ARKANSAS DEPARTMENT OF HEALTH

Trends in Thyroid Cancer Incidence and Mortality, Arkansas and United States, 2001-2015

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Outline

- Purpose
- Background
  - Types
  - Risk factors
  - Screening recommendations
- Incidence rates and trends AR and US (2001 – 2015)
- Mortality rates and trends AR and US (2001 – 2015)
- Discussion
- Conclusion

Purpose

- Addendum to Arkansas Cancer Facts & Figures 2017
- Describe national and state-specific incidence rates and trends of thyroid cancer
- Describe national and state-specific mortality rates and trends of thyroid cancer

Background

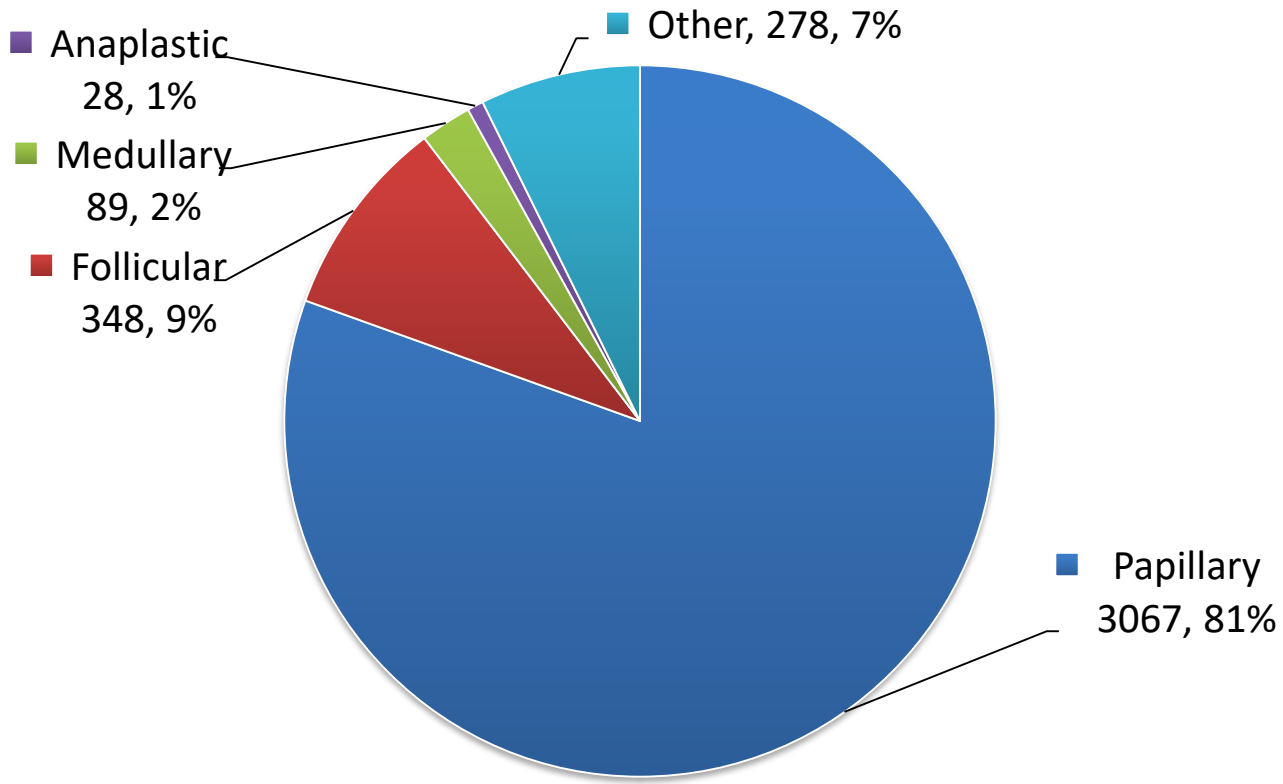
- Estimated to be twelfth most common malignancy in the United States in 2018
- SEER case projections estimate 53,990 new cases will be diagnosed in 2018
  - 40,900 cases will occur in females
  - 13,090 cases will occur in males
- National age-adjusted incidence rate
  - 2001, 7.9 per 100,000
  - 2015, 14.5 per 100,000
- National age-adjusted mortality rate
  - 2001, 0.5 per 100,000
  - 2015, 0.5 per 100,000

Types of Thyroid Cancer

- Differentiated
  - Prognosis is favorable, infrequently fatal
    - Papillary
      - Slow growing, commonly develop in one lobe of gland
    - Follicular

- Undifferentiated
  - Prognosis is less favorable
  - Difficult to detect, diagnose, and treat compared to differentiated types
    - Medullary
    - Anaplastic

Thyroid Cancers by Histology, Arkansas, 2001 - 2015



Note: Cancers were identified using the International Classification of Diseases for Oncology, 3rd Edition (ICD-O-3) for invasive thyroid cancer (C73.9) with histology codes for papillary tumors (8050, 8260, 8340-8344, 8504), medullary thyroid tumors (8345-8347, 8510), follicular tumors (8330-8332, 8335), and anaplastic tumors (8021). Data retrieved from the Arkansas Central Cancer Registry (ACCR) on 10/03/2018. Totals may not match NPCR dataset since reported cases are added, retrospectively, to the ACCR dataset.

Risk Factors

- Female sex
- History of goiter or nodules
- Family history of thyroid cancer
- Childhood or adolescent exposure to radiation
- Obesity

Source: CDC - https://www.cdc.gov/vitalsigns/obesity-cancer/infographic.html#graphic AND

https://www.cdc.gov/cancer/thyroid/index.htm

Screening for Thyroid Cancer

- For high-risk individuals or those experiencing any symptoms, there are various methods used to detect thyroid cancer.
  - The two primary methods to screen for thyroid cancer include neck palpation and ultrasound.

- The United States Preventative Services Task Force (USPSTF) recommends against screening for thyroid cancer among adults who are asymptomatic.(USPSTF, 2017)

- The USPSTF concludes with sufficient certainty that screening for thyroid cancer in asymptomatic adults is potentially harmful, which outweighs the benefit, or has no net benefit.(USPSTF, 2017)

Technical Notes

Incidence data obtained from:

National Program of Cancer Registries and Surveillance, Epidemiology, and End Results SEER*Stat Database: NPCR and SEER Incidence – U.S. Cancer Statistics 2001–2015 Public Use Research Database, based on November 2017 submission. Cases were identified based on “Site and Morphology Site Recode ICD-O-3/WHO 2008 = Thyroid”. Accessed at (https://www.cdc.gov/cancer/uscs/public-use/index.htm?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcancer%2Fnpcr%2Fpublic-use%2Findex.htm) on Oct. 3 2018.

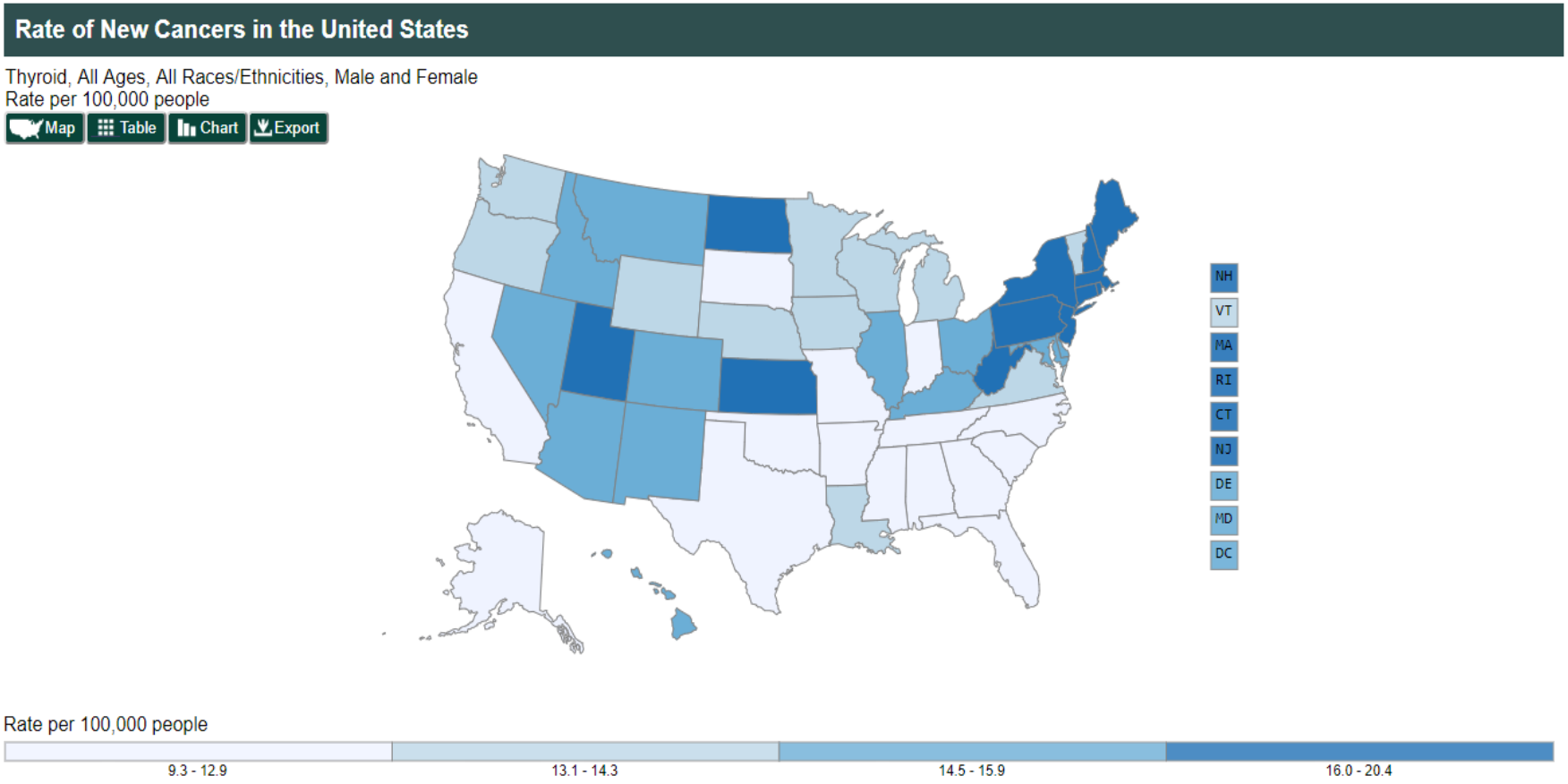
Mortality data obtained from:

United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute, Mortality WONDER Online Database. Case deaths identified based on underlying cause of death ICD-10 code C73 “Malignant neoplasm of the thyroid gland”. Accessed at (http://wonder.cdc.gov/cancer-v2015.html) on Oct 3, 2018.

Incidence of Thyroid Cancer

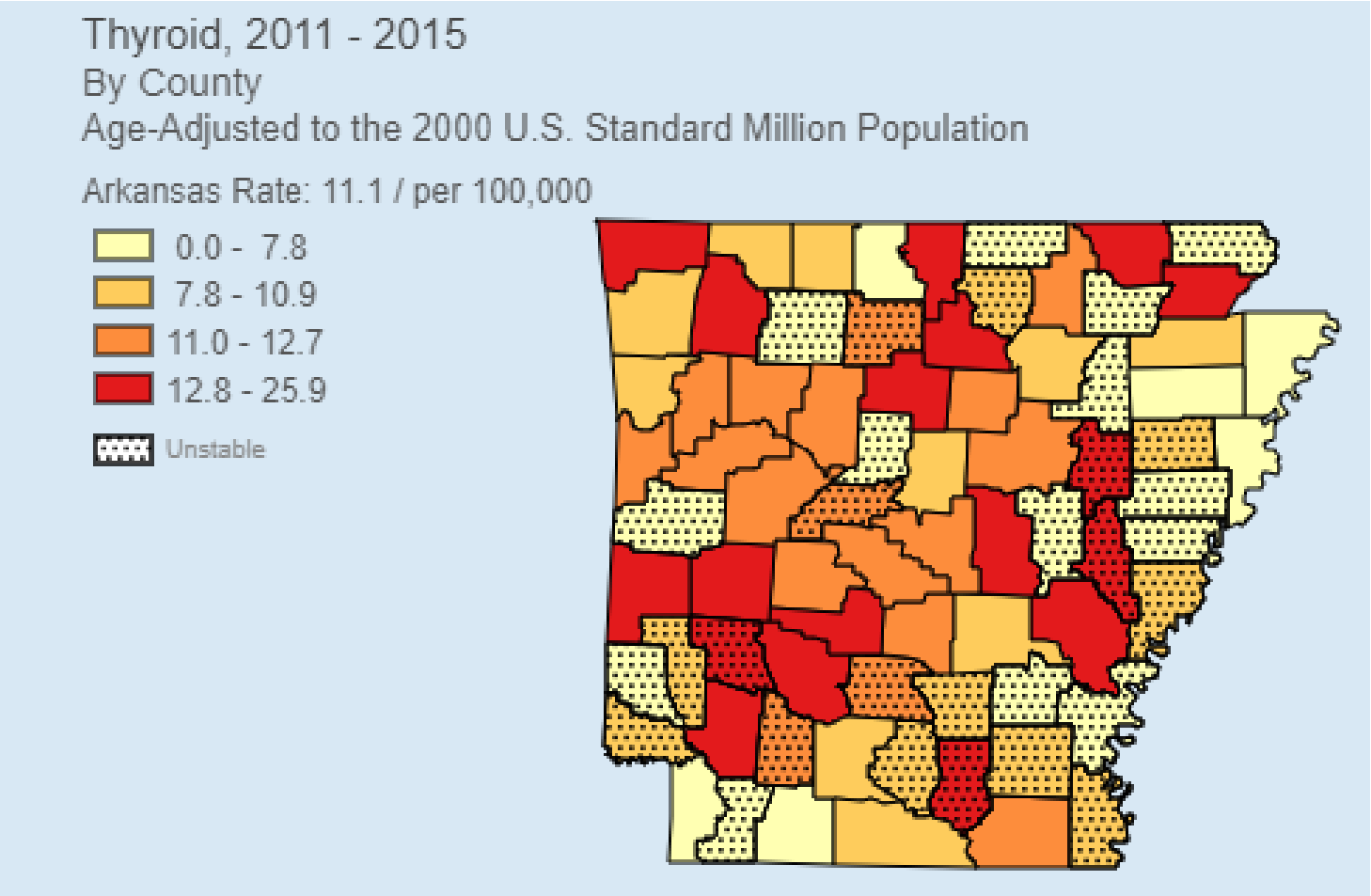
Arkansas and the United States

Thyroid Cancer Incidence Rates, by State, 2011-2015



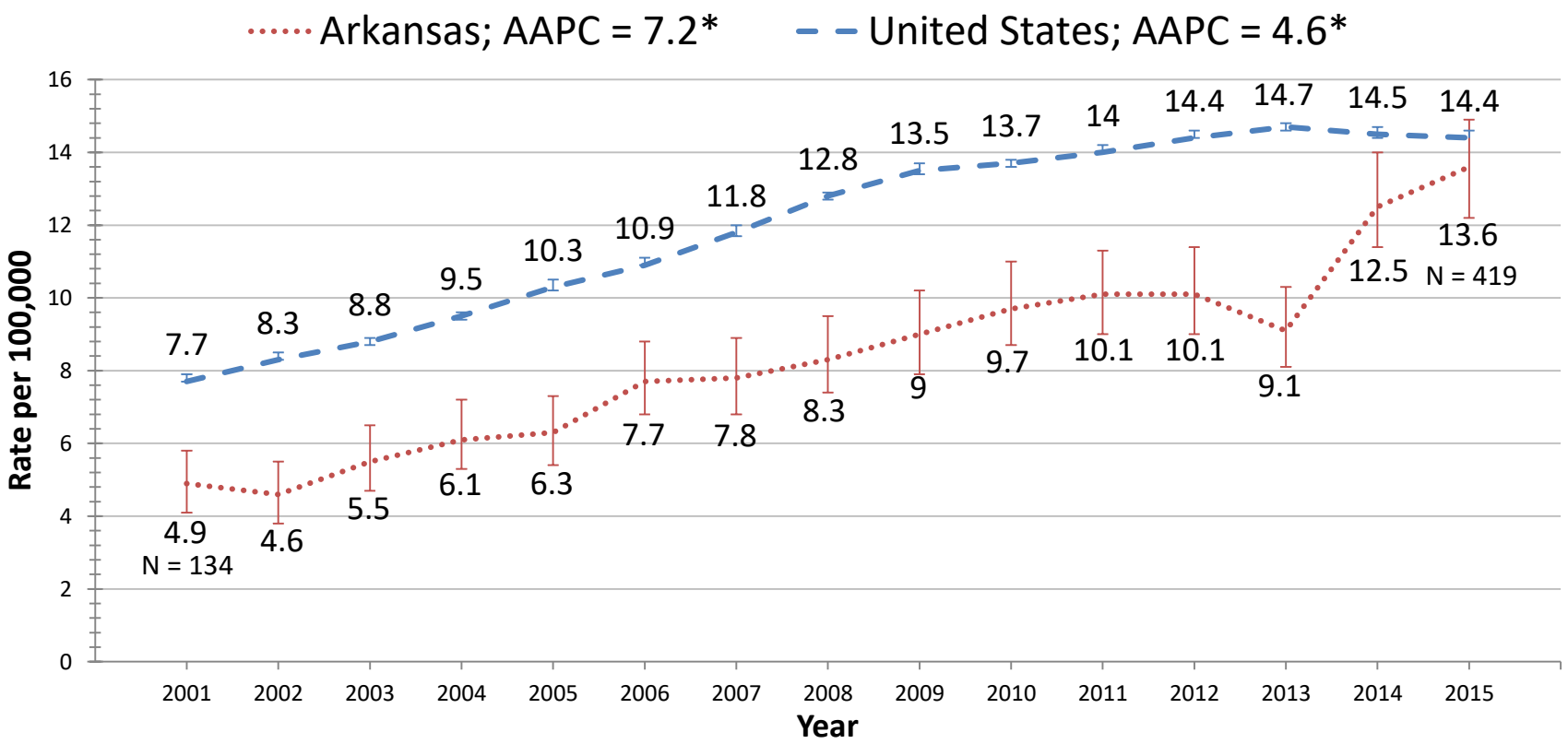
Source: NPCR Data Visualization Tool: https://gis.cdc.gov/Cancer/USCS/DataViz.html

Age-Adjusted Thyroid Cancer Incidence Rates, by County, Arkansas 2011 – 2015



Note: Incidence rates per 100,000 population; age-adjusted to the 2000 U.S. Standard Population. Arkansas Cancer Registry. Age-Adjusted Cancer Incidence Rates in Arkansas, 2011 - 2015. Accessed at http://cancer-rates.info/ar/. Retrieved on 10/08/2018.

Age-Standardized Thyroid Cancer Incidence Trends with 95 Percent Confidence Intervals, Arkansas and United States, 2001 - 2015

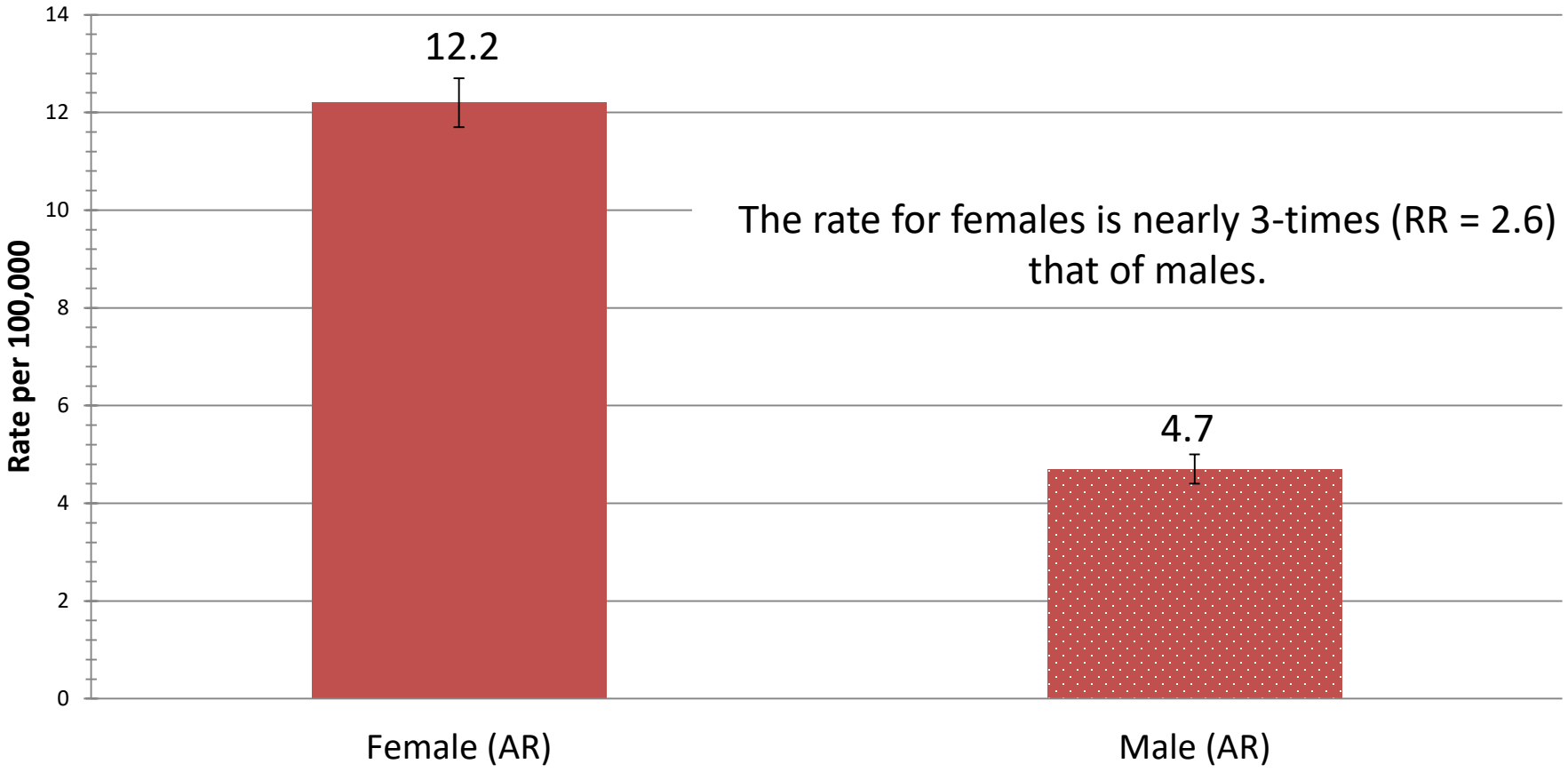


Arkansas = 3,767 cases, 2001-2015

*The AAPC is significantly different from zero ($p < 0.05$).

Note: Abbreviation: AAPC - Annual Average Percent Change. AAPCs were calculated using weighted least squares method. Incidence rates per 100,000 population; age-adjusted to the 2000 U.S. Standard Population. United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. National Program of Cancer Registries and Surveillance, Epidemiology, and End Results SEER*Stat Database: NPCR and SEER Incidence – U.S. Cancer Statistics 2001–2015 Public Use Research Database, based on November 2017 submission. Cases were identified based on "Site and Morphology Site Recode ICD-O-3/WHO 2008 = Thyroid". Accessed at www.cdc.gov/cancer/npcr/public-use. Retrieved on 10/03/2018.

Age-Standardized Thyroid Cancer Incidence Rates with 95 Percent Confidence Intervals by Sex, Arkansas, 2001 - 2015



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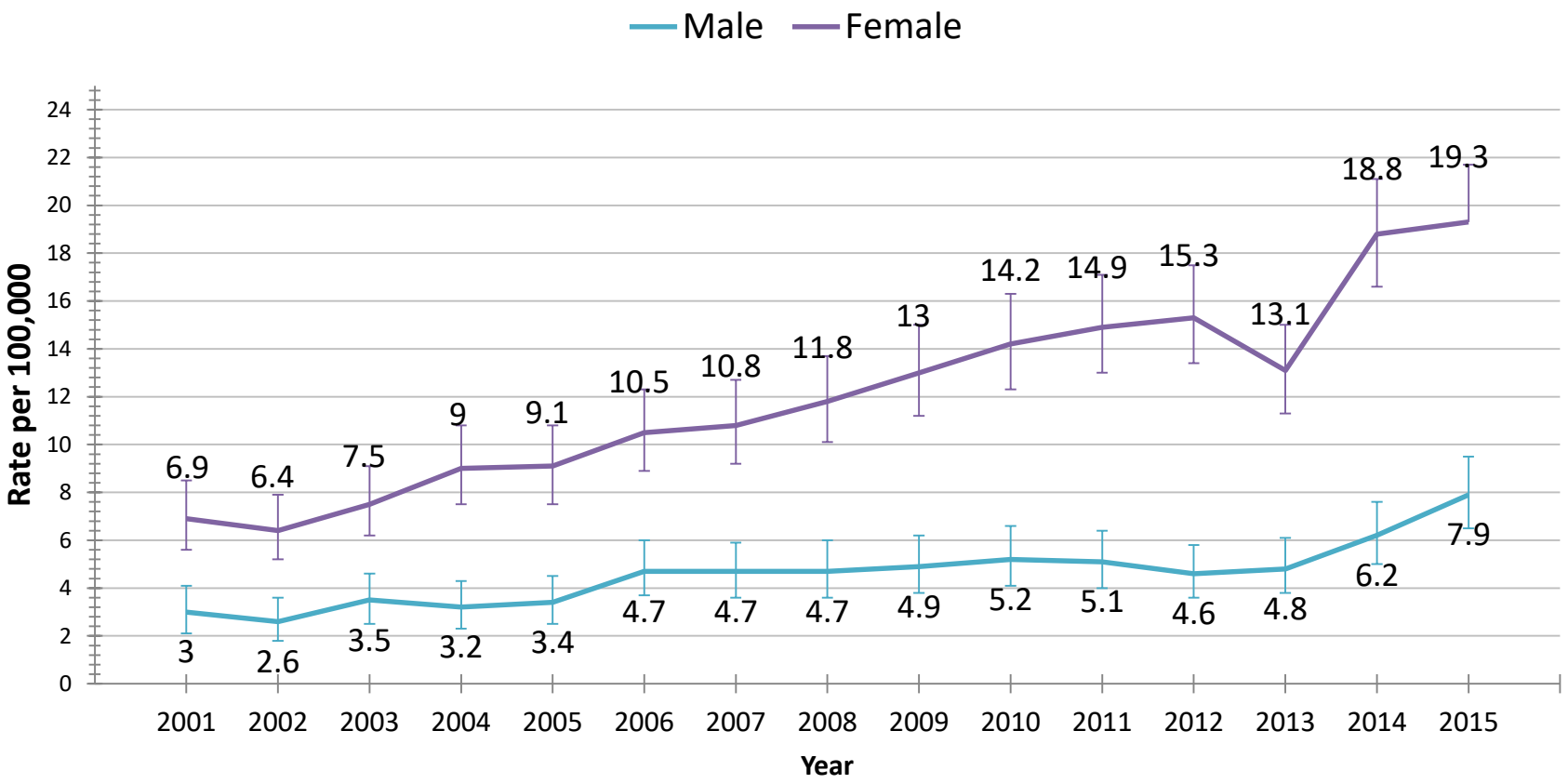
Age-Standardized Thyroid Cancer Incidence Trends with 95 Percent Confidence Intervals, By Sex, Arkansas, 2001 - 2015



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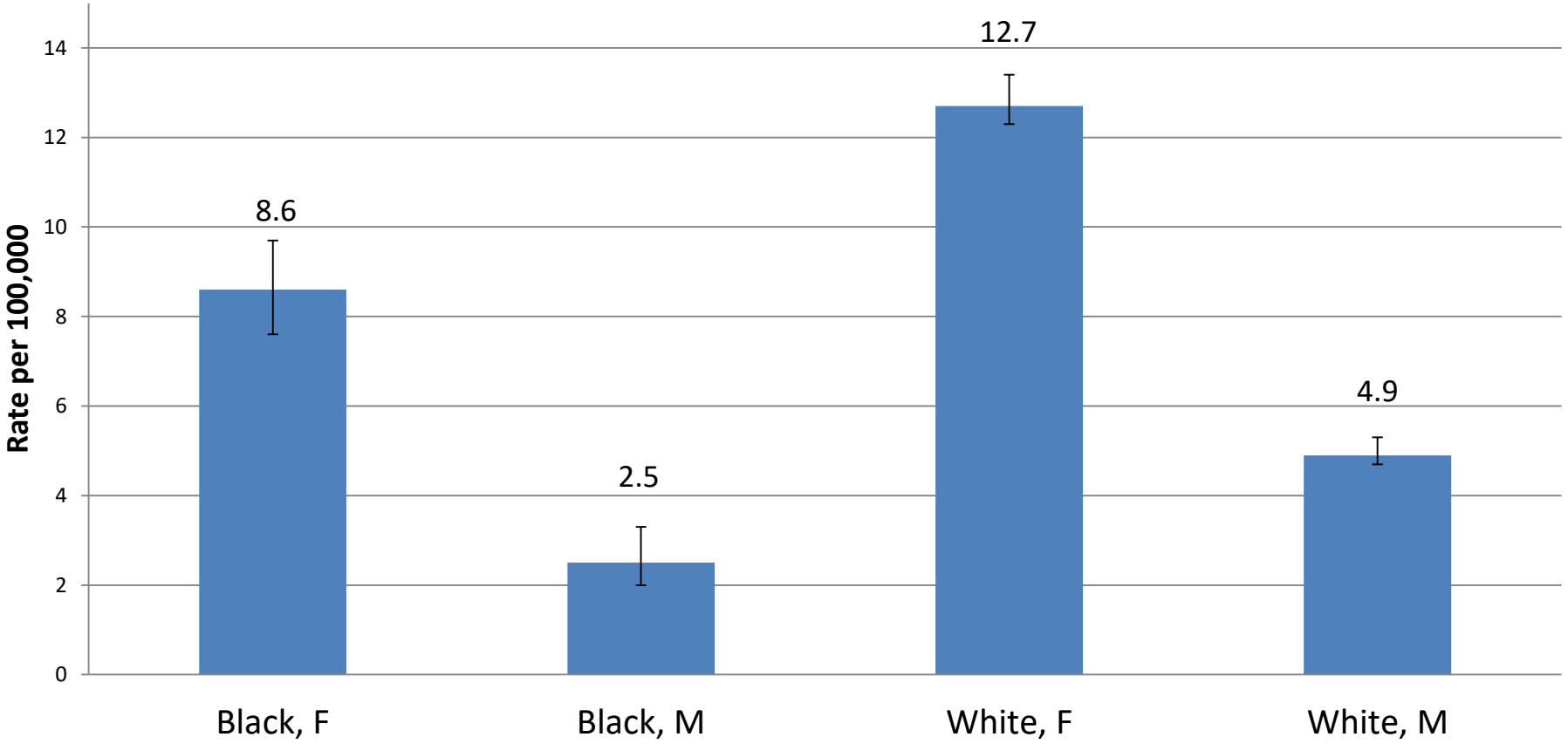
Age-Standardized Thyroid Cancer Incidence Rates with 95 Percent Confidence Intervals by Race and Sex, Arkansas, 2001 - 2015



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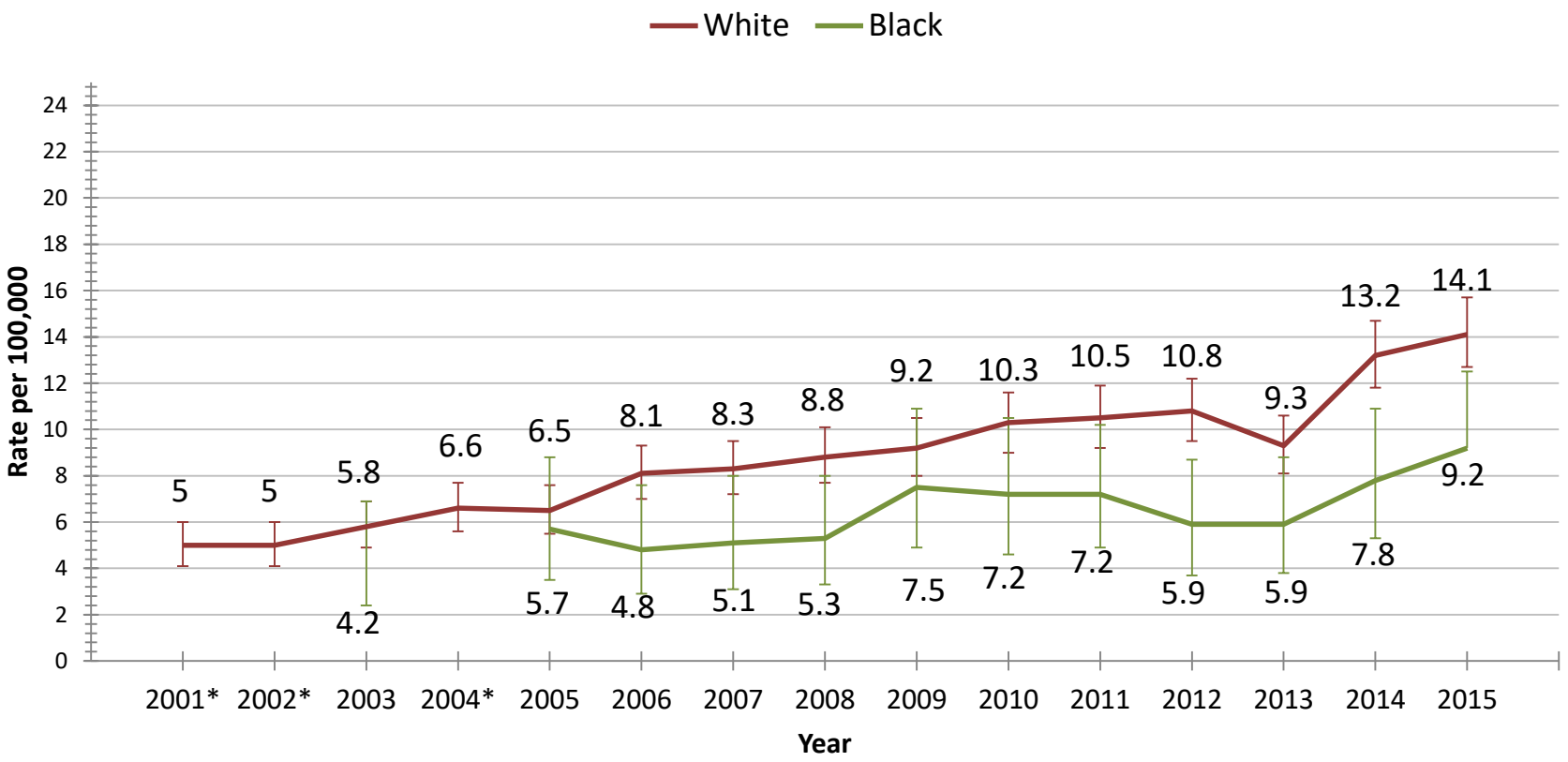
Age-Standardized Thyroid Cancer Incidence Trends with 95 Percent Confidence Intervals, By Race, Arkansas, 2001 - 2015



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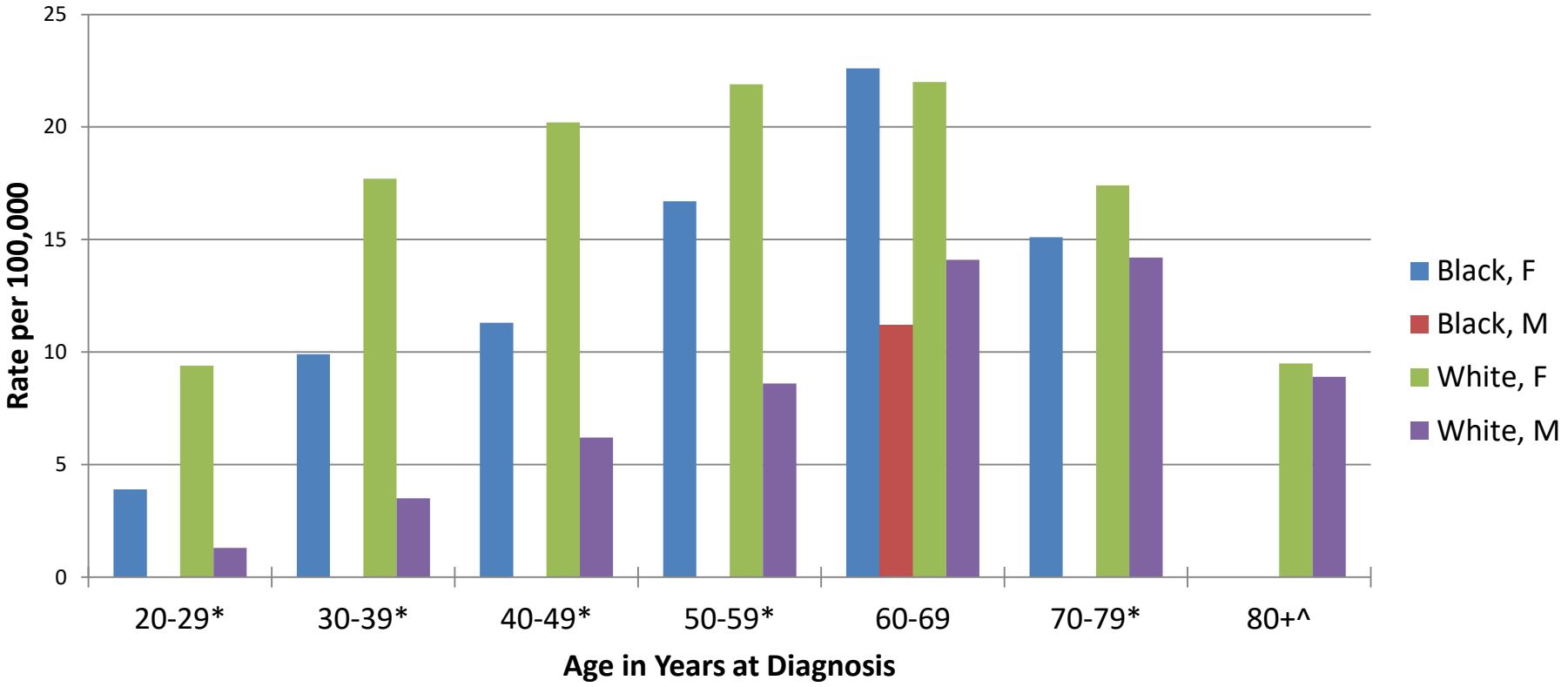
Mortality rates per 100,000 population; age-adjusted to the 2000 U.S. Standard Population. WONDER Online Database. Case deaths identified based on underlying cause of death ICD-10 code C73 "Malignant neoplasm of the thyroid gland".

***For years 2001, 2002, and 2004 totals were not available due to suppression rules.**

Age-Specific Thyroid Cancer Incidence Rates by Race and Sex, Arkansas, 2001 – 2015



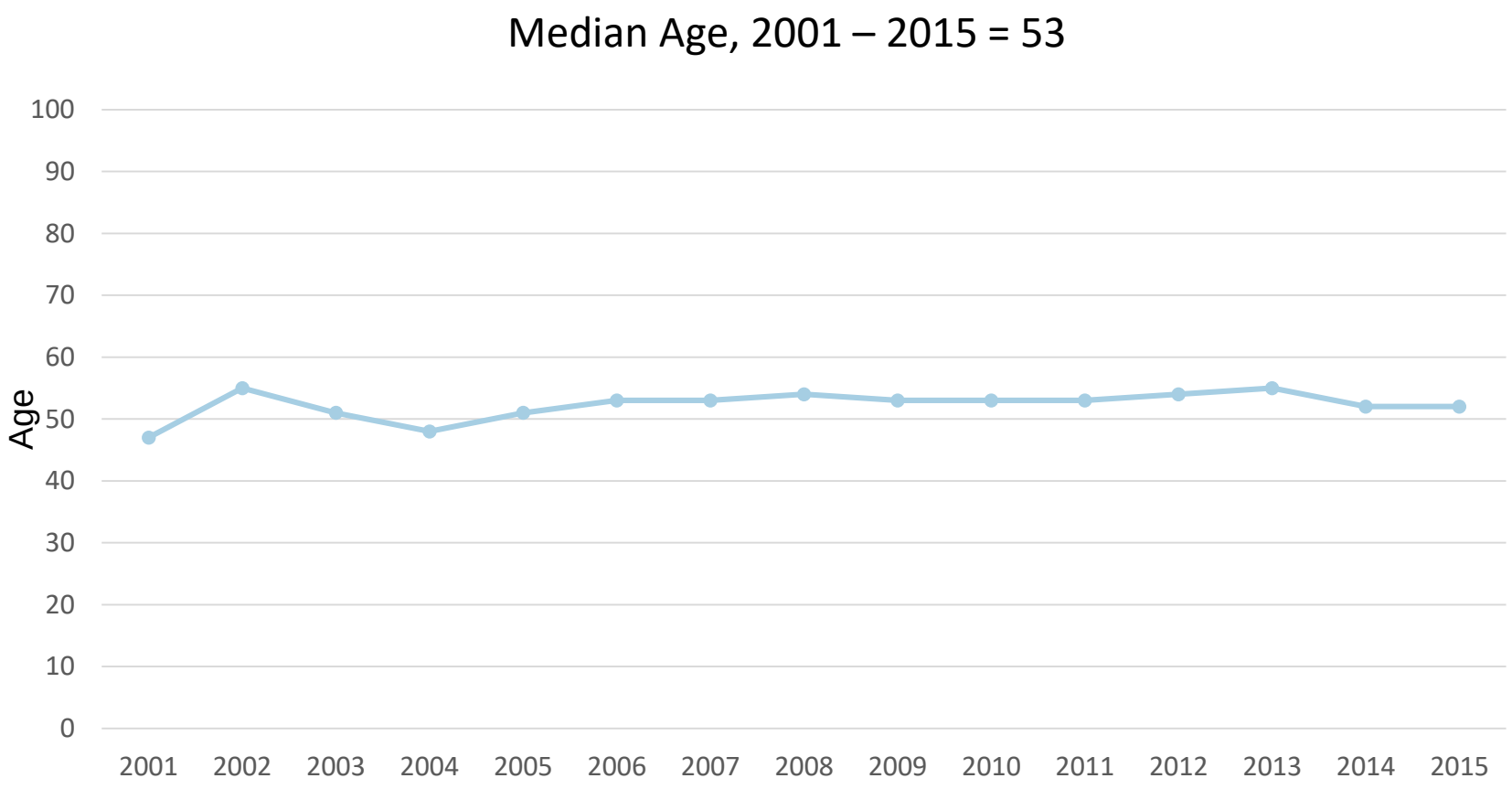
Note: Incidence rates per 100,000 population; age-adjusted to the 2000 U.S. Standard Population.

* Rate for Black males not displayed due to fewer than 16 cases.

^ Rate for Black females and males not displayed due to fewer than 16 cases.

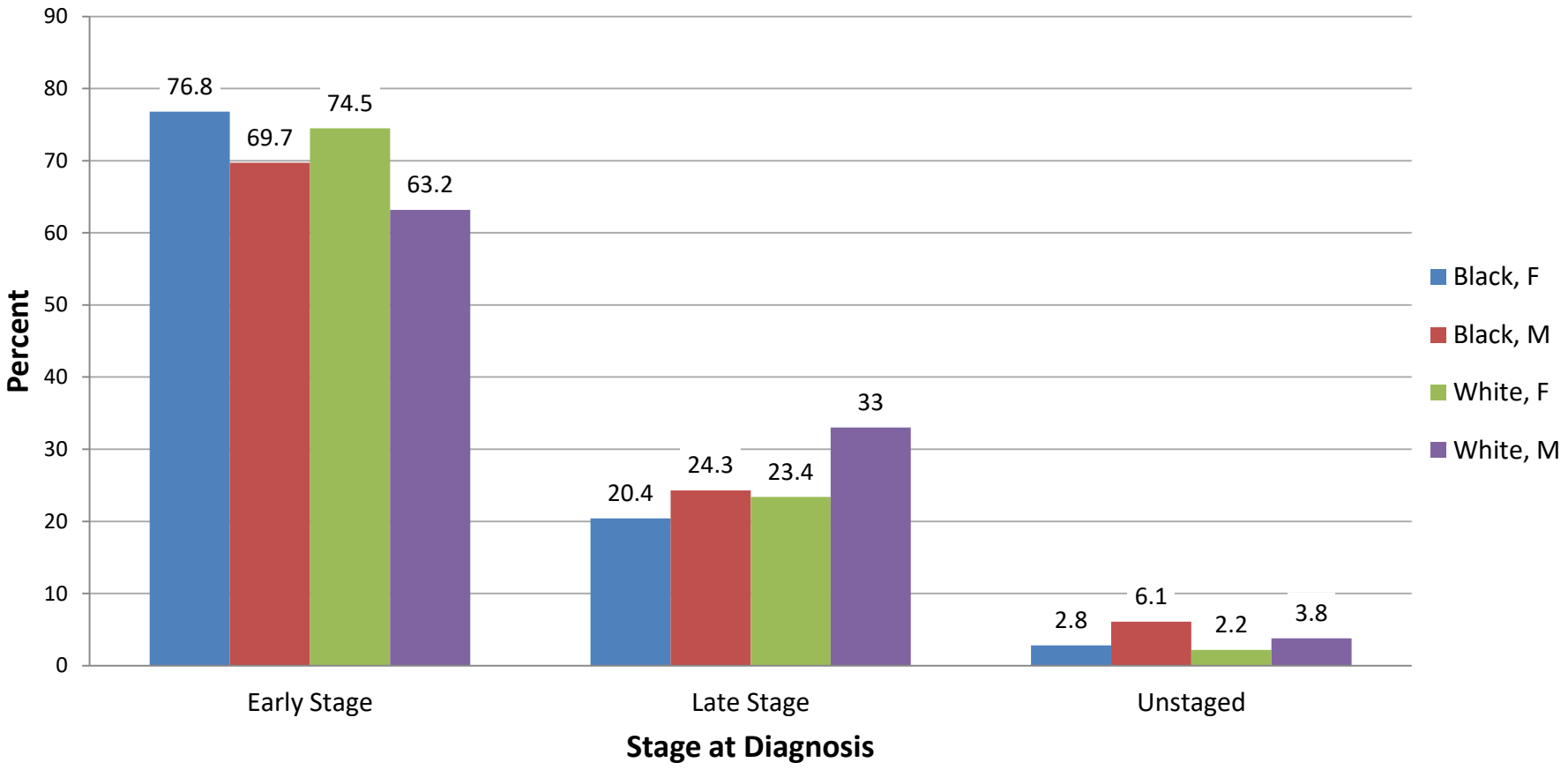
United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. National Program of Cancer Registries and Surveillance, Epidemiology, and End Results SEER*Stat Database: NPCR and SEER Incidence – U.S. Cancer Statistics 2001–2015 Public Use Research Database, based on November 2017 submission. Cases were identified based on "Site and Morphology Site Recode ICD-O-3/WHO 2008 = Thyroid". Accessed at www.cdc.gov/cancer/npcr/public-use. Retrieved on 10/03/2018.

Annual Median Age at Diagnosis, Arkansas, 2001 - 2015



Source: Arkansas Central Cancer Registry, ADH

Thyroid Cancer, SEER 2000 Stage at Diagnosis, by Race and Sex, Arkansas 2001 – 2015



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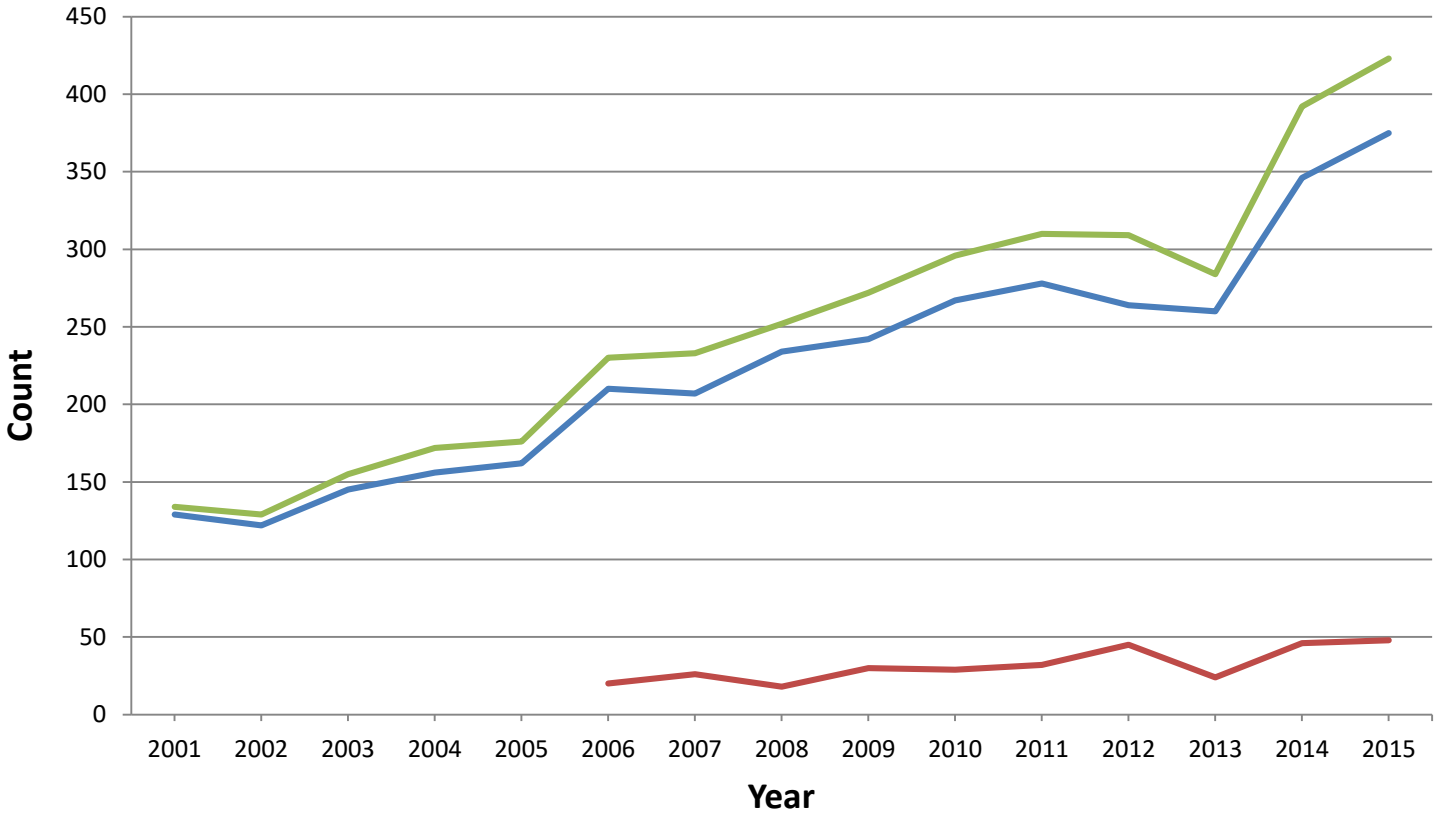
Thyroid Cancer Incidence by Tumor Sequence*, Arkansas, 2001-2015



2001-2015 (AR)
First primary: 3,397
Subsequent primaries: 370
Total: 3,767

* First Primary includes only 1 primary and first of 2 or more primaries.
^ Data suppressed before 2006 due to <16 cases per year for multiple years.
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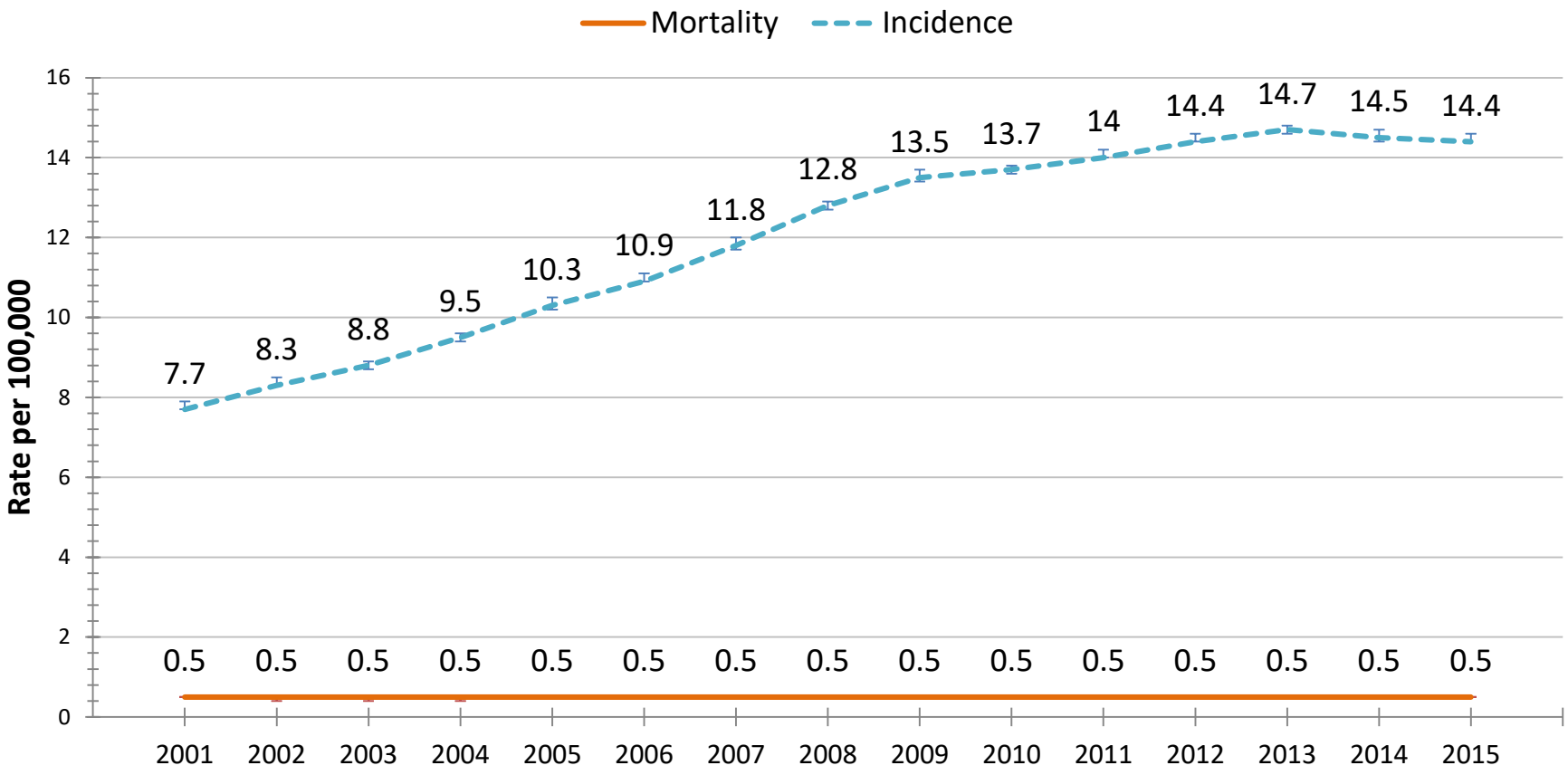
Mortality of Thyroid Cancer

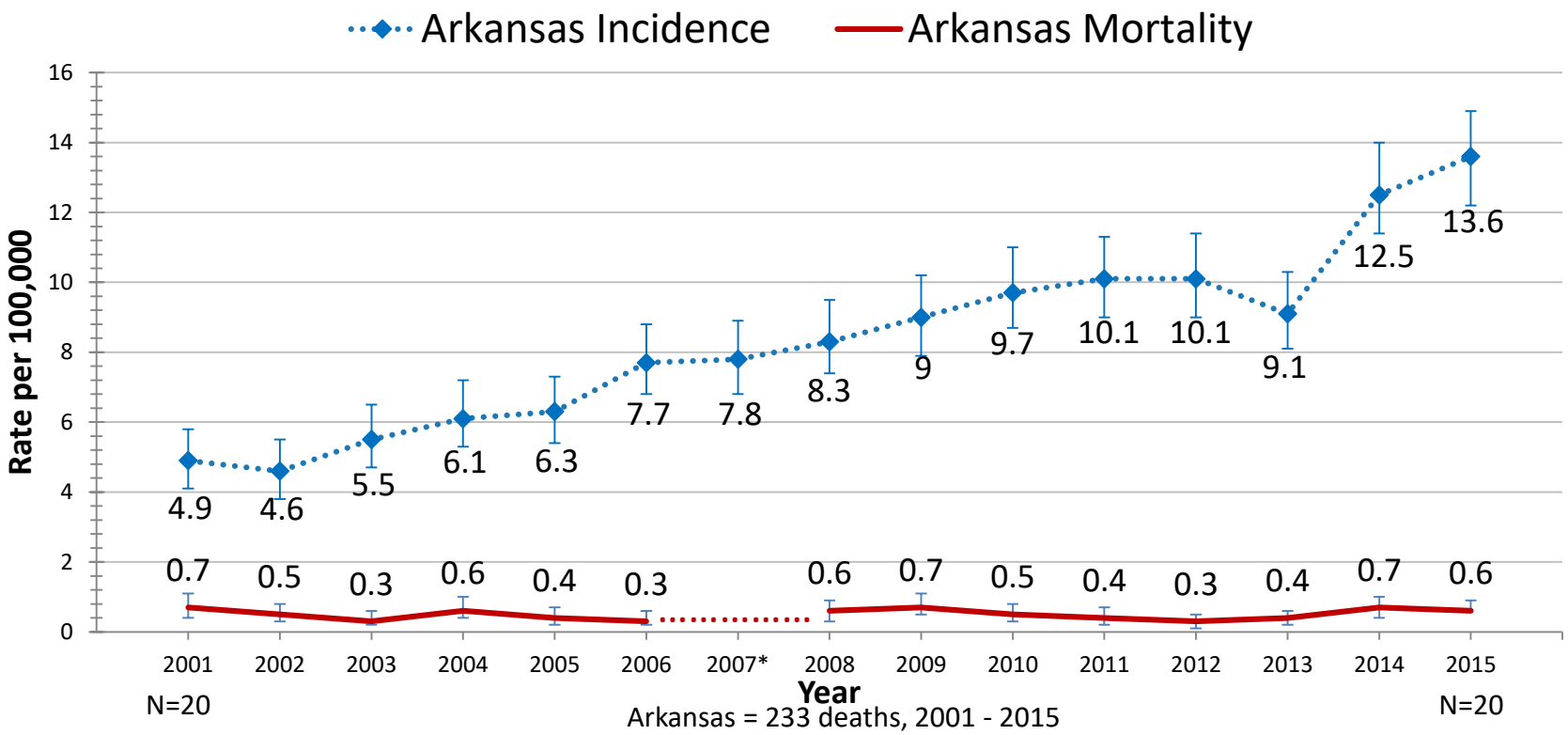
Arkansas and the United States

Age-Standardized Thyroid Cancer Incidence and Mortality Trends with 95 Percent Confidence Intervals, United States, 2001 – 2015



Note: Mortality rates per 100,000 population; age-adjusted to the 2000 U.S. Standard Population. United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute, Mortality WONDER Online Database. Case deaths identified based on underlying cause of death ICD-10 code C73 "Malignant neoplasm of the thyroid gland". Accessed at http://wonder.cdc.gov/cancer-v2015.html on Oct 3, 2018. Incidence rates per 100,000 population; age-adjusted to the 2000 U.S. Standard Population. United States Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute. National Program of Cancer Registries and Surveillance, Epidemiology, and End Results SEER*Stat Database: NPCR and SEER Incidence – U.S. Cancer Statistics 2001–2015 Public Use Research Database, based on November 2017 submission. Cases were identified based on "Site Recode ICD-O-3/WHO 2008 = Thyroid". Accessed at www.cdc.gov/cancer/npcr/public-use. Retrieved on 10/03/2018.

Age-Standardized Thyroid Cancer Incidence and Mortality Trends with 95 Percent Confidence Intervals, Arkansas, 2001 – 2015



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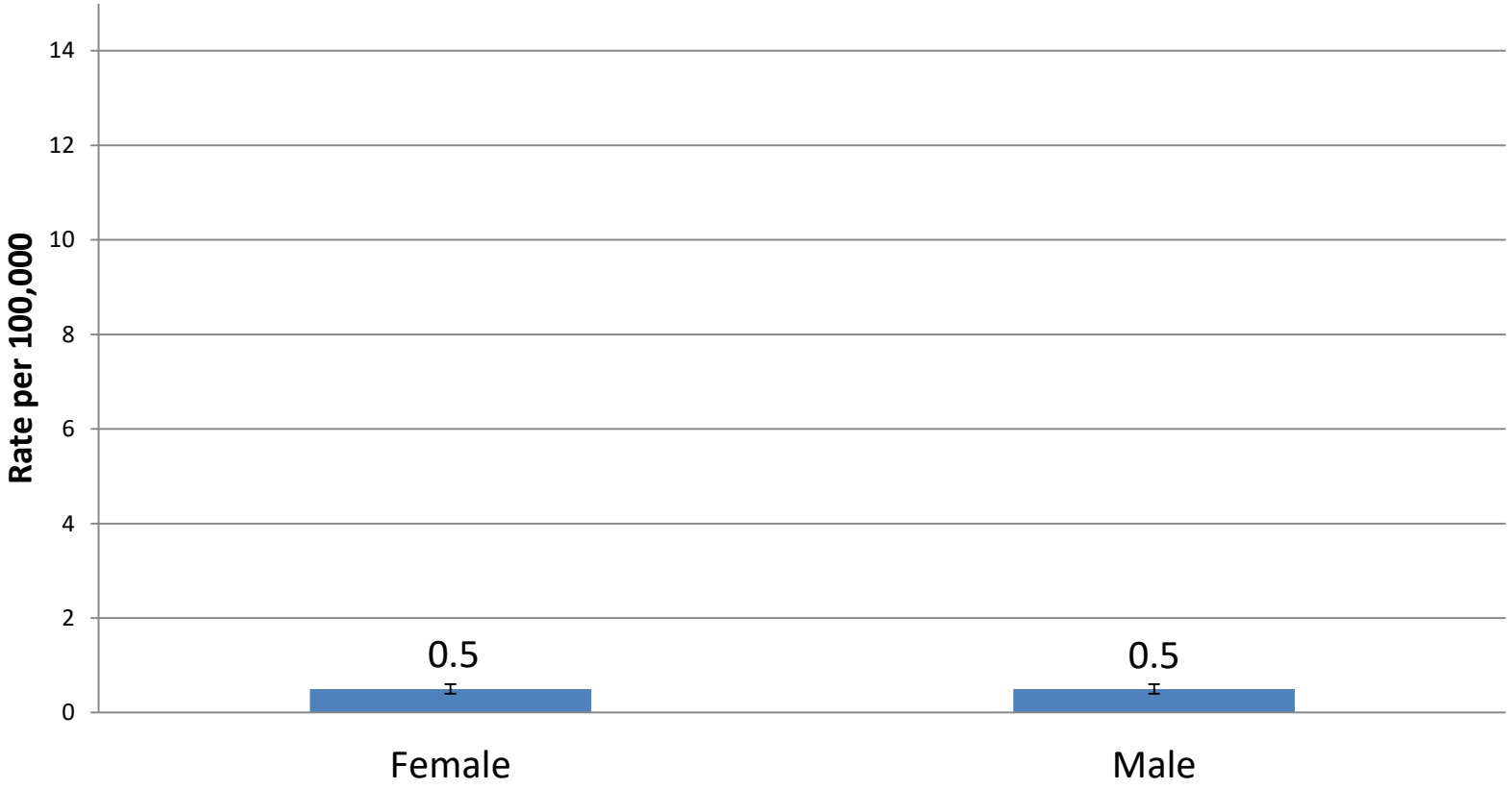
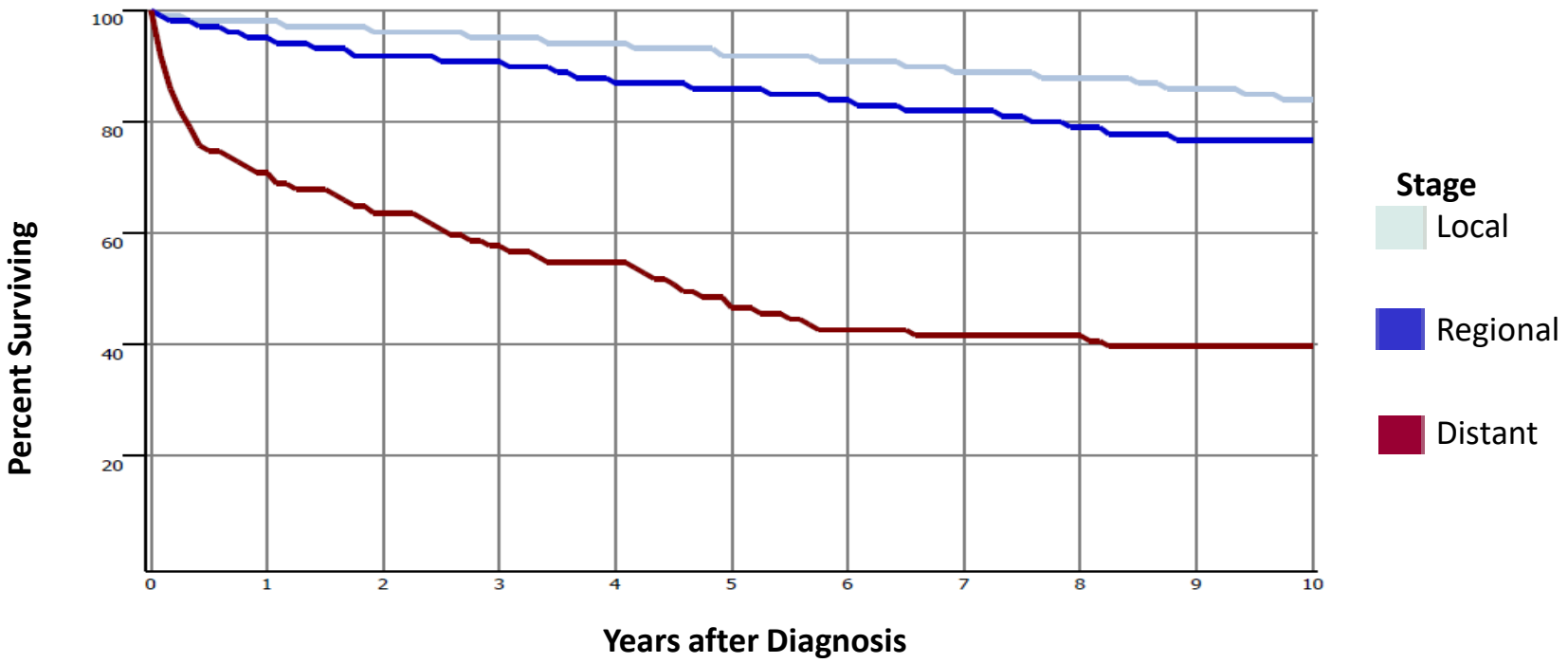
***For year 2007, totals were not available due to suppression rules. Age-adjusted rates for years 2002-2008 , 2010-2013 were unreliable due to small numbers.**

Age-Standardized Thyroid Cancer Mortality Rates with 95 Percent Confidence Interval by Sex, Arkansas, 2001 – 2015



Note: Mortality rates per 100,000 population; age-adjusted to the 2000 U.S. Standard Population. Centers for Disease Control and Prevention Wide-ranging Online Data for Epidemiologic Research [CDC WONDER]. Case deaths identified based on underlying cause of death ICD-10 code C73 “Malignant neoplasm of the thyroid gland”. Accessed at http://wonder.cdc.gov/cancer-v2015.html on Oct 3, 2018.

10 Year Survival by SEER Summary Stage, Arkansas, 2001 – 2015



Thyroid cancer 10-year survival depends on stage at diagnosis.

- Localized = 84%
- Regional = 77%
- Distant = 40%

Note: Arkansas Central Cancer Registry, Survival estimates are based on passive follow-up of mortality from all causes among incident cases using death certificates from Arkansas Department of Health and linkage results from the National Death Index.

Discussion

Incidence-Mortality Discrepancy

Indicative of enhanced disease detection and overdiagnosis

Overdiagnosis

1973

Development of real-time scanning device which produced 2-dimensional images(Woo, 2001)

Increase in the diagnostic capabilities of ultrasonography

Subsequent increase in detection of thyroid cancer, which included cases of overdiagnosis(ACS, 2018)

The rise in detection was confined to papillary thyroid cancer, the least aggressive and most common type

Cohort Effect

1930s – 1960s

Children routinely treated with external radiation therapy for benign conditions of the head and neck such as cystic acne or enlarged tonsils

(ACS, 2017, Haugen et al., 2015, Iglesias et al., 2017)

Minimum latency period after exposure to radiation before development of radiation-related thyroid cancers is 5 to 10 years

(Iglesias et al., 2017)

Risk increases and peaks at 20-35 years post-exposure

(Iglesias et al., 2017)

Persons treated with radiation as children would be in the peak risk post-exposure age range around 1950 through 1995

Threefold increase in age-adjusted incidence rates during 1975 through 2005 lends support to this suggested cohort effect

Conclusion

Even with the increase in thyroid cancer diagnosis in Arkansas, incidence remains low compared to other cancers.

- 1.7% (n=3,767) of all cancer cases, 2001-2015

Risk reduction, especially in young children, is stressed for thyroid cancer prevention.

- Avoid unnecessary exposure to radiation of head and neck
- Maintain normal body weight

References

Arkansas Central Cancer Registry. (2018). *Age-Adjusted Cancer Incidence Rates in Arkansas, 2001 - 2015.* Retrieved from http://cancer-rates.info/ar/

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Haugen, B.R., Alexander, E.K., Bible, K.C., Doherty, G.M., Mandel, S.J., Nikiforov, Y.E., Pacini, F., Randolph, G.W., Sawka, A.M., Schlumberger, M., Schuff, K.G., Sherman, S.I., Sosa, J.A., Steward, D.L., Tuttle, R.M., Wartofsky, L. (2016). 2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer: The American Thyroid Association Guidelines Task Force on Thyroid Nodules and Differentiated Thyroid Cancer. *Thyroid, 26*(1), 1-133. doi:10.1089/thy.2015.0020

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Woo, J. (2001). *A short history of the real-time ultrasound scanner*. Retrieved from http://www.ob-ultrasound.net/history-realtime.html