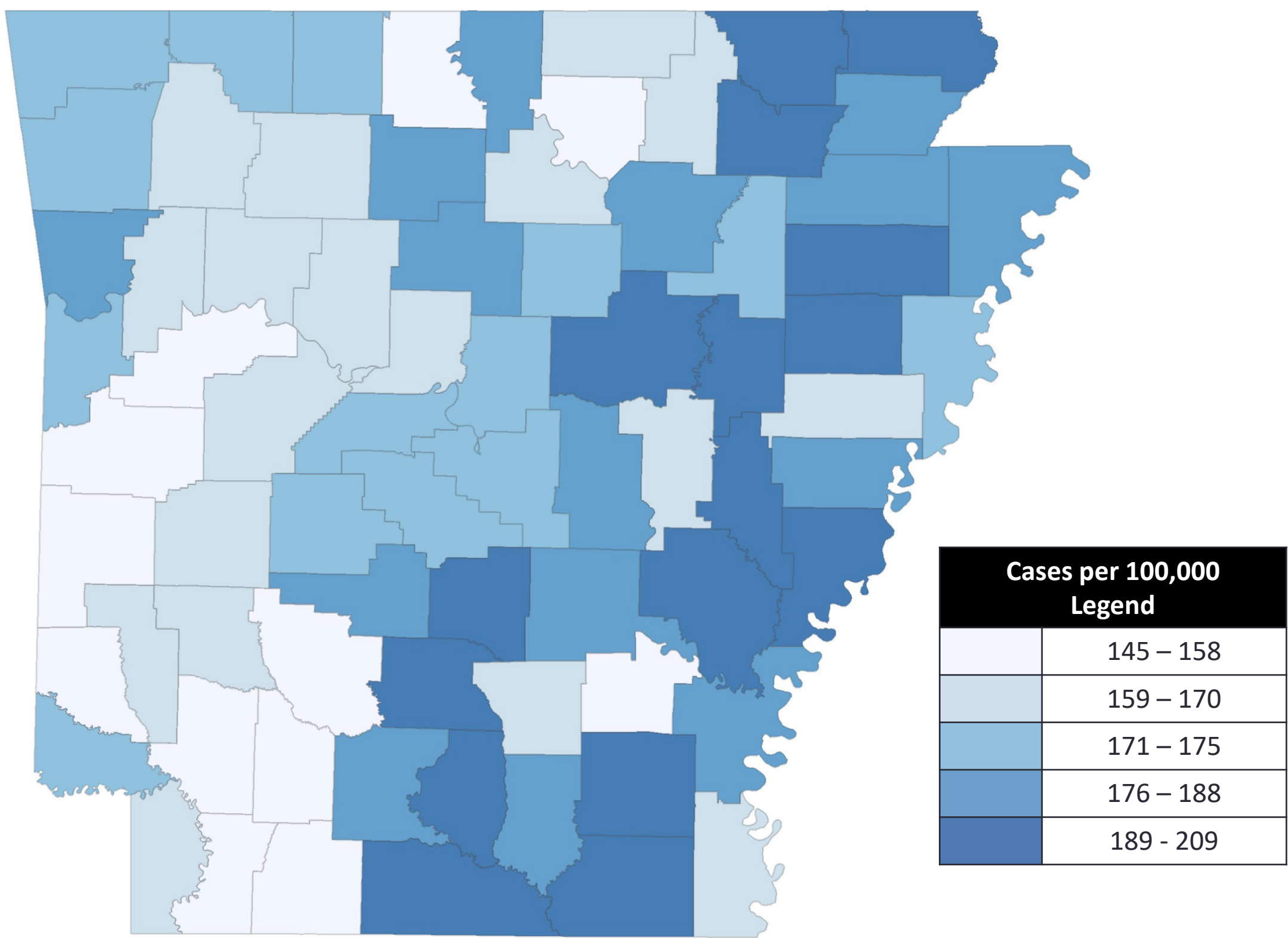
Sources: Arkansas Central Cancer Registry data retrieved 2/13/2025

Figure 2. Comparison of obesity prevalence (%) and obesity-associated cancer rate (AAIR) trendlines, Arkansas, 2011-2019

Obesity-Associated Cancer Rate (AAIR) Trendline: R^2 = 0.7141
127.2, 129.8, 137.0, 137.7, 138.1, 137.9, 135.0, 140.3, 148.9

Obesity Prevalence (%) Trendline: R^2 = 0.6443
30.7, 34.7, 34.9, 35.9, 34.4, 36.0, 34.9, 37.3, 37.6

Sources: Arkansas Central Cancer Registry data retrieved 2/13/2025, CDC BRFSS data retrieved 12/16/2025

Table 1. Number (#) and age-adjusted incidence rate (AAIR) of obesity associated cancers by race/ethnicity and sex, Arkansas, 2010-2019

| | FEMALES | | | | MALES | | | |
| | NH Black | | NH White | | NH Black | | NH White | |
	#	AAIR (95% CI)	#	AAIR (95% CI)	#	AAIR (95% CI)	#	AAIR (95% CI)
Overall	5,624	292.5 (284.7 - 300.5)	34,544	266.0 (263.1 - 268.9)	2,415	166.0 (158.9 - 173.2)	16,115	143.7 (141.4 - 146.0)
Breast (≥ 50 years)*	2,233	317.3 (303.9 - 331.2)	15,490	319.3 (314.3 - 324.5)	-	-	-	-
Colorectal	1,118	60.7 (57.1 - 64.5)	5,927	45.7 (44.5 - 46.9)	1,070	73.9 (69.2 - 78.8)	6,556	59.0 (57.5 - 60.5)
Corpus uteri*	616	31.1 (28.6 - 33.7)	3,753	29.9 (29.0 - 31.0)	-	-	-	-
EAC[β]	†	†	111	0.9 (0.7 - 1.0)	25	1.6 (1.0 - 2.4)	789	6.8 (6.3 - 7.3)
Gallbladder	35	1.9 (1.3 - 2.6)	185	1.4 (1.2 - 1.7)	16	1.2 (0.6 - 2.0)	85	0.7 (0.6 - 0.9)
Gastric cardia	19	1.0 (0.6 - 1.7)	132	1.0 (0.8 - 1.2)	40	2.7 (1.9 - 3.8)	519	4.5 (4.2 - 5.0)
Kidney	370	19.9 (17.9 - 22.1)	2,056	16.8 (16.0 - 17.5)	444	29.9 (27.0 - 33.0)	3,251	29.2 (28.2 - 30.3)
Liver	79	4.1 (3.3 - 5.2)	499	3.7 (3.4 - 4.1)	210	13.0 (11.2 - 15.1)	1,298	10.9 (10.3 - 11.6)
Multiple myeloma	289	15.2 (13.5 - 17.1)	760	5.7 (5.3 - 6.1)	253	18.4 (16.0 - 21.0)	945	8.4 (7.8 - 8.9)
Ovary*	206	11.1 (9.6 - 12.7)	1,681	13.8 (13.1 - 14.5)	-	-	-	-
Pancreas	399	22.3 (20.1 - 24.6)	1,662	12.2 (11.6 - 12.8)	295	21.3 (18.7 - 24.0)	1,887	16.6 (15.9 - 17.4)
Thyroid	256	13.4 (11.8 - 15.2)	2,273	22.4 (21.5 - 23.4)	62	4.1 (3.1 - 5.3)	767	7.4 (6.8 - 7.9)

Highlights group with the highest rate within each cancer type
* Female only
† Excluded due to low counts
β EAC = Esophageal adenocarcinoma
Sources: Arkansas Central Cancer Registry data retrieved 4/13/2024

Table 2. Obesity prevalence and calculated PAF% for sex, race and ethnicity by cancer type, Arkansas

| | FEMALES | | MALES | |
	NH Black	NH White	NH Black	NH White
Obesity prevalence*	59.9%	48.7%	40.1%	51.3%
Breast	11.6%	9.7%	-	-
Colorectal	16.7%	14.0%	11.8%	14.6%
Corpus uteri	60.5%	55.5%	-	-
EAC	†	52.7%	47.9%	54.0%
Gallbladder	25.8%	22.0%	18.9%	22.9%
Gastric cardia	7.2%	6.0%	5.0%	6.3%
Kidney	31.3%	27.0%	23.4%	28.0%
Liver	31.6%	27.3%	23.6%	28.3%
Multiple myeloma	12.1%	10.1%	8.4%	10.6%
Ovary	17.7%	14.9%	-	-
Pancreas	22.0%	18.6%	15.9%	19.4%
Thyroid	5.1%	4.2%	3.5%	4.4%

PAF considered high at 20%
*Obesity prevalence provided from Arkansas Survey Section, BRFSS on 4/30/2024

CONCLUSIONS

In Arkansas, the eastern counties in the state had the highest incidence rate of obesity-associated cancers. **Figure 2** showed a gradual rise in both obesity prevalence and obesity-associated cancers from 2011 through 2019, although caution is suggested as these trends serve to compare rather than provide causative explanations. Similar to national findings, females tend to have an overall higher obesity prevalence and rate of obesity associated cancers, with the latter primarily due to more female-specific cancers associated with obesity (**Table 1**). However, among cancers that affect both males and females, males had a higher rate of colorectal, EAC, gastric cardia, liver, and multiple myeloma. This study also quantified cancer cases that can be attributed to obesity thus providing an estimate of the percent of cancer cases in the population that could be prevented if the risk factor were eliminated. To note, estimated PAF shows 60.53% and 55.49% of corpus uteri (endometrial) cancer cases were likely due to obesity for NH Black and White females, respectively. Among males, 47.87% and 54.02% of esophageal adenocarcinoma cases were likely due to obesity for NH Black and White males, respectively. Although this study has its strengths, obesity prevalence from BRFSS can result in underreporting and is likely higher. Additionally, areas that have lower cancer incidence rates yet have a high obesity will show a higher PAF compared to other states, which may be the case for Arkansas. In summary, research suggests obesity is a contributing factor to not only a list of chronic diseases, but also cancer rates. With Arkansas consistently ranking among the highest in the nation for obesity prevalence, public health initiatives are needed in the prevention of the disease such as access to healthy foods and access to physical activity opportunities, which could play a crucial role in reducing the state's obesity-associated cancer burden.

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