



RISING THYROID CANCER IN PUERTO RICO, 1987-2013: EXCESS, ACCESS, OR WHAT?

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BACKGROUND

- Thyroid cancer incidence has increased over the last three decades worldwide. This increase has been mainly attributed to an increase in papillary thyroid carcinoma (PTC).
- Factors for this increase include population aging, changes in life-styles, environmental factors, and increased surveillance.
- Thyroid cancer is the eighth most common diagnosed cancer in the United States, with an age-adjusted incidence rate of 13.9 per 100,000 men and women per year, based on 2009-2013 cases.
- In Puerto Rico, thyroid cancer was the third most commonly diagnosed cancer among women, and the twelfth among males, representing about 6% of all cancers for the period 2009-2013. In 2013, thyroid cancer was the second most diagnosed cancer among women.
- During this same period, the incidence rate of PTC remained higher in Puerto Ricans than any race/ethnic group in the United States.
- Previous studies reported a 2.3-fold increase in thyroid cancer incidence in Puerto Rico between 1985 and 2004. The increase was mostly due to an increase in PTC.
- Reports of thyroid cancer by race/ethnic groups in the U.S. suggest that the Hispanic population in general tend to have lower cancer rates, including thyroid cancer, than Non-Hispanic. Nonetheless this pattern does not seem to be the case in the Hispanic population of Puerto Rico.

PURPOSE

- To describe the pattern of thyroid cancer among the Puerto Rican population.
- To assess the trend of PTC among the population of Puerto Rico during the period 1987-2013.

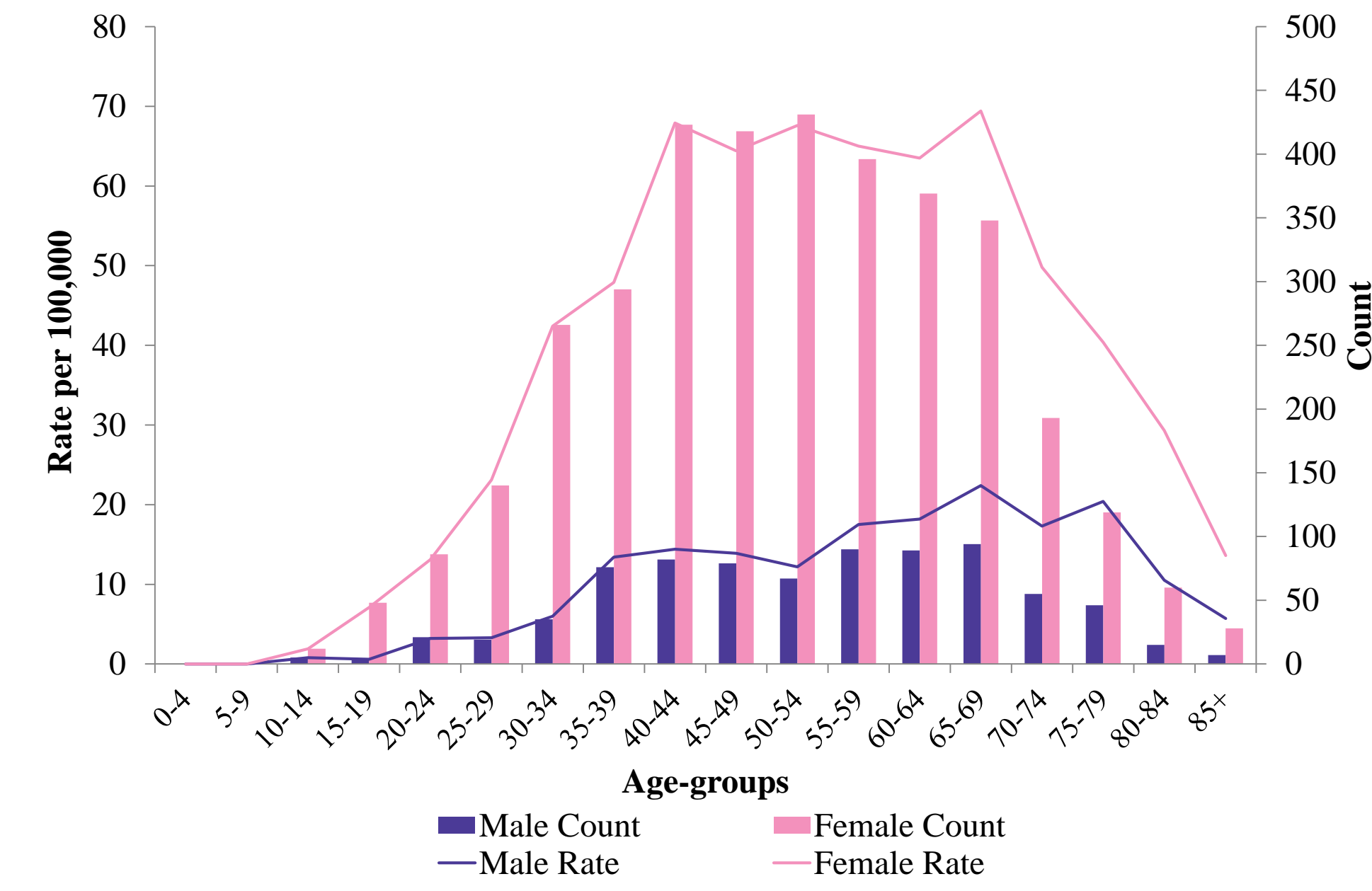
METHODS

- Incidence data of thyroid cancer were obtained from the Puerto Rico Central Cancer Registry. Histology subtypes of thyroid cancer were defined according to the ICD-O-3.
- Data were stratified by sex, age groups, stage at diagnosis, histology, and time period. Incidence rates were calculated per 100,000 and age-adjusted to the 2000 United States Standard Population using the SEER*Stat software version 8.3.2. Analyses are presented by histological subtype, sex, and age-groups.
- NCIs Joinpoint Regression Program version 4.2.0.2 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 1987-2013 time period. It is computed as a weighted average of the APCs from the joinpoint model. Statistical significance was established at alpha < 0.05.
- Data from the Census 2000 indicate that socioeconomic disparities exist geographically across Puerto Rico, where municipalities differ by socioeconomic determinants such as proportion of residents living below the poverty level and with lower educational attainment. Rate Ratios were presented to compare Socio-Economic Position Index (SEP) groups (low vs. high). This analysis is presented by sex and time period.

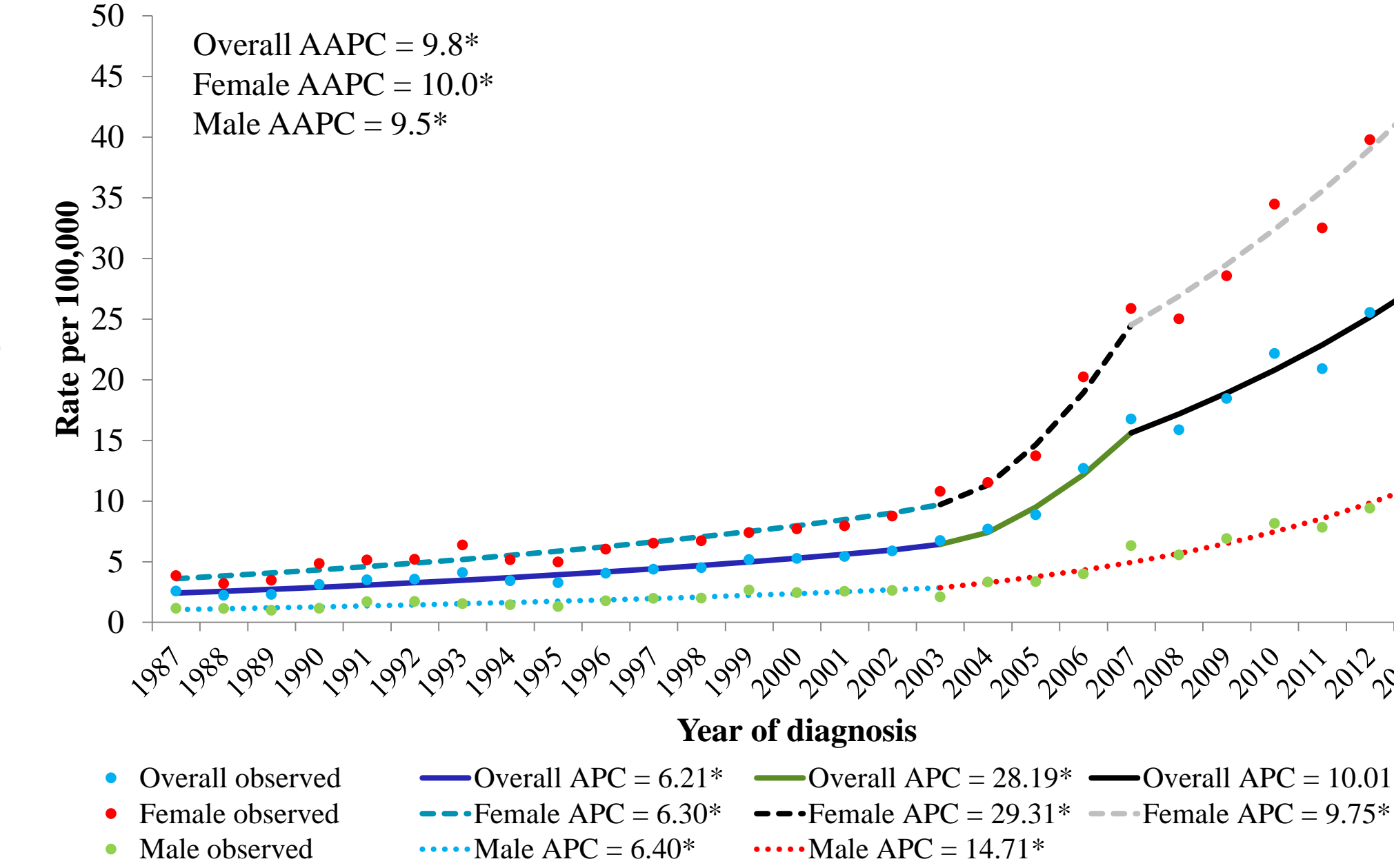
RESULTS

Thyroid Cancer

Average Age-Specific Incidence Rates and Counts for Thyroid Cancer by Sex: Puerto Rico 2009-2013



Age-Adjusted Incidence Rates for Thyroid Cancer by Sex: Puerto Rico 1987-2013

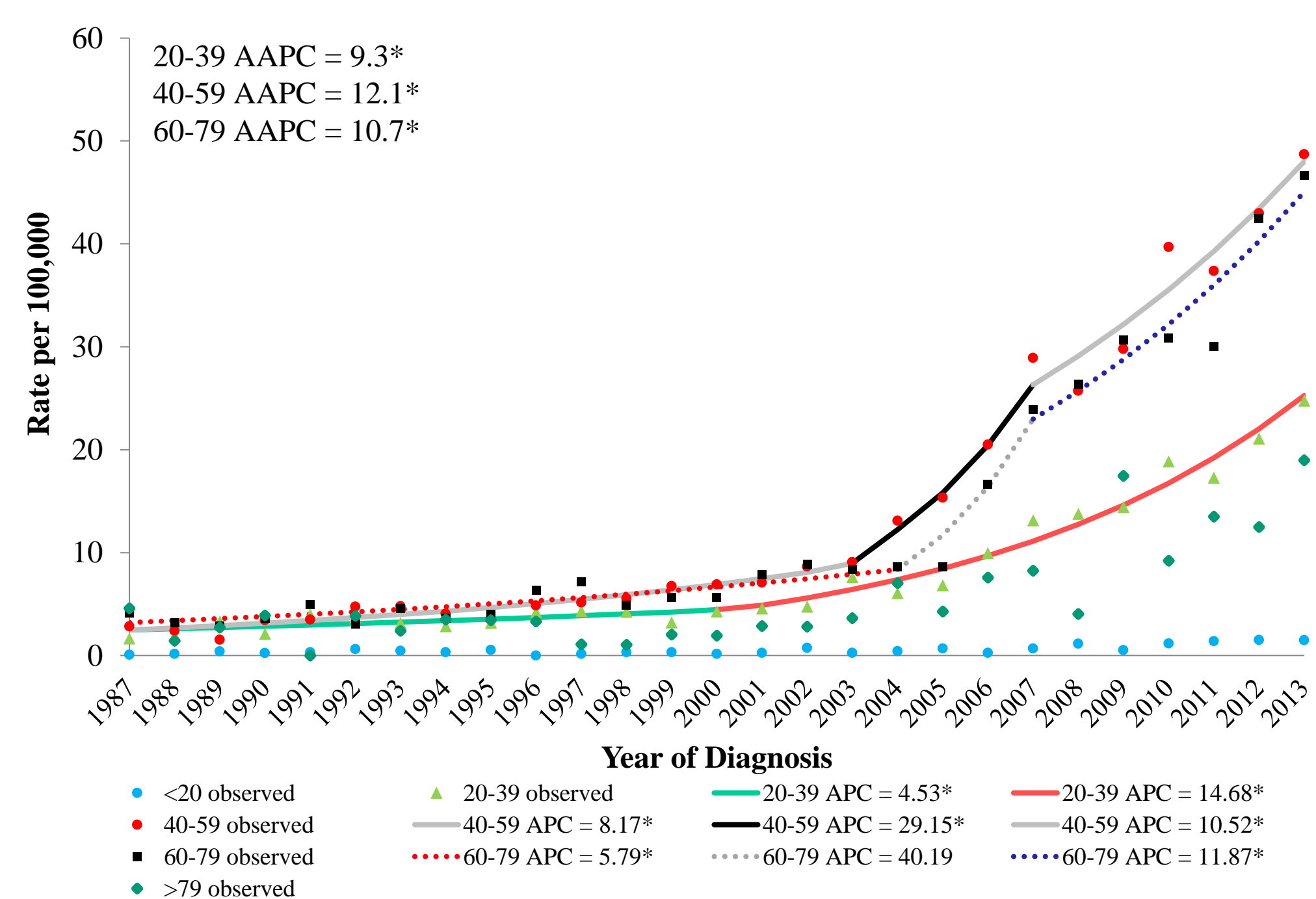


Age-Adjusted Incidence Rates for Thyroid Cancer by Histologic Group and Period: Puerto Rico 1987-2013

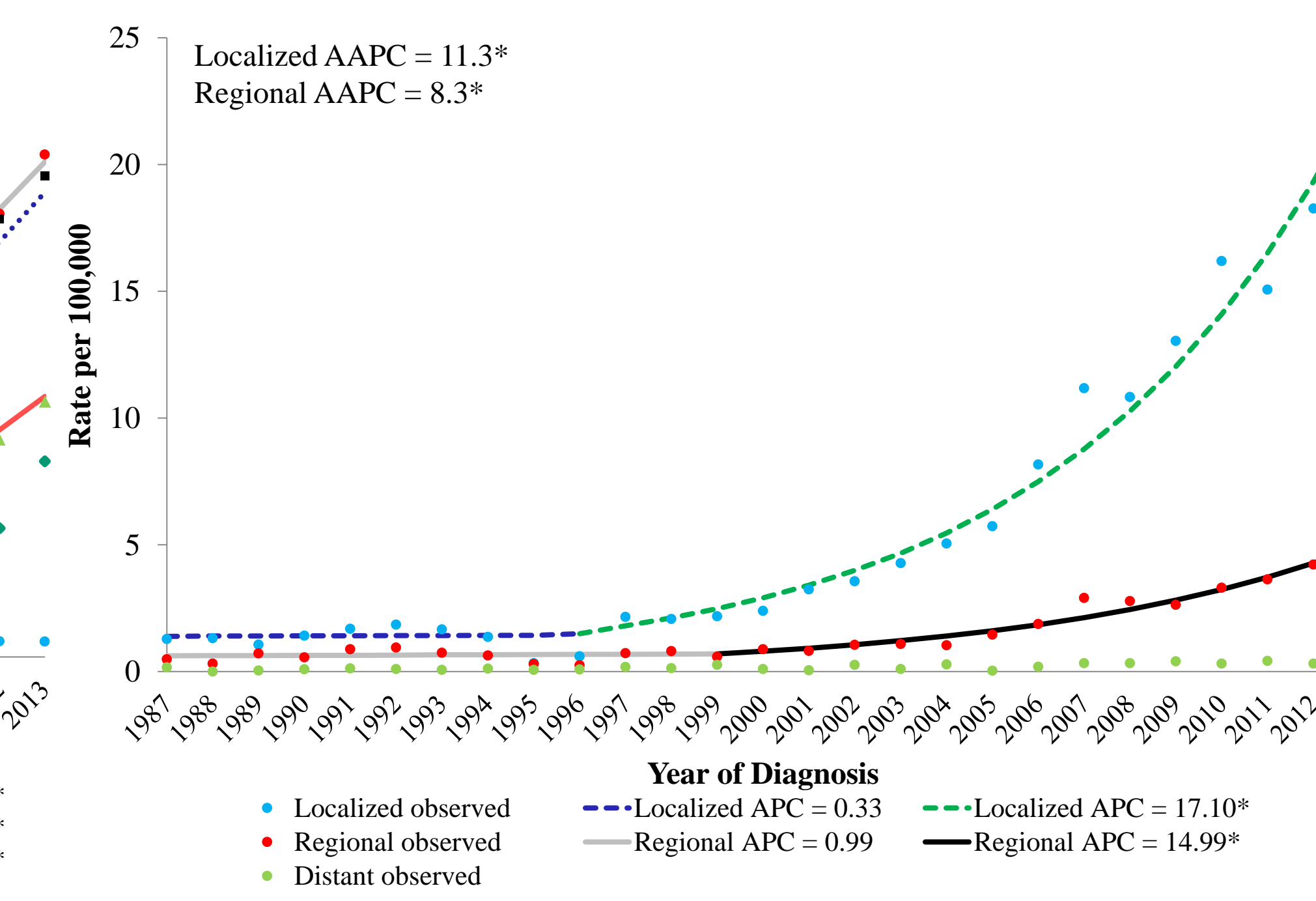
Histologic Group ↓	1987-2003			2004-2007			2008-2013		
	Rate	Count	%	Rate	Count	%	Rate	Count	%
All Thyroid Cancers	4.2	2,352	100.0	11.5	1,719	100.0	21.9	5,020	100.0
Papillary	3.3	1,882	80.0	10.0	1,492	86.8	20.4	4,676	93.1
Follicular	0.5	261	11.1	1.0	145	8.4	0.9	212	4.2
Medullary	0.2	85	3.6	0.2	31	1.8	0.3	69	1.4
Anaplastic	0.0	21	0.9	0.0	6	0.3	0.0	10	0.2
Other or unknown	0.2	103	4.4	0.3	45	2.6	0.2	53	1.1

Papillary Thyroid Carcinoma (PTC)

Age-Adjusted Incidence Rates for PTC by Age-Groups: Puerto Rico 1987-2013



Age-Adjusted Incidence Rates for PTC by Stage: Puerto Rico 1987-2013



Socio-Economic Position Index (SEP) Rate Ratio (RR) for PTC by Sex: Puerto Rico 1987-2013

Sex →	Overall						Male						Female					
	1987-2003		2004-2007		2008-2013		1987-2003		2004-2007		2008-2013		1987-2003		2004-2007		2008-2013	
SEP ↓	RR	P-Value	RR	P-Value	RR	P-Value	RR	P-Value	RR	P-Value	RR	P-Value	RR	P-Value	RR	P-Value	RR	P-Value
Low SEP	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
High SEP	1.5	<0.01	1.4	<0.01	1.2	<0.01	1.5	<0.01	1.6	<0.01	1.4	<0.01	1.4	<0.01	1.3	<0.01	1.1	<0.01

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: Incidence Case File of Puerto Rico from the Puerto Rico Central Cancer Registry (April 6, 2016); 2013 data is preliminary. Population Source: Vintage 2014 estimates series from the Population Division of the United States Census Bureau

RESULTS

- For the period 2009-2013 the overall age-adjusted incidence rate of
 - thyroid cancer was 23.0/100,000 (men: 8.7; women: 35.7).
 - PTC was 21.5/100,000 (men: 7.8; women: 33.7).
- Over 45% of PTC cases were diagnosed among men and women aged 40-59 years.
- Among women, the highest PTC incidence rates were observed among those aged 40-59 (63.0/100,000) and 60-79 (52.5/100,000); whereas among men, the highest rates were among those 60-79 years (16.6/100,000).
- Rate of PTC significantly increase by 2003 and onwards for both men and women.
- The percentage of PTC in localized stage at time of diagnosis increased from 53.6% during the period 1987-2000 to 77.3% during the period 2009-2013 (data not shown).
- Whereas, the percentage of cases with unknown stage decreased from 20.3% to 4.3% between 1987-2000 and 2009-2013.
- Compared with those in the lowest SEP, those in the highest SEP have a higher risk of being diagnosed with PTC. However this risk decreased overtime.

DISCUSSION

- A statistically significant increase trend in thyroid cancer is observed for both sexes from 1987 to 2013. However, the increase was higher among women. The overall thyroid cancer increase is mostly due to an increase of PTC.
- Over time more PTC cases diagnosed on localized stage increased; whereas, cases diagnosed on distant stage remain low, 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 PTC, this trend is not identified.
- Few studies have suggested that the increase in thyroid carcinoma incidence is related to greater access of health care services and/or to high socioeconomic position. Other 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.
- Higher risk of PTC was observed among men and women living in municipalities with highest SEP Index compared with those municipalities with lowest SEP Index. However, this difference has been decreasing overtime. These findings might be explained by an increased opportunity of diagnosis among individuals in lower SEP Index provided by an increase access to health care through the Government Health Plan implemented in 1994, which provides access to healthcare to those at or below the 200% Federal Poverty Level.
- Further research is needed to better understand these trends and to include other factors (e.g. tumor size) in the analysis.