



An Assessment of Obesity Attributable Cancers for Implementation of New Data Items in Cancer Surveillance in Arkansas

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BACKGROUND

In 2016, the International Agency for Research on Cancer (IARC) Working Group identified 13 cancers associated with excess body weight (EBW) with a significant association between BMI and cancer risk and positive dose-response relationships.¹ As of 2021, Arkansas ranked 6th in the nation with the highest obesity prevalence at 38.9%, consistently higher than the US crude prevalence in past years.² Although the Arkansas Central Cancer Registry (ACCR) state-specific data items have data items for risk factors including alcohol history, tobacco history, and family history of cancer for cancer surveillance efforts and research, data items for obesity associated factors are not collected. From a population health-cancer surveillance perspective, height and weight, used for calculating body mass index (BMI), can serve as a form of cross-sectional surveillance on obesity and its impact on cancer burden. As part of ACCR's initiative in implementing the collection of height and weight data items for cancer surveillance, **we assessed the burden due to obesity associated and attributable cancers in Arkansas since the inception of ACCR in 1996. A separate analysis was performed to evaluate the diagnostic text field for physical exam, history variable for information on collected height and weight.**

METHODS

Data was extracted from ACCR for obesity associated cancer cases since the inception of ACCR in 1996 to 2020. At the time of data collection, 2020 data was considered provisional. Our data analysis included cancer cases diagnosed in Arkansas at least 30 years of age and older. Obesity associated cancers were determined by the IARC definitions of obesity-associated cancers.^{2,3} The age-adjusted incidence rate (per 100,000 population) of obesity associated cancers were calculated in SAS 9.4 and standardized to the 2000 US Standard Population. Obesity attributable cancers were calculated by multiplying to the estimated population attributable fraction percent (PAF%) from the published paper by Islami, et al, *Proportion of Cancer Cases Attributable to Excess Body Weight by US State, 2011-2015*.⁴ The PAF% of incident cancer cases attributable to obesity was determined for esophageal adenocarcinoma, gastric cardia (stomach), colon & rectum, corpus uteri (NOS), ovary, breast (females, postmenopausal), pancreas, kidney and renal pelvis, thyroid, and multiple myeloma. Liver and gallbladder were grouped together considering the rarity of the latter tumor, while meningioma was excluded due to the sparsity of the number of invasive cases in the state.

A separate qualitative analysis was performed to assess the number and percent of overall obesity-associated cancer cases of all ages with height and weight within the diagnostic text field for physical exam, history field utilizing SEER*DMS query tool.

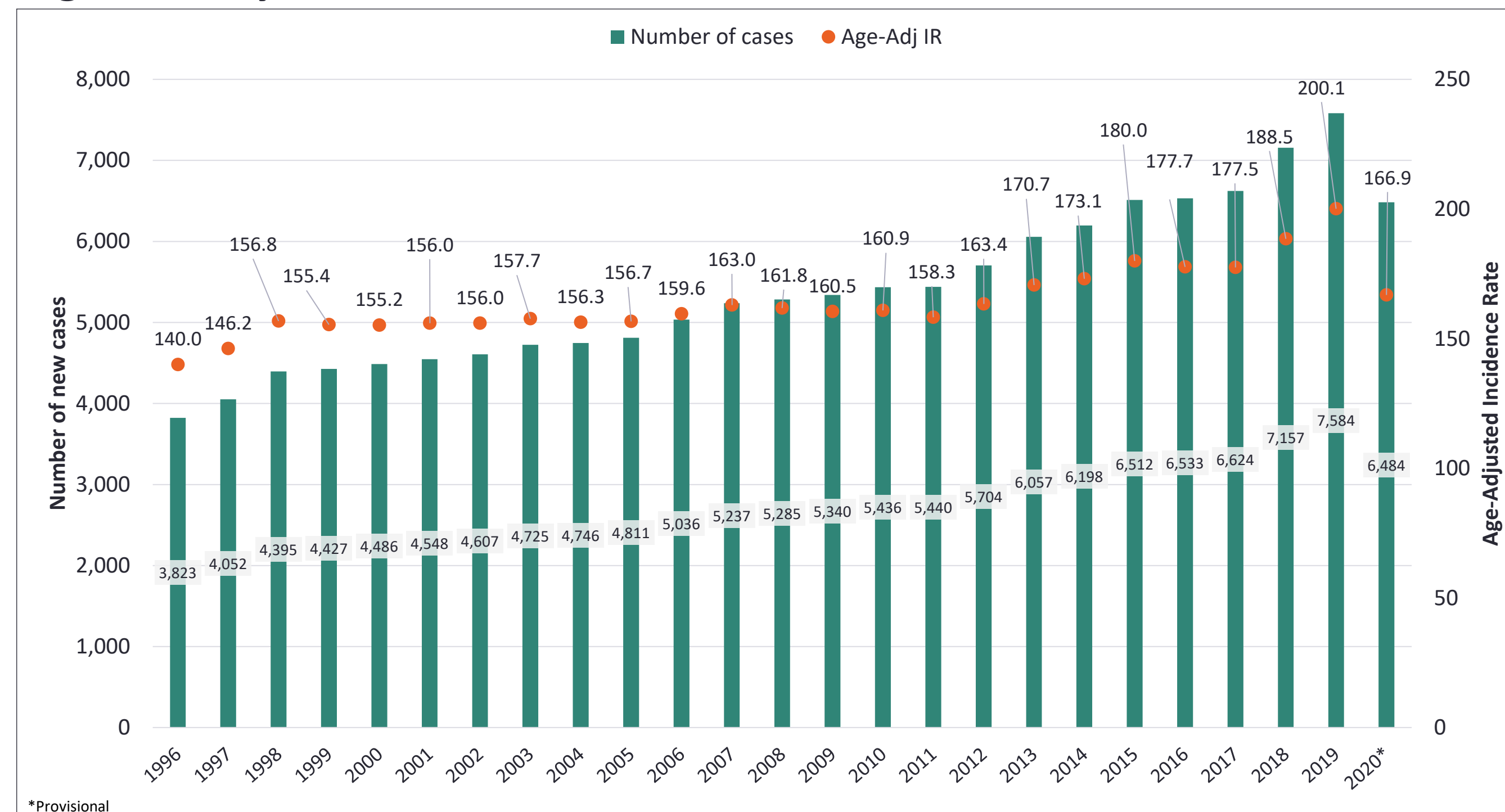
RESULTS

Of the approximately 368,651 of cancer cases diagnosed in Arkansas from 1996-2020, about 36.69% were obesity-associated cancer cases (n=135,247). Among obesity associated cancers, approximately 15.85% were attributable to obesity (n=21,452) during the study period. The AAIR of obesity associated and attributable cancers have increased from 1996 through 2019. Corpus uteri, NOS, had the highest obesity attributable cancer incidence rates (AAIR= 5.68, 95%CI: 5.11-6.26) followed by postmenopausal female breast (AAIR= 5.08, 95%CI: 4.50-5.72), kidney cancer (AAIR= 4.97, 95%CI: 4.38-5.62), liver/gallbladder (AAIR= 3.09, 95%CI: 2.61-3.61), colorectal (AAIR= 2.29, 95%CI: 1.85-2.69), pancreas (AAIR= 1.81, 95%CI: 1.46-2.14), thyroid (AAIR= 0.84, 95%CI: 0.64-1.04), esophageal adenocarcinoma (AAIR= 0.78, 95%CI: 0.66-0.92), multiple myeloma (AAIR= 0.63, 95%CI: 0.45-0.83), ovary (AAIR= 0.57, 95%CI: 0.43-0.72), and gastric cardia (AAIR= 0.35, 95%CI: 0.28-0.43).

Females had a higher obesity attributable cancer incidence rate (AAIR= 21.35, 95%CI: 20.00-22.52) in the magnitude of 4 times compared to males compared to males (AAIR= 5.85, 95%CI: 5.32-6.27).

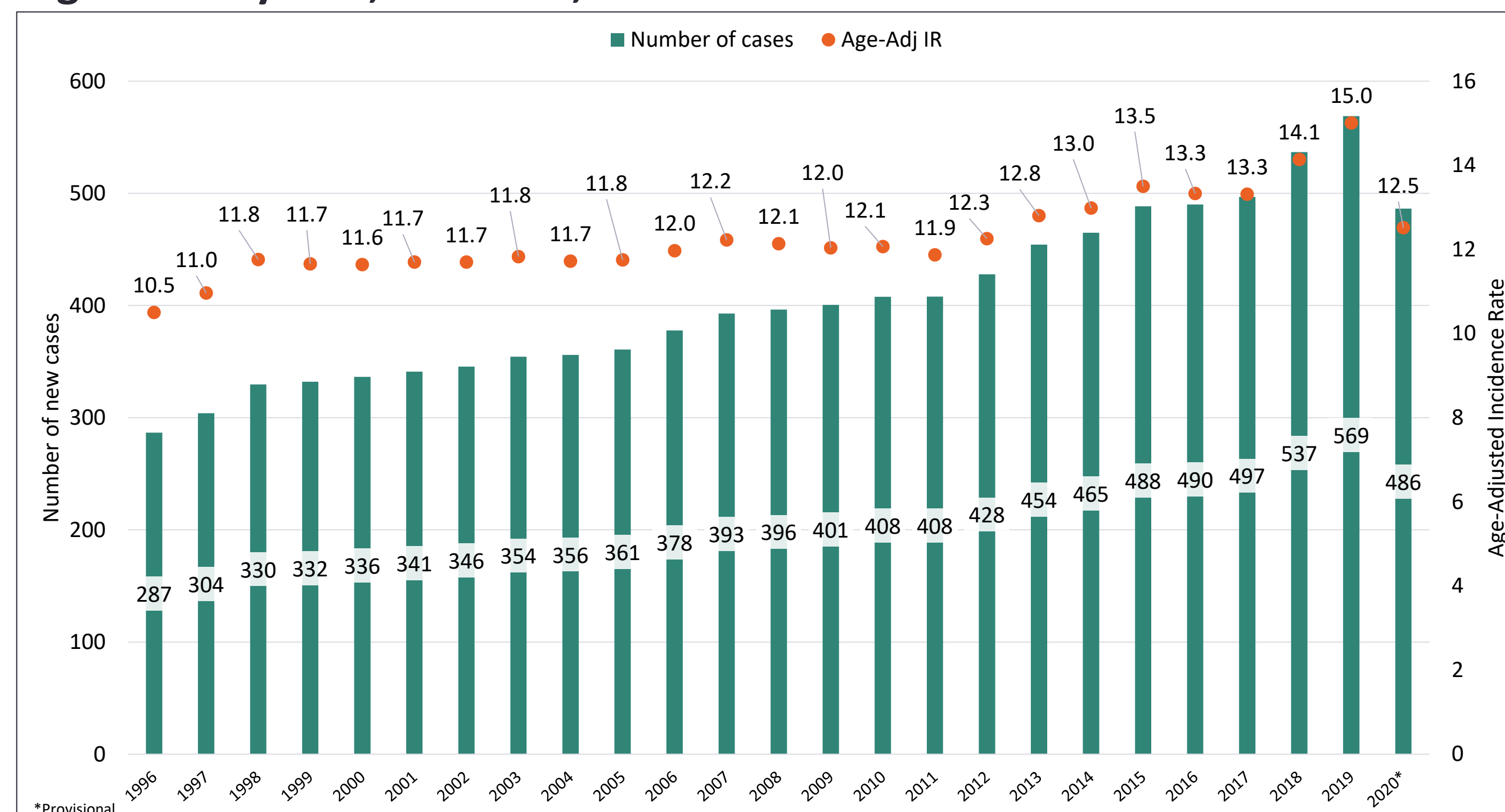
Among 1996-2020 overall obesity-associated cancer cases (N= 135,247), only 0.58% (n= 789) contained height and weight information within the cancer physician report text field in the ACCR database.

Figure 1. Number and AAIR of Obesity-Associated Cancers among Adults Ages ≥ 30 by Year, Arkansas, 1996-2020



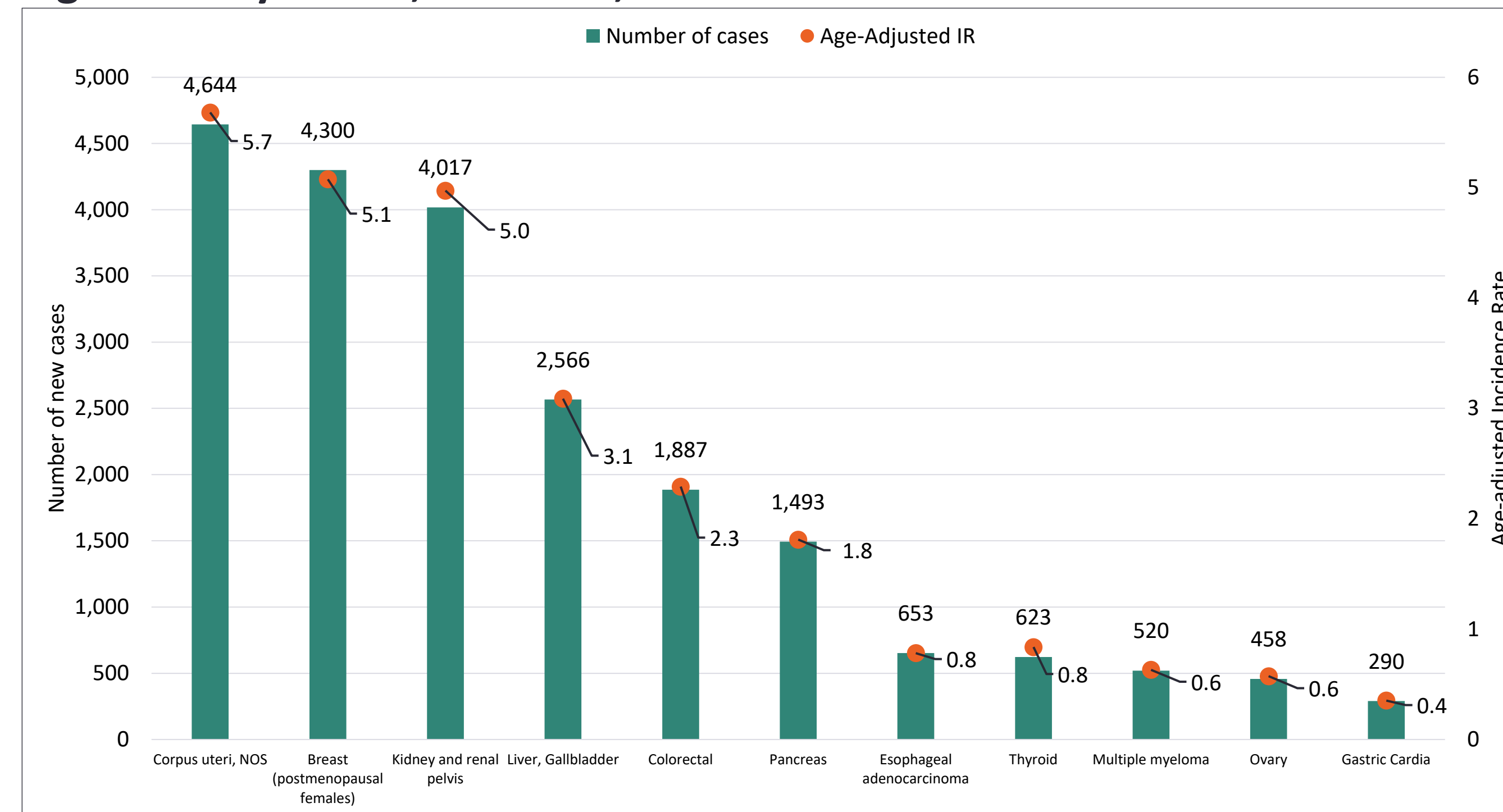
AAIR standardized to 2000 US Standard Population. Rate is per 100,000 population. Source: Data retrieved from ACCR SEER*DMS on 01-27-2023.

Figure 2. Number and AAIR of Obesity-Attributable Cancers among Adults Ages ≥ 30 by Year, Arkansas, 1996-2020



AAIR standardized to 2000 US Standard Population. Rate is per 100,000 population. Source: Based on data retrieved from ACCR SEER*DMS on 01-27-2023.

Figure 3. Number and AAIR of Obesity-Attributable Cancers among Adults Ages ≥ 30 by Tumor, Arkansas, 1996-2020



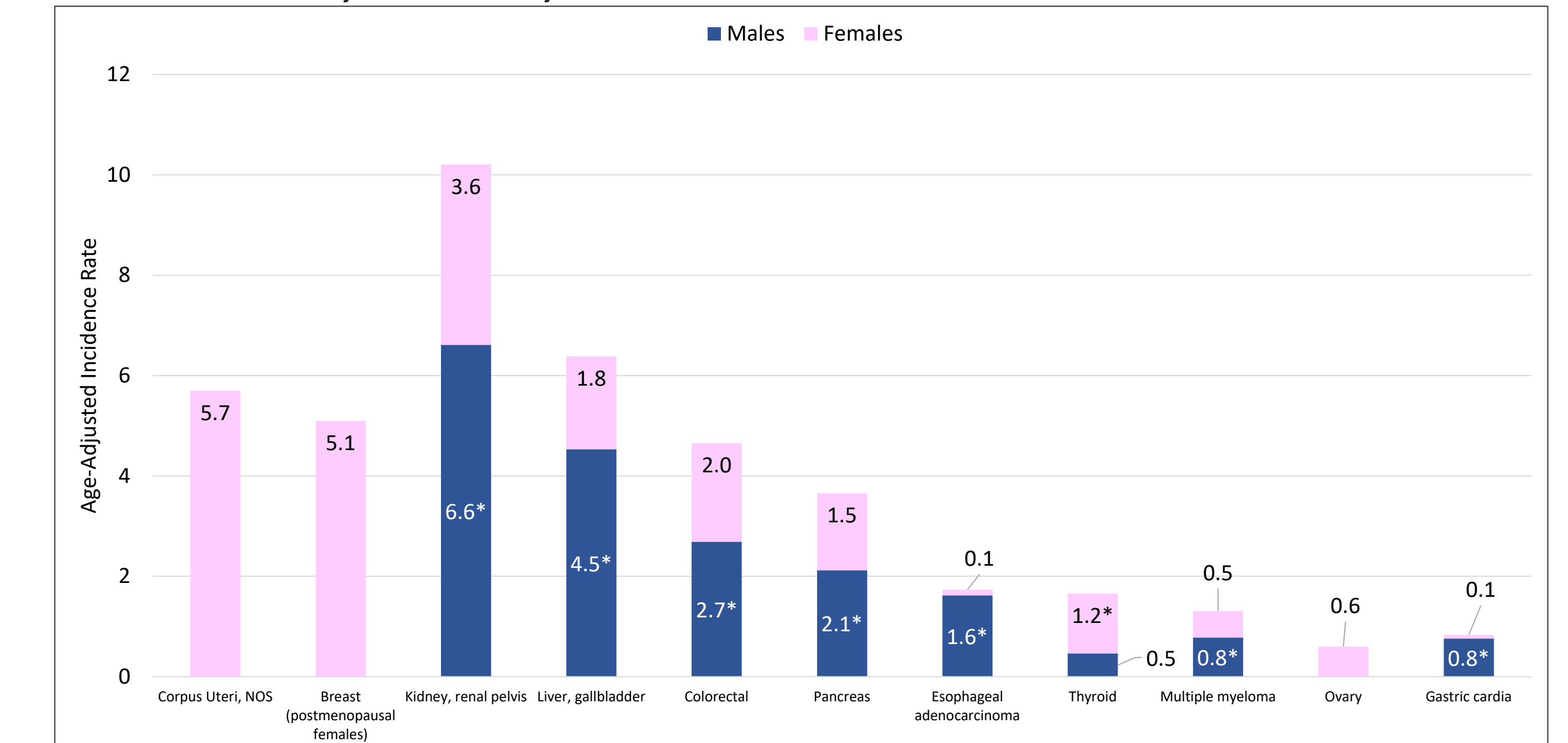
AAIR standardized to 2000 US Standard Population. Rate is per 100,000 population. Source: Based on data retrieved from ACCR SEER*DMS on 01-27-2023.

Table 1. Comparison of Number and AAIR of Obesity-Attributable Cancers among Adults Ages ≥ 30 by Sex, Arkansas, 1996-2020

Sex	Number of cases	AAIR (95% CI)
Females	9,575	21.4 (20.0 - 22.5)
Males	2,158	5.9 (5.3 - 6.3)

AAIR standardized to 2000 US Standard Population. Rate is per 100,000 population. Source: Based on data retrieved from ACCR SEER*DMS on 01-27-2023.

Figure 4. AAIR of Obesity-Attributable Cancers among Adults Ages ≥ 30 by Tumor and Sex, Arkansas, 1996-2020



*Reflects statistical difference (95% confidence interval) AAIR standardized to 2000 US Standard Population. Rate is per 100,000 population. Source: Based on data retrieved from ACCR SEER*DMS on 01-27-2023.

Figure 5. Sample of Query Results with Height and Weight Information in Diagnostic Text Field for Physical Exam, History Variable Among Obesity-Associated Cancers, Arkansas, 1996-2020

Example 1: 80YO MARRIED NON-HISPANIC W/M SCHEDULED FOR EGD FOR EVALUATION OF DYSPHAGIA AND ABNORMAL BARIUM SWALLOW. FAM CA HX POS UNK/BROTHER. SMOKING: FORMER SMOKER (QUIT DATE: 06/20/2009). 0.5 PPD, 5 PACK-YEARS, SMOKELESS TOBACCO: NEVER USED. ALCOHOL: YES. HEIGHT 5'10", WEIGHT 150 LB, BMI 21.52.

Example 2: 59YO SINGLE NON-HISPANIC W/M PRESENTS TO THE ED WITH A CHIEF COMPLAINT OF ABNORMAL LAB RESULTS. HEIGHT 5'7", WEIGHT 208 LB, BMI 32.57.

CONCLUSIONS

The assessment is consistent with past research in showing that the overall AAIR obesity-associated and attributable cancers were higher in females than in males, reflecting the associations of EBW with increased risk for several female-specific cancers (corpus uteri, female breast, and ovary). Despite females having a higher overall AAIR for obesity attributable cancers, males had a higher obesity-attributable AAIR for kidney, renal pelvis, liver/gallbladder, colorectal, pancreas, esophageal adenocarcinoma, multiple myeloma, and gastric cardia, prompting a need for future research to examine the relationship. With obesity and its associated cancers on the rise in Arkansas, ACCR aims to incorporate height and weight as state-specific required data items as part of its effort to expand cancer surveillance in the state, and to address the growing public health burden due to obesity.

References:

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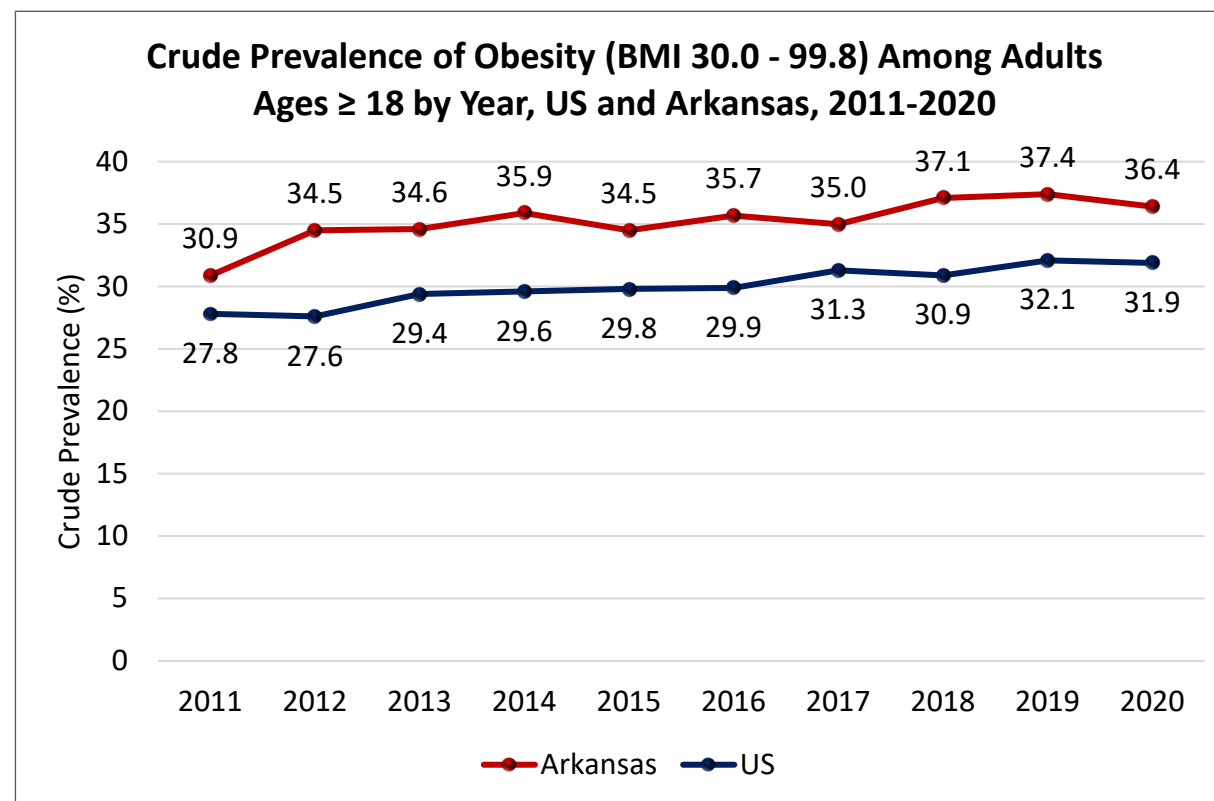
DISCLAIMER

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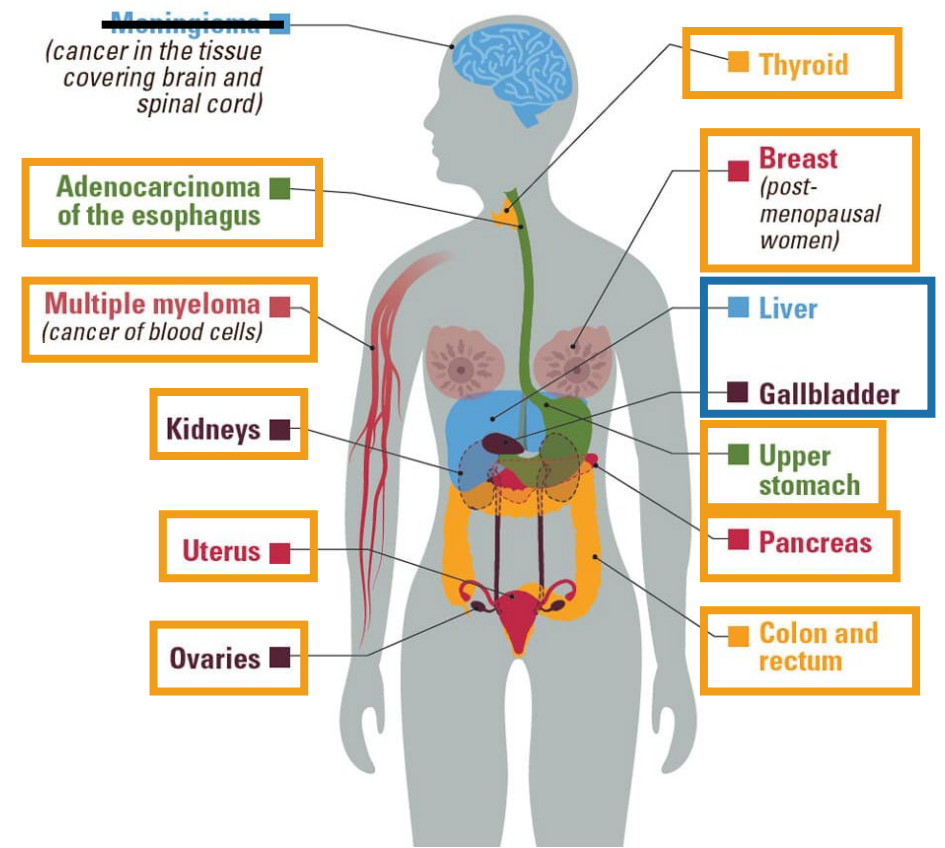
BACKGROUND

- Excess Body Weight (EBW) was found to have sufficient evidence for its attribution in 13 different cancers among humans by the International Agency for Research on Cancer (IARC).
- Arkansas ranks 6th in the nation with the highest obesity prevalence at 38.9%.
- **Purpose: As part of Arkansas Central Cancer Registry (ACCR) initiative in implementing the collection of height and weight data items for cancer surveillance, we assessed the burden due to obesity attributable cancers in Arkansas.**



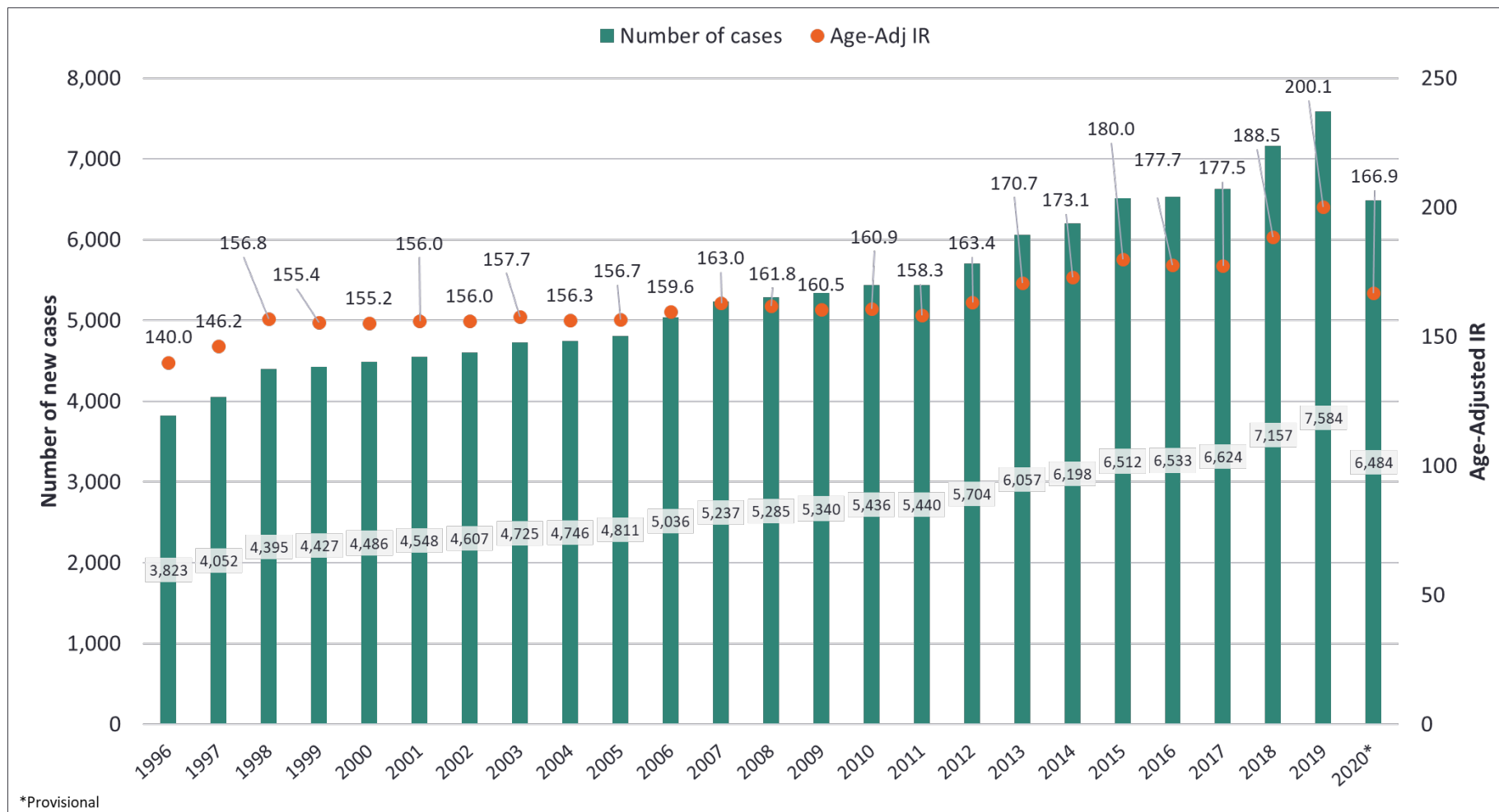
METHODS

- **Inclusion Criteria**
 - CDC Defined Obesity-Associated Cancers
 - 1996 to 2020 (provisional)
 - Adults \geq 30 years old
- **AAIR Analysis**
 - Age-adjusted incidence rate (AAIR) per 100,000 population.
 - Standardized to the 2000 US Standard Population.
 - Obesity-Attributable Tumor AAIR = **Obesity-Associated AAIR** x **Percent of Est. Population Attributable Fraction (PAF%)**
 - Tumors included: Esophageal adenocarcinoma, Gastric cardia, Colon & rectum, Corpus uteri (NOS), Ovary, Breast (females, postmenopausal), Pancreas, Kidney & renal pelvis, Thyroid, and Multiple myeloma.
 - Liver and gallbladder were grouped together
 - Meningioma excluded due to the sparsity of the number of invasive cases in the state.
- **Qualitative Analysis**
 - Number and percent of overall obesity-associated cancer cases with height, weight and/or BMI within the diagnostic text field for physical exam, history variable utilizing SEER*DMS data search tool.



RESULTS - AAIR

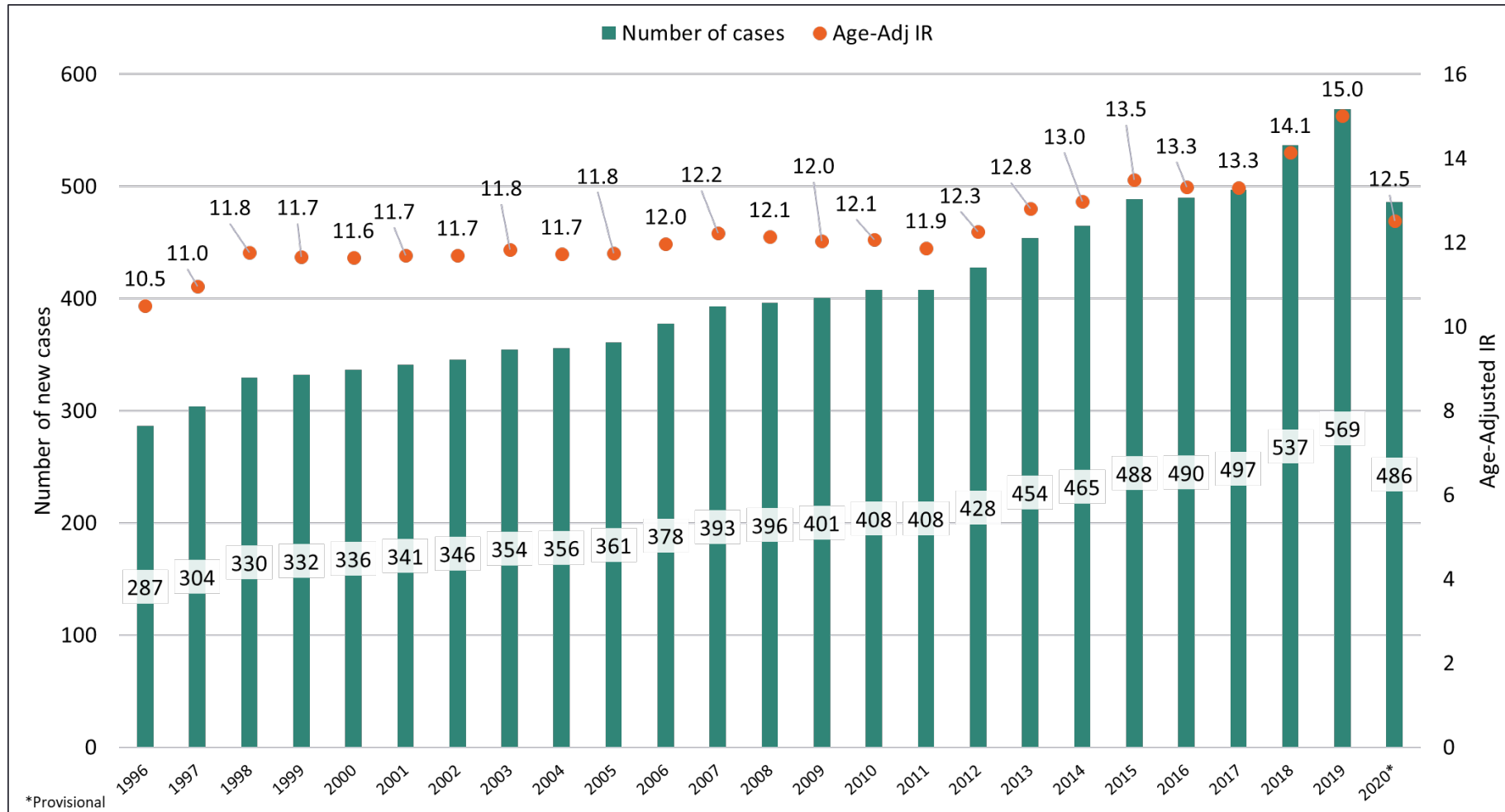
Figure 1. Number and AAIR of Obesity-Associated Cancers among Adults Ages ≥ 30 by Year, Arkansas, 1996-2020



AAIR standardized to 2000 US Standard Population. Rate is per 100,000 population.
Source: Based on data retrieved from ACCR SEER*DMS on 01-27-2023.

RESULTS – AAIR (continued)

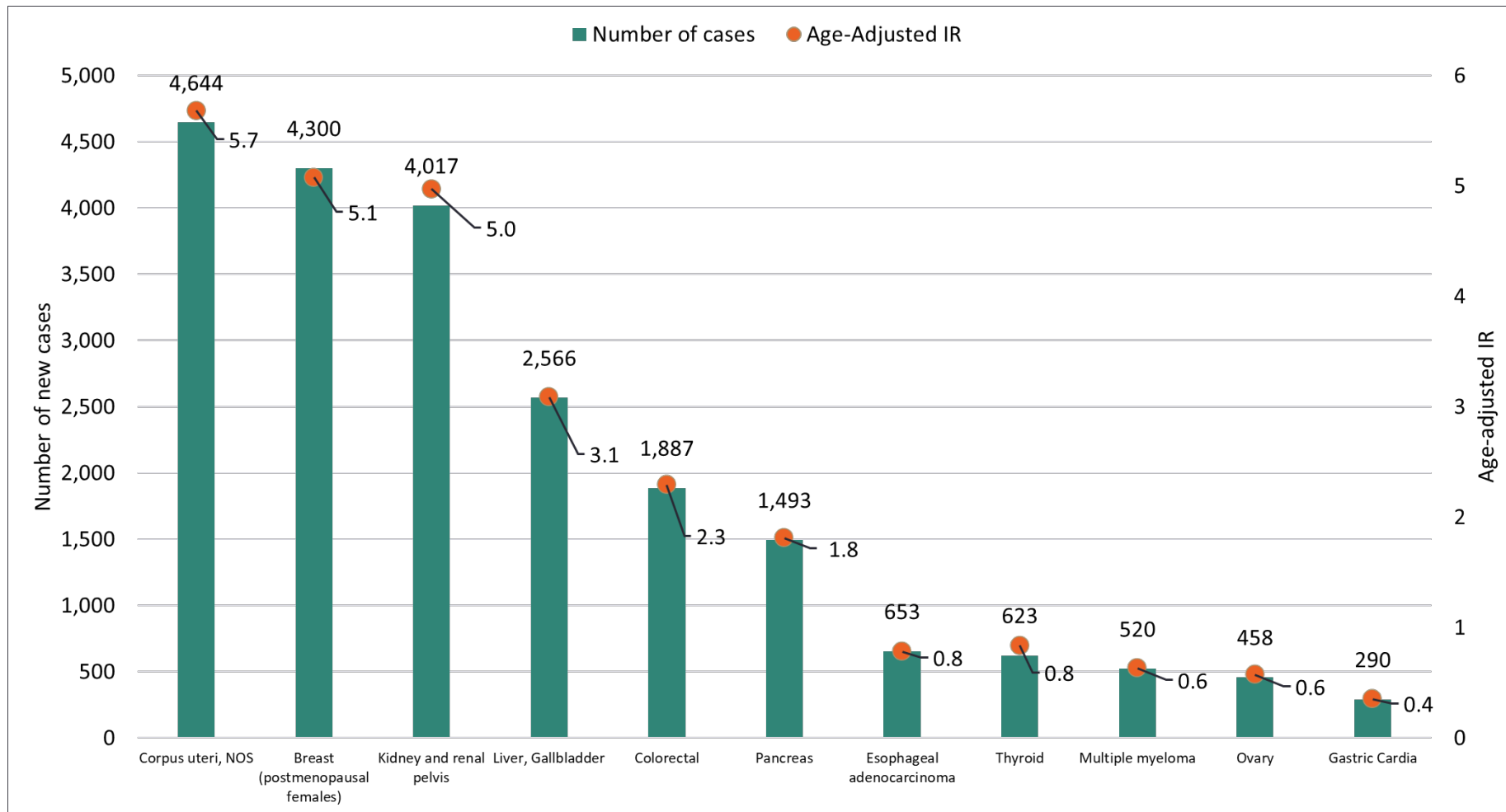
Figure 2. Number and AAIR of Obesity-Attributable Cancers among Adults Ages ≥ 30 by Year, Arkansas, 1996-2020



*Provisional

RESULTS – AAIR (continued)

Figure 3. Number and AAIR of Obesity-Attributable Cancers among Adults Ages ≥ 30 by Tumor, Arkansas, 1996-2020

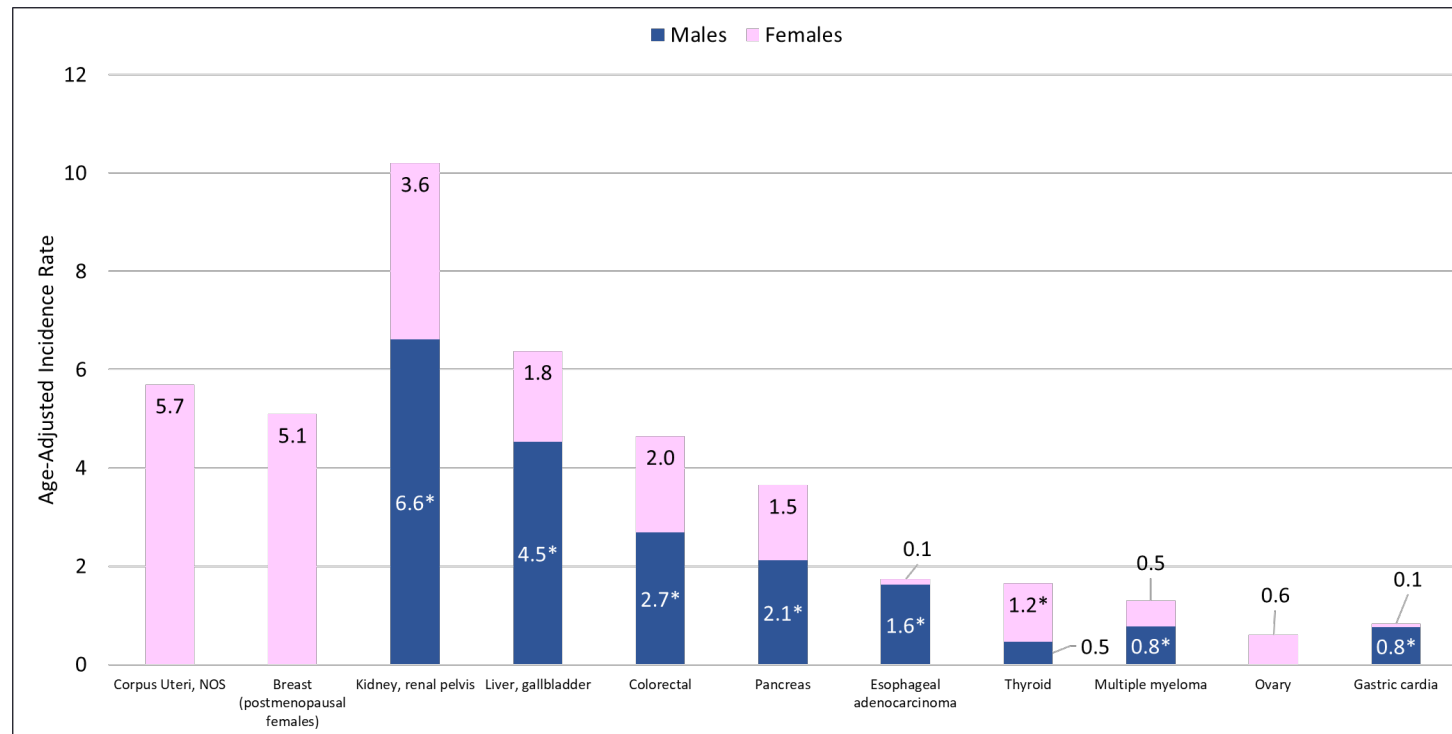


RESULTS – AAIR (continued)

Table 1. Number and AAIR of Obesity-Attributable Cancers among Adults Ages ≥ 30 by Year, Arkansas, 1996-2020

Sex	Number of cases	AAIR (95% CI)
Females	9,575	21.4 (20.0 - 22.5)
Males	2,158	5.9 (5.3 - 6.3)

Figure 4. AAIR of Obesity-Attributable Cancers among Adults Ages ≥ 30 by Tumor and Sex, Arkansas, 1996-2020



*Reflects statistical difference (95% confidence interval). AAIR standardized to 2000 US Standard Population. Rate is per 100,000 population.
Source: Based on data retrieved from ACCR SEER*DMS on 01-27-2023.

RESULTS – Qualitative Analysis

Figure 1. Sample of Height and Weight in Physical Examination, History Text Fields for Obesity Associated Cancers, Arkansas, 1996-2020

Example 1	{ 80YO MARRIED NON-HISPANIC WM SCHEDULED FOR EGD FOR EVALUATION OF DYSPHAGIA AND ABNORMAL BARIUM SWALLOW. FAM CA HX POS UNK/BROTHER. SMOKING: FORMER SMOKER (QUIT DATE: 06/20/2009), 0.5 PPD, 5 PACK-YEARS, SMOKELESS TOBACCO: NEVER USED. ALCOHOL: YES. HEIGHT 5'10", WEIGHT 150 LB, BMI 21.52.
Example 2	{ 59YO SINGLE NON-HISPANIC WM PRESENTS TO THE ED WITH A CHIEF COMPLAINT OF ABNORMAL LAB RESULTS. HEIGHT 5'7", WEIGHT 208 LB, BMI 32.57.

$$\left(\frac{135,247}{789} \right) * 100 = 0.58\%$$

Number of obesity associated cancers of all ages in Arkansas, 1996-2020

Number of obesity associated cancers with height and weight information in physician text field reports

Overall percent of obesity associated cancer cases with height and weight information in physician text field reports

CONCLUSIONS

- Consistent with past research where obesity-associated and attributable cancers are higher in women than in men for Arkansas
- Males had a higher obesity-attributable AAIR for kidney, renal pelvis, liver/gallbladder, colorectal, pancreas, esophageal adenocarcinoma, multiple myeloma, and gastric cardia, prompting a need for future research to examine the relationship.
- ACCR aims to incorporate height and weight as state-specific required data items as part of its effort to expand cancer surveillance in the state, and to address the growing public health burden due to obesity.



Thanks for watching!

Questions or comments?

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