



THYROID CANCER INCIDENCE TRENDS IN U.S. AND PUERTO RICO: 2001-2015

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BACKGROUND

- Thyroid cancer (TC) incidence has increased over the last three decades worldwide.
- Puerto Rico (PR) has the highest incidence rate of TC in the Americas and the third highest rate worldwide.
- TC was the eighth most common diagnosed cancer in the United States (U.S.), with an estimated incidence of 65,528 new cases during 2011-2015.
- In PR, TC was the third most commonly diagnosed cancer among women, and the 13th among males, representing about 11.5% and 2.5% of all cancers diagnosed in women and men, respectively
- During this same period, the incidence rate of thyroid papillary carcinoma (TPC) remained higher in Puerto Ricans than any race/ethnic group in the U.S.
- Previous studies reported a 2.3-fold increase in TC incidence in PR between 1985 and 2004. The increase was mostly due to an increase in TPC in women.
- A continuous increase in the incidence of TPC is also observed worldwide but the factors associated with this trend remain unknown.
- Reports of TC by race/ethnic groups in the U.S. suggest that the Hispanic population in general tends to have lower cancer rates, including TC, than Non-Hispanic. Nonetheless this pattern does not seem to be the case in the Hispanic population of PR.

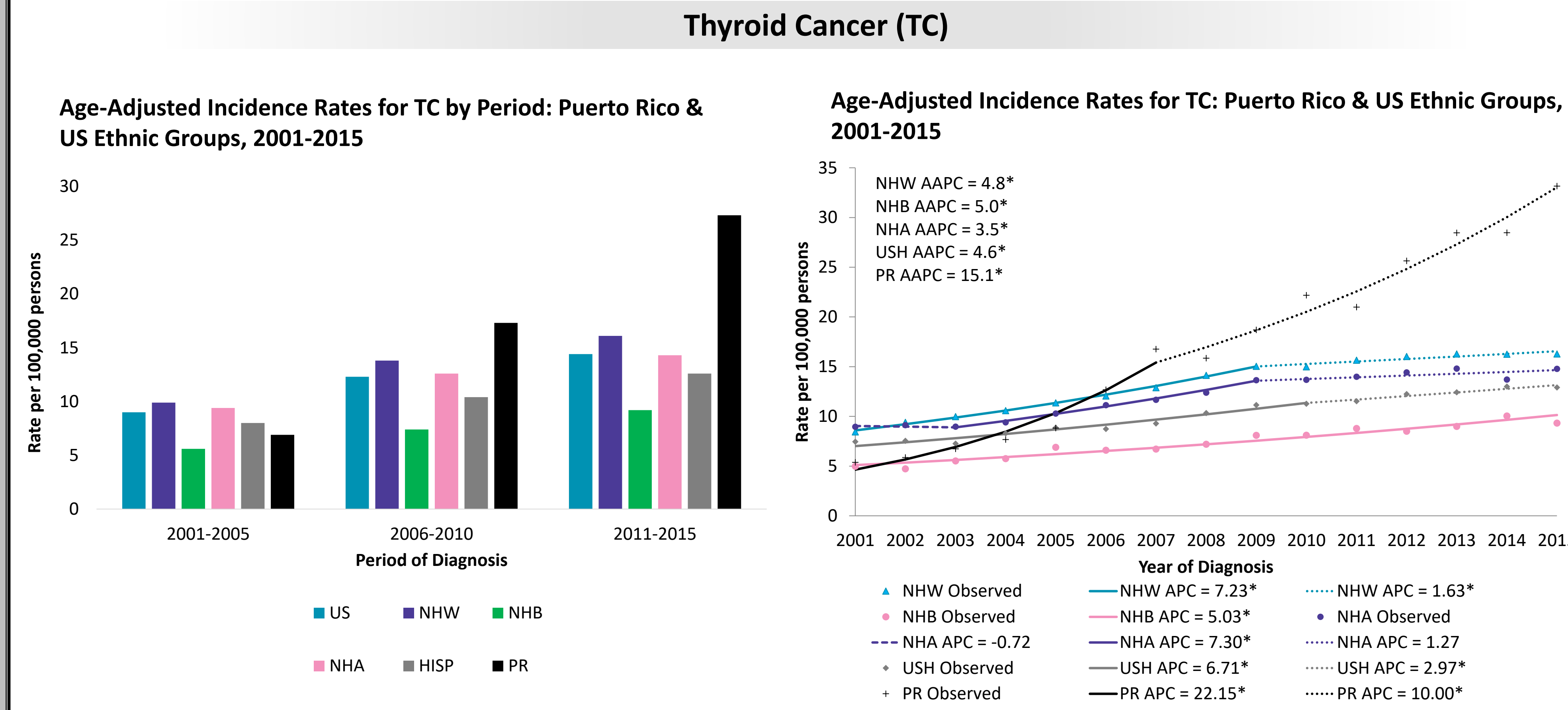
PURPOSE

- To assess the trends of TC among U.S. racial/ethnic groups and the PR population during the period 2001-2015.

METHODS

- Incidence data of microscopically confirmed TC were obtained from the Puerto Rico Central Cancer Registry (PRCCR) database and from SEER 18 Registries database. Histology subtypes of TC were defined according to the ICD-O-3.
- Data were stratified by sex, age-groups, stage at diagnosis, histology, and tumor size. Incidence rates were calculated per 100,000 and age-adjusted to the 2000 US Standard Population using the SEER*Stat software version 8.3.5.
- NCIs Joinpoint Regression Program version 4.7.0.0 was used to identify inflection points and to compare incidence trends using a permuted comparability test. The derived Annual Percentage Change (APC) was used to measure trends or change in rates over time. Also the Average APC (AAPC) was presented to summarize the APCs over the 2001-2015 period. Statistical significance was established at alpha < 0.05.
- Tumor size were evaluated for cases diagnosed between 2004 and 2015 only due to availability of data.

RESULTS

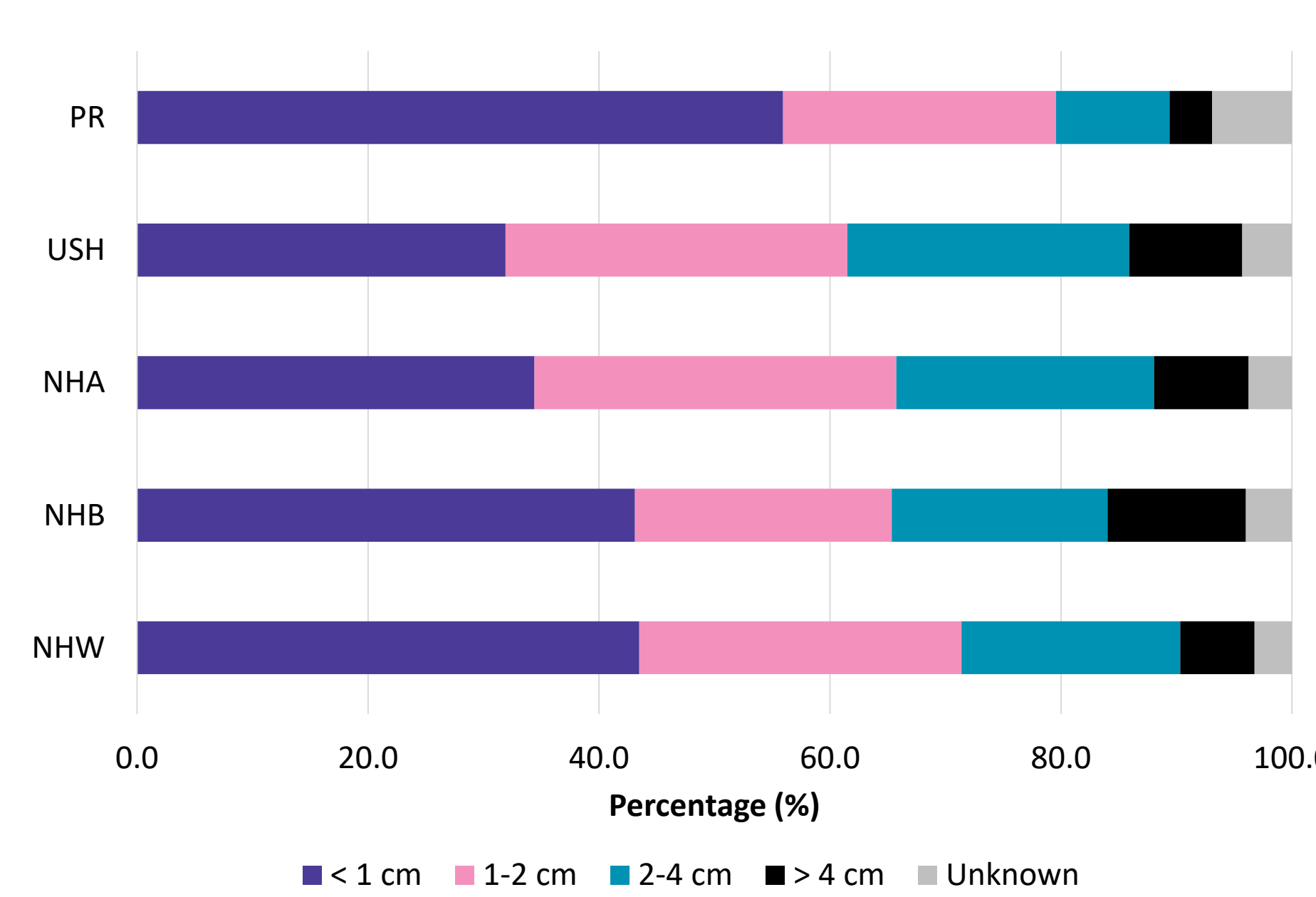


Distribution of TC by Histologic Group and Period: US & Puerto Rico 2001-2015

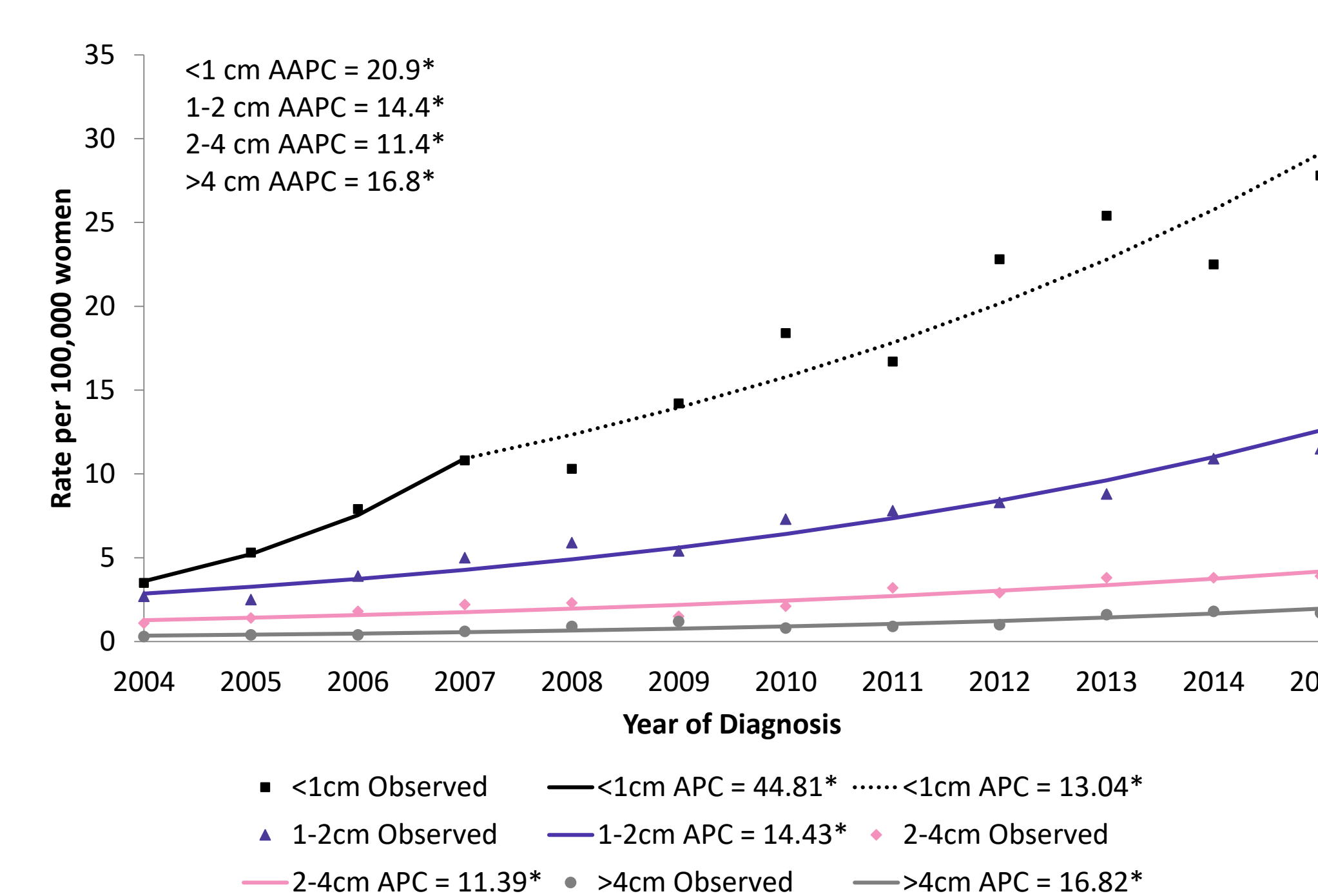
Period →	2001-2005					2006-2010					2011-2015				
	NHW (25,337)	NHB (2,294)	NHA (3,248)	USH (4,755)	PR (1,263)	NHW (35,844)	NHB (3,366)	NHA (5,112)	USH (7,479)	PR (3,279)	NHW (42,435)	NHB (4,551)	NHA (6,838)	USH (10,736)	PR (5,172)
Papillary	84.2	78.4	87.0	87.6	85.4	86.9	79.9	89.8	89.4	90.5	89.4	84.1	91.3	91.0	94.2
Follicular	10.3	15.3	9.0	7.8	9.2	8.5	13.8	6.6	6.5	6.1	6.4	10.8	5.1	5.3	3.2
Medullary	2.2	2.0	1.1	1.9	2.2	1.9	2.6	0.9	1.9	1.6	1.8	1.8	1.1	1.6	1.3
Anaplastic	1.0	1.4	0.9	0.7	0.4	0.9	0.9	1.2	0.6	0.3	0.8	0.9	0.9	0.7	0.2
Other or unknown	2.4	2.9	2.0	2.0	2.9	1.9	2.8	1.5	1.6	1.6	1.7	2.3	1.6	1.4	1.1

Thyroid Papillary Carcinoma (TPC)

Distribution (%) of Tumor Size among TPC: Puerto Rico and US Ethnic Groups, 2011-2015



Age-Adjusted Incidence Rates for TPC in Women by Tumor Size: Puerto Rico, 2004-2015



NHW = Non-Hispanic Whites | NHB = Non-Hispanic Blacks | NHA = Non-Hispanic Asians | USH = Hispanics
 Rates are per 100,000 and age-adjusted to the 2000 US Standard Population (19 age groups - Census P25-1130)
 *The APC is significantly different from zero (p<0.05).
 Data Source PR: Incidence Case File of Puerto Rico from the PRCCR (April 9, 2019)
 Data Source US: SEER Program - 18 Registries Research Data
 Population Source: Vintage 2016 estimates series from the Population Division of the United States Census Bureau

RESULTS

- Independently of sex, age group, and histologic type, the PR population showed higher incidence APC than other U.S. racial/ethnic groups.
- During 2001-2015, age-adjusted incidence rates in PR and U.S. racial/ethnic groups showed an upward trend. We observed higher APCs in PR than in U.S. racial/ethnic groups.
- In PR, TC incidence increased 23.9% annually (p<0.05) from 2001-2007, and 10.9% annually (p<0.05) from 2007-2015; whereas, in U.S. increased 7.6% from 2001 to 2009, and 2.5% from 2009 to 2015 (p<0.05).
- Trends were driven by increases in TPC in females, and aged 40-59 years. PR and U.S. non-Hispanic whites (NHW) had higher increases of PTC.
- PR females had a significant upward trend of TPC from 2001-2015: APC₂₀₀₁₋₂₀₀₇=+25.0% and APC₂₀₀₇₋₂₀₁₅=+10.4%; whereas, NHW showed a significant upward trend from 2001-2013 and a slight decline since 2013 (APC₂₀₀₁₋₂₀₀₉=+8.0%; APC₂₀₀₉₋₂₀₁₃=+2.7%; and APC₂₀₁₃₋₂₀₁₅=-0.8%).
- PR women population showed highest proportion (56%) of TPC tumors sized <1 cm when compared to U.S. racial/ethnic groups.

DISCUSSION

- This is the first time we analyzed and compared TC incidence trends in U.S. and PR. TC incidence trends continue to increase throughout the study period across age-groups in PR population. However, a reversed trend occurred in NHW starting in 2013. Despite this, increases were higher in the PR population, in females, in ages 40-59 years, and for TPC.
- Over time more TPC cases diagnosed on localized stage increased; whereas, cases diagnosed on regional and distant stage decreased, which might suggest an increase in overdiagnosis.
- The fact that there is a decreased in APC in women from 2003-2007 to 2007-2013 also suggest that the observed increase in incidence was due to overdiagnosis. Due to the lower number of men diagnosed with TPC, this trend is not identified
- Few studies have suggested that the increase of thyroid carcinoma can be related to an increase in the use of new diagnostic modalities and an increase in medical surveillance. This can be correlated to the fact that, through time, more thyroid cancers are diagnosed in earlier stages of disease. Still, more studies that assess the etiological factors of thyroid carcinoma are needed.
- Further research is needed to better understand these disparities. In addition, there is a need to monitor and identify the causes for the reversed trend in TPC observed in NHW females aged 40-59 years, as well as the reduction in the upward trend of TPC observed in NHW males aged 40-59 and females aged 60+.