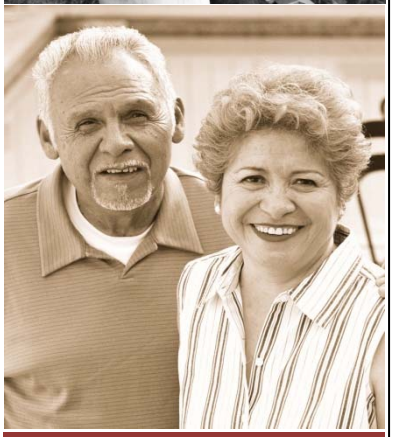
FLORIDA CANCER DATA SYSTEM
SYLVESTER COMPREHENSIVE CANCER CENTER

Cancer in Florida Hispanics 1989 – 2006



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CANCER IN FLORIDA HISPANICS

1989-2006

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Table of Contents

A. INTRODUCTION 1

B. BACKGROUND 1

B.1. The Hispanic Paradox 1

B.2. Cancer in Hispanics 1

B.2.1. Hispanic Females 2

B.2.2. Hispanic Males 2

B.2.3. Hispanic Children 2

B.2.4. Other Cancers 2

B.3. Hispanic Cancer Screening and Risk Behaviors 2

B.4. Hispanic Subpopulations 2

C. METHODS 3

C.1. Assignment of Ethnicity and Subpopulation 3

C.2. Hispanic Cancers 3

C.3. Cancer Rates 3

C.4. Joinpoint Analyses 4

C.5. Proportional Incidence Ratios 4

D. RESULTS 4

D.1. Florida Hispanic Population and Cancer Cases 4

D.1.1. Florida Hispanics by Percentage of County Population 2006 4

D1.2. Florida Hispanics by Percentage of Total State Population 2006 4

D.1.3. Florida Distribution of Hispanic Cancer by County 2000-2006 4

D.1.4. Percentage of New Cancer Cases by Ethnicity and Site, 2006 5

D.2. Trends Top Hispanic Cancers Joinpoint Results 10

D.2.1. All Cancers 10

D.2.2. Lung and Bronchus Cancer 12

D.2.3. Prostate Cancer (males only) 14

D.2.4. Breast Cancer (females only) 15

D.2.5. Colorectal Cancer 15

D.2.6. Bladder Cancer (including in situ) 17

D.2.7. Head and Neck Cancer 19

D.2.8. Non Hodgkin's Lymphoma (NHL) 20

D.2.9. Melanoma 22

D.2.10. Ovarian Cancer (females only) 23

D.2.11. Cervical Cancer (females only) 24
D.2.12. Stomach Cancer 25
D.2.13. Liver Cancer 26
D.2.14. Gall Bladder Cancer 28
D.3. Percentage Distributions for All Cancer 29
D.3.1. Hispanics Versus non-Hispanic Whites by Gender 29
D.3.2. Proportional Distribution of Cancers by Hispanic Subpopulation and Gender 31
D.3.3. Hispanic Subpopulations by Gender 33
E. DISCUSSION 37
E.1. Cancer Trends in Florida Hispanics 37
E.2. Stage-Specific Cancer Trends in Florida Hispanics 37
E.3. Comparison of Select 2006 Florida Incidence Rates with Pooled Data from 38 State Registries 38
E.4. Cancer Distribution within Hispanic Subgroups 39
E.5. The Hispanic Paradox and Cancer in Florida 39
E.6. Study Limitations 40
E.7. Future Research and Prevention Activities 40
APPENDIX 1. Major Hispanic Cancers: International Classification of Disease (ICD) and FCDS Coding 41
REFERENCES 43

A. INTRODUCTION

In the United States, Hispanics are the largest, youngest and fastest-growing minority accounting for 15% of the US population with 45.5 million people in 2007.[1] In 2006, there were 3.6 million (21%) Hispanics among Florida's rapidly growing population.[2] Although traditionally the majority of Hispanic population growth in both the US and Florida has been due to immigration from Spanish-speaking countries, recently Hispanic births have become the largest source of Hispanic population growth.[3]

Traditionally, Hispanics as a group have experienced lower cancer incidence and mortality rates. However, as described below, recent studies have demonstrated significant variation among Hispanic subpopulations within all US Hispanics with regards to their cancer experience. This variation has significant implications for the future cancer burden as well as cancer prevention and control in the US, given the projected rapid and continuing growth of both the immigrant and US-born Hispanic populations. This Monograph focuses on the cancer experience of Florida Hispanics (including Hispanic subpopulation analyses) from 1989 through 2006, including identifying potential health disparities.

B. BACKGROUND

As noted above, Hispanics are the largest, youngest and fastest-growing minority in the United States.[1] Following California and Texas, Florida ranks third among states with the highest number of Hispanics, totaling over 3.7 million in 2007.[4] In Florida, Hispanics make up roughly 21% of the total population, composed of 49% Native-Born Hispanics and 51% Foreign-Born Hispanics. Cancer in Hispanics is an important issue because overall the Hispanic population in the US has demonstrated lower cancer incidence and mortality rates than non-Hispanic populations.[5-7] However, in the US, Hispanics are a heterogeneous group, immigrating originally from Mexico, Puerto Rico, Cuba, and other countries in Central and South America. Furthermore, Hispanics may also differ significantly by their degree of acculturation and socioeconomic status. For example, acculturation to US lifestyles and behaviors has been associated with an increase in obesity, substance abuse, and less nutritious diets among the US Hispanic population (as well as positive behaviors such as an increase in reported exercise), particularly with increasing time spent in the US.[8] Therefore, cancer occurrence and risk factors can vary among Hispanics because of acculturation, geographic, behavioral, and/or genetic differences.[7, 9]

B.1. The Hispanic Paradox

Since the 1980s, despite lower socio-economic status and lower rates of health insurance coverage, US Hispanics as a group have been noted to have better health outcomes on indicators such as infant mortality, life-expectancy, mortality from cardiovascular diseases, mortality from major types of cancer, and measures of functional health. Labeled as the "Hispanic Paradox," various factors have been explored to explain the relative advantages of US Hispanics including cultural practices, family supports, selective migration ("healthy immigrant effects"), diet, and genetic heritage, as well as Census undercounting, misclassification of Hispanic deaths, and Hispanic emigration.[5, 6, 13, 14] Of note, this Hispanic Paradox has been found particularly among Mexican Americans (and not necessarily among other Hispanic subpopulations), and is concentrated among those at lower levels of socioeconomic status, with little or no advantage found at higher socioeconomic levels.[15]

B.2. Cancer in Hispanics

In general, US Hispanics as a group experience lower cancer incidence and mortality rates compared to US non-Hispanic Whites and non-Hispanic Blacks. The leading cases of cancer incidence and cancer death are similar among US Hispanics as among non-Hispanic Whites: breast, lung and colorectal cancers among females, and lung, colorectal and prostate cancers among males.[7, 13] However, certain "Hispanic" cancers remain increased in incidence and mortality rates across multiple studies for US Hispanics as a group: cancers of the stomach, liver, uterine cervix, penis, gall bladder, and acute lymphocytic leukemia.[7, 9, 13, 16-20] In addition, Hispanics are more likely to be diagnosed at a later stage for certain common cancers, and less likely to report utilizing cancer screening.[17, 21]

B.2.1. Hispanic Females

In multiple studies, US Hispanic females have been found to have increased rates of cervical, gall bladder, stomach, and liver cancer, as well as multiple myeloma.[17, 20, 22, 23] As with other race-ethnic groups, lung carcinoma is increasing among Hispanic females.[20]

B.2.2. Hispanic Males

In multiple studies, US Hispanic males have been found to have elevated rates of liver, stomach, gall bladder, possibly nasal cavity, penis, and possibly thyroid cancers, acute lymphocytic leukemia, and Kaposi's sarcoma.[17, 19, 24]

B.2.3. Hispanic Children

Although few in number, studies of US Hispanic children have shown increased rates of leukemia, Hodgkin's lymphoma, and germ cell tumors.[25, 26] However, differences have been found between different states with varying proportions of Hispanic subpopulations. For example, the incidence of lymphoma, central nervous system tumors, sympathetic nervous system tumors, and malignant bone tumors was highest among Hispanic youth in Florida (primarily Cuban and Central American Hispanics); the incidence of hepatic tumors was highest among Hispanic youth in California (primarily Mexican Hispanics).[26]

B.2.4. Other Cancers

Although traditionally Hispanics have not been thought to be at increased risk for skin cancer, recent evidence suggests that melanoma incidence and particularly mortality may be increasing among Hispanics.[27] In part this may be due to lack of knowledge about this risk among both Hispanics and their healthcare providers.

B.3. Hispanic Cancer Screening and Risk Behaviors

As a group, Hispanics tend to have fewer known cancer risk behaviors.[13, 17] These include smoking prevalence rates of 15% among Hispanic versus 22% among non-Hispanic White adults, while 63% and 37% of Hispanic females and males, respectively, report not consuming alcohol (vs. 46% and 33% of non-Hispanic White females and males, respectively). Nevertheless, there is considerable variation among Hispanics for some of these cancer risk factors; for example, 28.9% and 30.0% of Cuban males and females, and 26.1% and 14.1% of Puerto Rican males and females, respectively reportedly smoke.[17] And as with non-Hispanic Whites, obesity is a rapidly growing issue among Hispanics, again with considerable Hispanic subpopulation variation including 80% of Mexican American males and females measured as overweight or obese.[13] In general, Hispanics are less likely to participate in preventive cancer screening. In part, this may be due to a significant lack of health insurance among Hispanics compared to non-Hispanic Whites and Blacks; beyond access to care, other issues have been identified as barriers to Hispanic cancer screening including: less education, lower socio-economic status, and cultural barriers.[13, 21] Among Floridians 50 years or older based on the 2008 Behavioral Risk Factor Surveillance Survey (BRFSS), with regards to colorectal cancer screening, only 27.0% Hispanics compared to 49.8% non-Hispanic Whites reported ever having home fecal blood testing, while only 49.5% vs. 67.7% reported ever having had sigmoidoscopy or colonoscopy. Among Floridian females, only 58.7% of Hispanic females compared to 74.2% of non-Hispanic White females reported ever having had a mammogram, 76.8% vs. 93.2% a clinical breast exam, and 84.3% vs. 94.9% a pap smear.[28]

B.4. Hispanic Subpopulations

When data are available, as noted above, cancer incidence and mortality rates may vary considerably by Hispanic subpopulation.[12] In 2003, out of the estimated 40 million Hispanics in the US**,** 64% were of Mexican background, 9% Puerto Rican, 3.4% Cuban, 3.1% Salvadoran and 2.8% Dominican; the rest are of some other Central American, South American or other Hispanic/Latino origin.[1] In 2000, there were 2.7 million Hispanics among Florida's rapidly growing population of 16 million, with an estimated 14% Mexican, 19% Puerto Rican, 33% Cuban, and 34% other Hispanic subpopulations.[3] The majority of these Florida Hispanics are first generation, having immigrated to the US at different times in their life. However, this diversity among Hispanics, generally defined by birthplace or geographic origin, has been neglected when assessing cancer risk.

C. METHODS

The data in this Monograph were derived from all cancer cases residing in Florida, diagnosed between 1989-2006, and reported to the Florida Cancer Data System (FCDS). The FCDS is a statewide, population-based cancer incidence registry created by the State of Florida Department of Health in 1978, and operated by the Sylvester Comprehensive Cancer Center at the University of Miami Leonard M. Miller School of Medicine with support from the Florida Department of Health and from the Centers for Disease Control and Prevention (CDC) National Program for Cancer Registries (NPCR).

C.1. Assignment of Ethnicity and Subpopulation

For the assignment of ethnicity and subpopulation, the recently developed HOIA (Hispanic Origin Identification Algorithm) was used, using data from the FCDS.[11] HOIA is largely based on the existing North American Association of Central Cancer Registries (NAACCR) Hispanic Identification Algorithm (NHIA).[29] HOIA takes into account all information routinely available to cancer registries, and in addition, all non-Hispanic cases are matched to a Hispanic surname list.[30] HOIA is available online at http://fcds.med.miami.edu and has been described in detail in previous publications.[10-12] A comparison between results from HOIA and NHIA has been performed.[10, 12] In short, HOIA corrects for data miscodes common in the FCDS database in the NAACCR data item 190 "Hispanic Origin," e.g., misclassification of unknown Hispanics as "Mexican," or the inclusion of Brazilians and Portuguese as Hispanics. In addition, HOIA uses a stepwise approach to incorporate the information present in death certificates (birthplace and recorded Hispanic subgroup) with the same information from cancer registry records. Not only does HOIA provide increased ascertainment of Hispanic ethnicity, it also allows for estimates of cancer rates in the following Hispanic subpopulations: Mexican Hispanics, Puerto Ricans, Cubans, and New Latinos (all other Hispanics).[9] Of note, HOIA was not able to reclassify all Hispanics into these subpopulations; in this case, these Hispanics were categorized as a subgroup denoted as "Hispanic NOS" or "not otherwise classified."

Of note, the rates presented below were focused on Hispanics and the comparison group of non-Hispanic Whites, i.e., a mixed ethnicity and racial classification. "Hispanics" include both Blacks and Whites in part because this follows the patterns of Hispanic race-ethnic self-identification (i.e. Black Hispanics often identify as "Hispanics" rather than "Black"), and because the numbers of identified Black Hispanics in the FCDS database are quite small. These analyses do not include non-Hispanic Blacks who are a mixture of African Americans and Blacks from other countries (particularly the Caribbean). As with all data in the FCDS, these race-ethnic data are extracted from the medical and pathology records by trained Certified Cancer Registrars using nationally recognized standards.

C.2. Hispanic Cancers

For the incidence and mortality analyses, all records of invasive Hispanic cancers diagnosed among Florida residents of all races and ethnicities during the 18 year period from 1989-2006 were used in the analysis. Primary cancer site and histology data were coded according to the International Classification of Diseases for Oncology edition in use at the time of diagnosis, converted to the third edition,[31] and categorized according to SEER site groups.[32] The top 10 cancers among all Florida residents in the FCDS database for 2006 were selected, as well as additional cancers demonstrated to be elevated in Hispanic populations, as described above in the Background section (Appendix 1).

C.3. Cancer Rates

Age and gender-specific population data for the state of Florida for each racial/ethnic group for the study years were obtained from the US Census Bureau for the underlying denominator of all persons at risk. As noted above, for the incidence analysis, all records of invasive Hispanic cancers diagnosed among Florida residents of all races and ethnicities during the 18 year period were used in the analysis.

Cancer incidence rates for years (1989–2006) per 100,000 persons were age-adjusted by 18 age groups (0–4, 5–9, . . . , 80–84, 85 and above) to the 2000 U.S. standard population. Age-adjustment is a process to correct for the differences in cancer cases and death counts caused by differing age composition among different populations and counties. The direct method of age-adjustment was used to calculate age-adjusted incidence and mortality rates in this report.[33] Standard errors and 95% confidence intervals (95% CI) were generated using equations published by SEER*Stat.[34] These values were produced to enable long-term cancer incidence

trends (1989-2006) through Joinpoint analysis for all Hispanics and non-Hispanic Whites.[35] To protect confidentiality, data were suppressed when cell counts were less than 10 cancer cases (following FCDS rules).

C.4. Joinpoint Analyses

The analyses of cancer incidence trends between the years 1989-2006 were conducted using the Joinpoint regression model, where statistically significant rate changes (increase or decrease) determine the best fitting points, or "joinpoints." The analysis begins with a minimum number of joinpoints (e.g. zero or a straight line), and tests whether one or more points are significant and whether they should be added to the model by means of the Monte Carlo Permutation method.[35] The final model represents a statistically significant change in a trend at each joinpoint. The Annual Percent Change (APC), or the average rate of change in a cancer rate, was generated for each joinpoint segment and was tested at the $\rho < 0.05$ to determine if the rate of change was significantly different from zero. The Joinpoint analyses were performed using the Joinpoint software, version 3.3, from the Surveillance Research Program of the US National Cancer Institute (available at http://srab.cancer.gov/joinpoint).

Of note, two different statistical models are used in the Joinpoint analyses, linear and log linear. In order to generate the APCs, the log linear model is used; however, if there are any zero values in the dependent variable due to small sample sizes in particular subpopulations, the log linear model drops that particular value from the analysis, and neither an APC nor a graphic line is generated by the software. In these cases (e.g. subpopulations of gall bladder cancer), we elected to use the linear model to generate a graphic line which is noted in the affected figures (http://srab.cancer.gov/joinpoint/faq/zeros.html).

C.5. Proportional Incidence Ratios

An age-standardized proportional incidence ratio (PIR) analysis was performed in lieu of incidence rate ratios due to the lack of detailed census population data for Hispanic sub-groups. This analysis compares the distribution of cancers by anatomical site between Hispanic sub-groups to the distribution in non-Hispanics. This analysis was derived by calculating the expected number of cancer-specific cases in each sub-Hispanic group, and the PIR represents a ratio of the cases observed to those expected. For each sub-Hispanic group, this expected number was obtained by multiplying the total number of cases for each age by the corresponding age-cause-specific proportions in the non-Hispanic white population. An elevated PIR does not necessarily indicate that the risk of disease is raised, but rather that there is a higher proportion of cases for the specific anatomic site than in the reference group.[36]

D. RESULTS

D.1. Florida Hispanic Population and Cancer Cases

D.1.1. Florida Hispanics by Percentage of County Population 2006

The distribution of Florida Hispanics as a percentage of the total population in each county in 2006 is represented as a map in **Figure 1**. Miami-Dade, Hendry, and Hardee Counties had the highest proportion of Hispanics with 60%, 48%, and 43% of the total population being Hispanic, respectively. There was a clear south to north gradient in the proportion of Hispanics, with a greater percentage of Hispanics living in South Florida than in Central and North Florida.

D1.2. Florida Hispanics by Percentage of Total State Population 2006

Figure 2 is a map showing the percent distribution of total Florida Hispanics in the State by county in 2006. A majority of Hispanics in Florida lived in South Florida, with about 57% residing in Miami-Dade, Broward, and Palm Beach counties alone. Another 15% resided in the counties of Orange and Hillsborough, which are located in central Florida. A smaller percentage of all Florida Hispanics lived in North Florida.

D.1.3. Florida Distribution of Hispanic Cancer by County 2000-2006

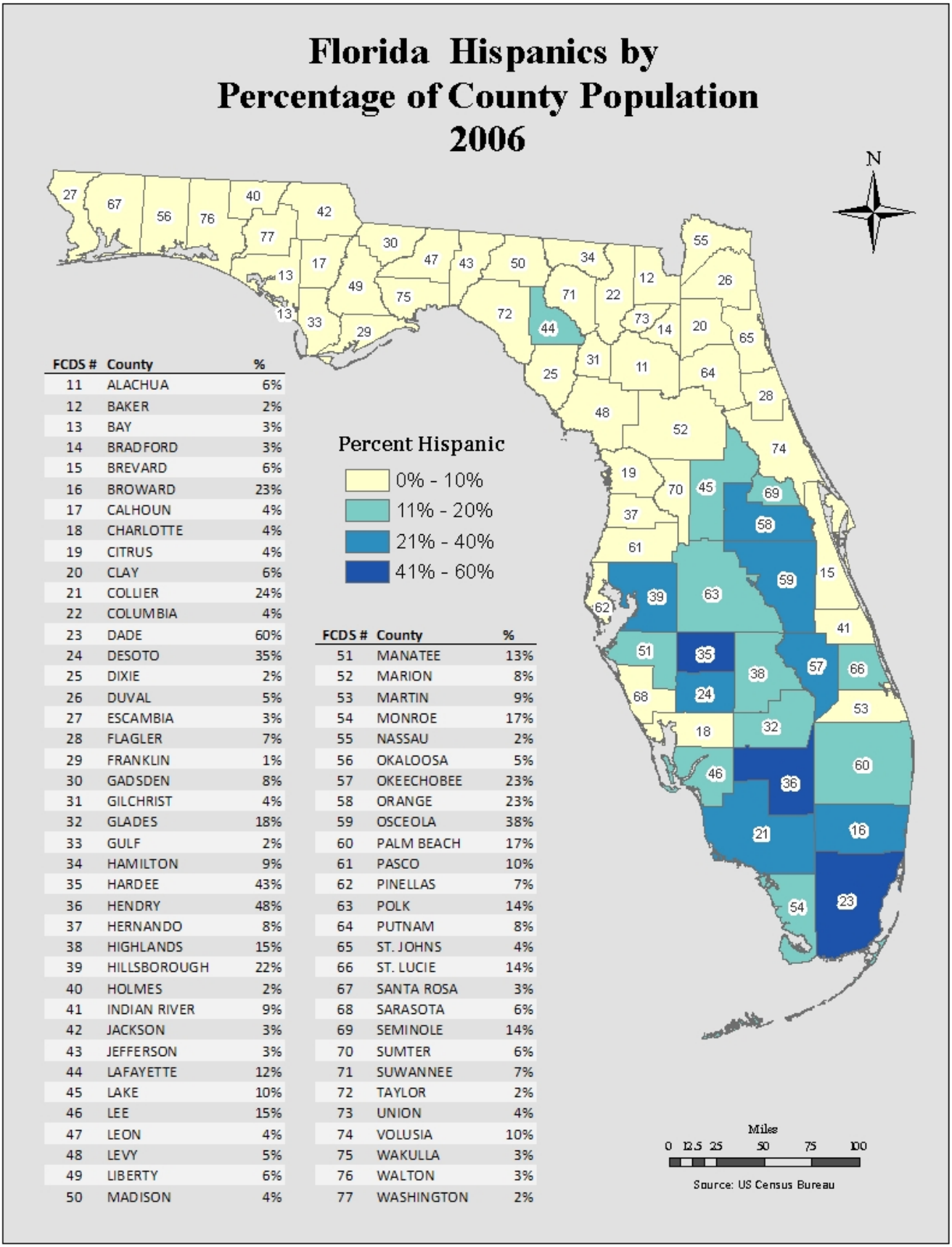
The map of Florida Hispanic age-adjusted cancer rates are displayed by county and are divided into quartiles (**Figure 3**). The age-adjusted rates are per 100,000 people and represent newly diagnosed cases between the years 2000 to 2006, pooled to provide more stable estimates than for a single year. Data for counties with

less than 11 cases are suppressed. As a result, rates for many counties in the Florida Panhandle area, which has a relatively small Hispanic population, are suppressed. Counties within the highest quartile (with rates between 500 and 820) were dispersed throughout the state, although not in the South Florida counties where the majority of Florida's Hispanics lived. Counties in the third highest quartile with rates between 430 and 490 were also distributed throughout the state with the highest number of contiguous counties located in the Central West part of Florida. Counties in the lower two quartiles were predominantly located in the Central and Southern parts of Florida.

D.1.4. Percentage of New Cancer Cases by Ethnicity and Site, 2006

Figures 4 and **5** compare the ranking of primary sites for the year 2006 with the highest proportion of cancer diagnoses in Hispanic males as compared to non-Hispanic White males, and Hispanic females as compared to non-Hispanic White females. Rankings are in order of the top non-Hispanic White cancer diagnoses. Among males, ethnic-specific cancer site rankings were similar for the top four cancers (prostate, lung and bronchus, colorectal, and head and neck). Proportionally, male Hispanics had lower cases of melanoma and bladder cancer, and slightly higher proportions of Non Hodgkin's lymphoma, liver and stomach cancer. Among non-Hispanic White females, the top five cancers consisted of cancer of the breast, lung and bronchus, colorectal, and uterus, while for Hispanic females the top five were cancers of the breast, colorectal, lung and bronchus, uterus, and thyroid. Hispanic females also had a higher proportion of cervical cancer, but a lower proportion of melanoma than did non-Hispanic White females.

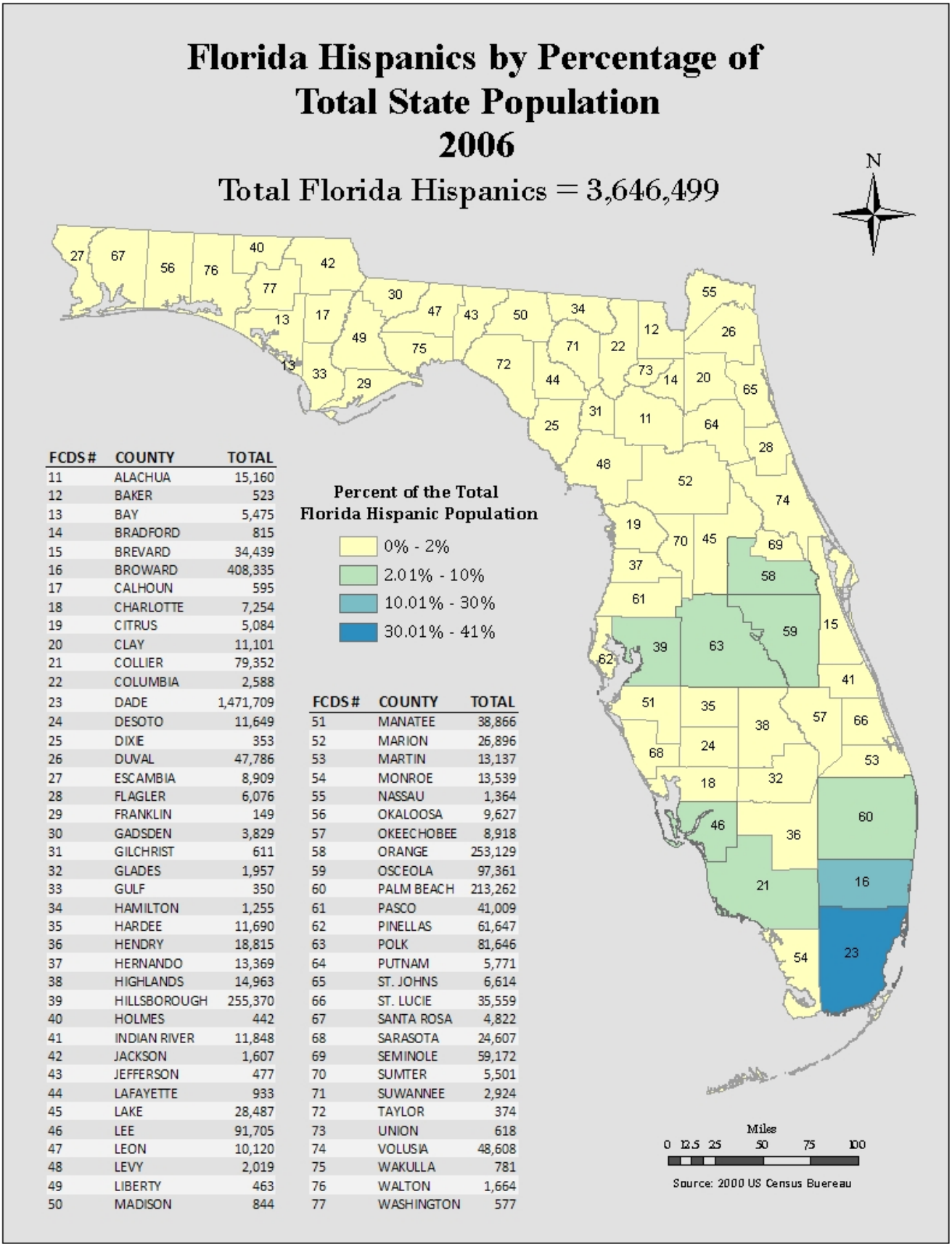
Figure 1.



FCDS #	County	%
11	ALACHUA	6%
12	BAKER	2%
13	BAY	3%
14	BRADFORD	3%
15	BREVARD	6%
16	BROWARD	23%
17	CALHOUN	4%
18	CHARLOTTE	4%
19	CITRUS	4%
20	CLAY	6%
21	COLLIER	24%
22	COLUMBIA	4%
23	DADE	60%
24	DESOTO	35%
25	DIXIE	2%
26	DUVAL	5%
27	ESCAMBIA	3%
28	FLAGLER	7%
29	FRANKLIN	1%
30	GADSDEN	8%
31	GILCHRIST	4%
32	GLADES	18%
33	GULF	2%
34	HAMILTON	9%
35	HARDEE	43%
36	HENDRY	48%
37	HERNANDO	8%
38	HIGHLANDS	15%
39	HILLSBOROUGH	22%
40	HOLMES	2%
41	INDIAN RIVER	9%
42	JACKSON	3%
43	JEFFERSON	3%
44	LAFAYETTE	12%
45	LAKE	10%
46	LEE	15%
47	LEON	4%
48	LEVY	5%
49	LIBERTY	6%
50	MADISON	4%

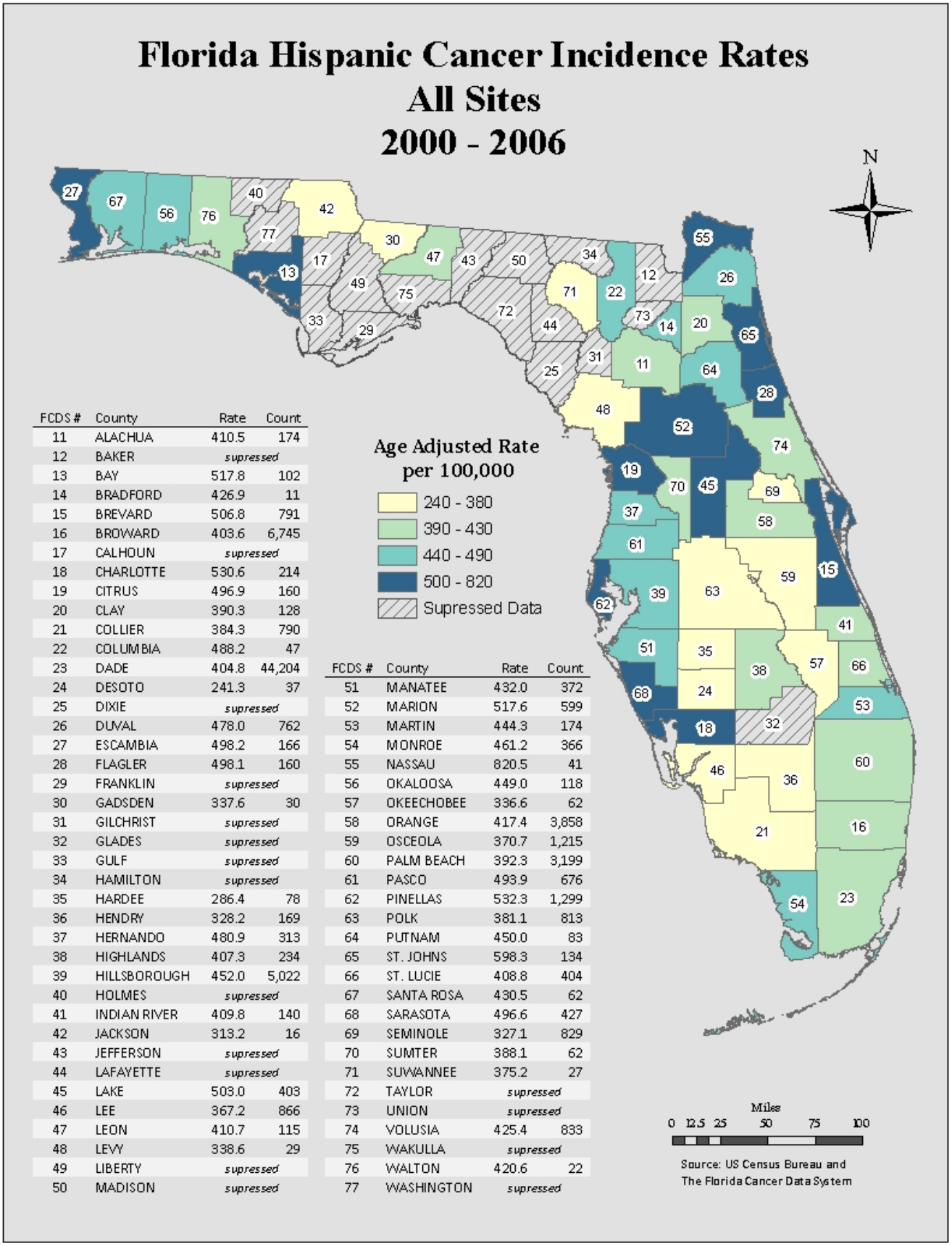
FCDS #	County	%
51	MANATEE	13%
52	MARION	8%
53	MARTIN	9%
54	MONROE	17%
55	NASSAU	2%
56	OKALOOSA	5%
57	OKEECHOBEE	23%
58	ORANGE	23%
59	OSCEOLA	38%
60	PALM BEACH	17%
61	PASCO	10%
62	PINELLAS	7%
63	POLK	14%
64	PUTNAM	8%
65	ST. JOHNS	4%
66	ST. LUCIE	14%
67	SANTA ROSA	3%
68	SARASOTA	6%
69	SEMINOLE	14%
70	SUMTER	6%
71	SUWANNEE	7%
72	TAYLOR	2%
73	UNION	4%
74	VOLUSIA	10%
75	WAKULLA	3%
76	WALTON	3%
77	WASHINGTON	2%

Figure 2.



FCDS #	COUNTY	TOTAL
11	ALACHUA	15,160
12	BAKER	523
13	BAY	5,475
14	BRADFORD	815
15	BREVARD	34,439
16	BROWARD	408,335
17	CALHOUN	595
18	CHARLOTTE	7,254
19	CITRUS	5,084
20	CLAY	11,101
21	COLLIER	79,352
22	COLUMBIA	2,588
23	DADE	1,471,709
24	DESOTO	11,649
25	DIXIE	353
26	DUVAL	47,786
27	ESCAMBIA	8,909
28	FLAGLER	6,076
29	FRANKLIN	149
30	GADSDEN	3,829
31	GILCHRIST	611
32	GLADES	1,957
33	GULF	350
34	HAMILTON	1,255
35	HARDEE	11,690
36	HENDRY	18,815
37	HERNANDO	13,369
38	HIGHLANDS	14,963
39	HILLSBOROUGH	255,370
40	HOLMES	442
41	INDIAN RIVER	11,848
42	JACKSON	1,607
43	JEFFERSON	477
44	LAFAYETTE	933
45	LAKE	28,487
46	LEE	91,705
47	LEON	10,120
48	LEVY	2,019
49	LIBERTY	463
50	MADISON	844
51	MANATEE	38,866
52	MARION	26,896
53	MARTIN	13,137
54	MONROE	13,539
55	NASSAU	1,364
56	OKALOOSA	9,627
57	OKEECHOBEE	8,918
58	ORANGE	253,129
59	OSCEOLA	97,361
60	PALM BEACH	213,262
61	PASCO	41,009
62	PINELLAS	61,647
63	POLK	81,646
64	PUTNAM	5,771
65	ST. JOHNS	6,614
66	ST. LUCIE	35,559
67	SANTA ROSA	4,822
68	SARASOTA	24,607
69	SEMINOLE	59,172
70	SUMTER	5,501
71	SUWANNEE	2,924
72	TAYLOR	374
73	UNION	618
74	VOLUSIA	48,608
75	WAKULLA	781
76	WALTON	1,664
77	WASHINGTON	577

Figure 3.



FCDS #	County	Rate	Count
11	ALACHUA	410.5	174
12	BAKER	*supressed*	
13	BAY	517.8	102
14	BRADFORD	426.9	11
15	BREVARD	506.8	791
16	BROWARD	403.6	6,745
17	CALHOUN	*supressed*	
18	CHARLOTTE	530.6	214
19	CITRUS	496.9	160
20	CLAY	390.3	128
21	COLLIER	384.3	790
22	COLUMBIA	488.2	47
23	DADE	404.8	44,204
24	DESOTO	241.3	37
25	DIXIE	*supressed*	
26	DUVAL	478.0	762
27	ESCAMBIA	498.2	166
28	FLAGLER	498.1	160
29	FRANKLIN	*supressed*	
30	GADSDEN	337.6	30
31	GILCHRIST	*supressed*	
32	GLADES	*supressed*	
33	GULF	*supressed*	
34	HAMILTON	*supressed*	
35	HARDEE	286.4	78
36	HENDRY	328.2	169
37	HERNANDO	480.9	313
38	HIGHLANDS	407.3	234
39	HILLSBOROUGH	452.0	5,022
40	HOLMES	*supressed*	
41	INDIAN RIVER	409.8	140
42	JACKSON	313.2	16
43	JEFFERSON	*supressed*	
44	LAFAYETTE	*supressed*	
45	LAKE	503.0	403
46	LEE	367.2	866
47	LEON	410.7	115
48	LEVY	338.6	29
49	LIBERTY	*supressed*	
50	MADISON	*supressed*	

FCDS #	County	Rate	Count
51	MANATEE	432.0	372
52	MARION	517.6	599
53	MARTIN	444.3	174
54	MONROE	461.2	366
55	NASSAU	820.5	41
56	OKALOOSA	449.0	118
57	OKEECHOBEE	336.6	62
58	ORANGE	417.4	3,858
59	OSCEOLA	370.7	1,215
60	PALM BEACH	392.3	3,199
61	PASCO	493.9	676
62	PINELLAS	532.3	1,299
63	POLK	381.1	813
64	PUTNAM	450.0	83
65	ST. JOHNS	598.3	134
66	ST. LUCIE	408.8	404
67	SANTA ROSA	430.5	62
68	SARASOTA	496.6	427
69	SEMINOLE	327.1	829
70	SUMTER	388.1	62
71	SUWANNEE	375.2	27
72	TAYLOR	*supressed*	
73	UNION	*supressed*	
74	VOLUSIA	425.4	833
75	WAKULLA	*supressed*	
76	WALTON	420.6	22
77	WASHINGTON	*supressed*	

Figure 4.

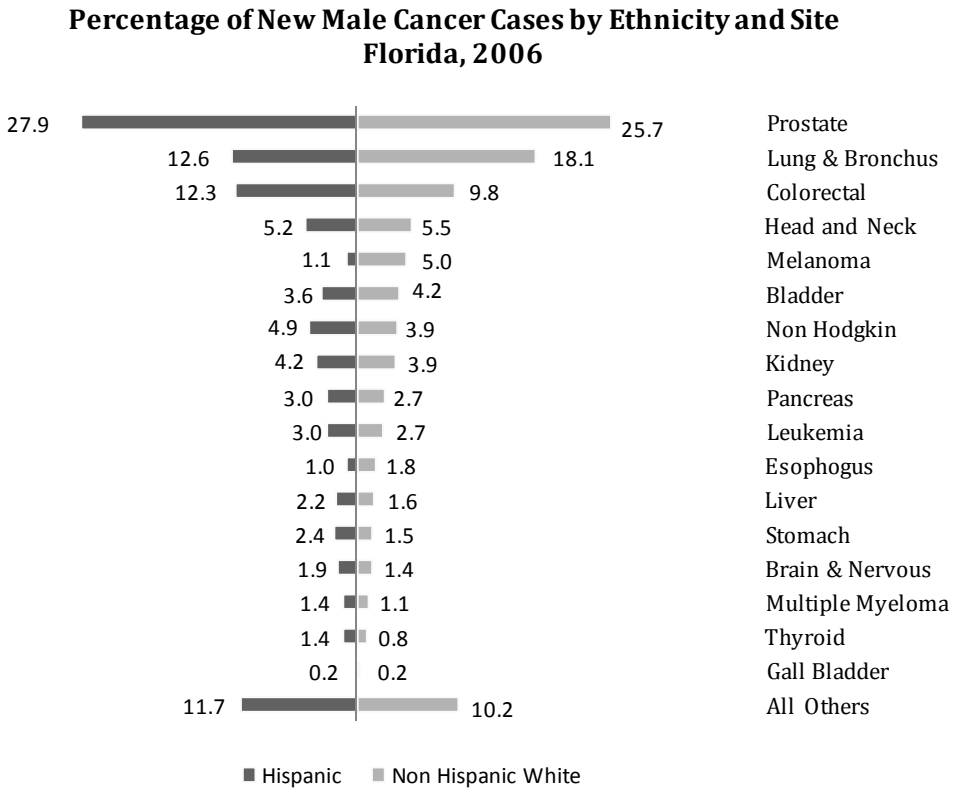
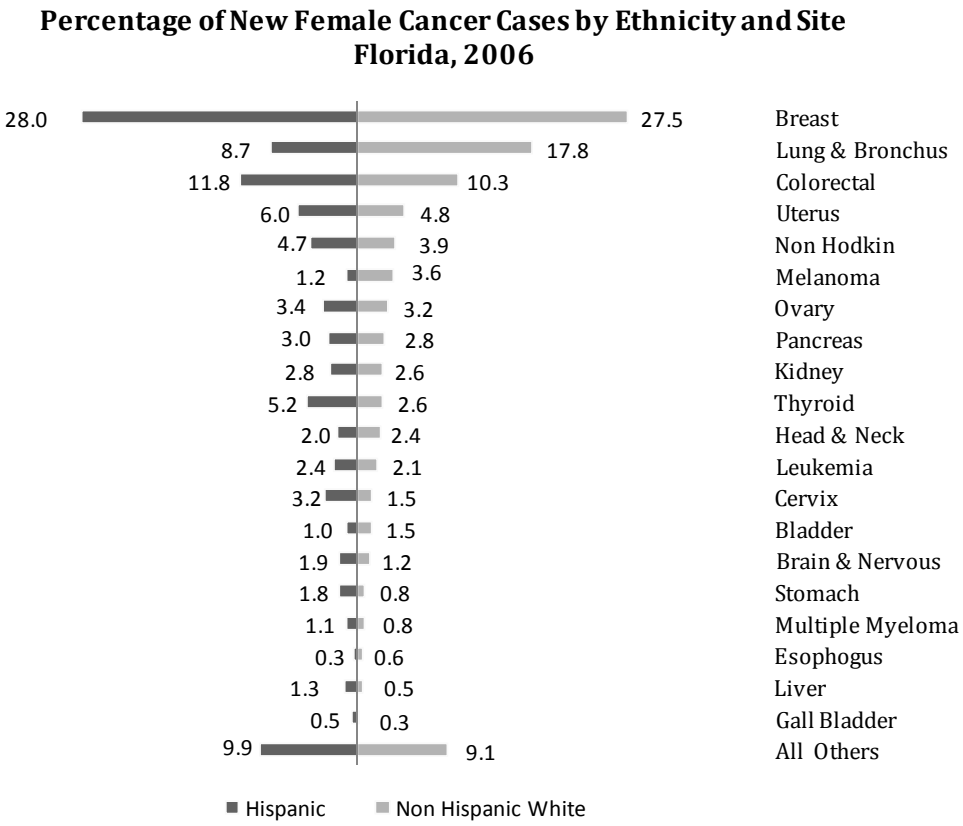


Figure 5.



D.2. Trends Top Hispanic Cancers Joinpoint Results

The following are the results of the Joinpoint analyses of the rates of the Top Hispanic Cancers over the 1989-2006 time period comparing Hispanic males and females to non-Hispanic White males and females by each cancer and by stage of that cancer. The overall statistical significance was set to $\rho < 0.05$, and a maximum of three joinpoints and four line segments was allowed for each model. While all joinpoints presented in the following graphs are statistically significant, meaning there is a significant shift in the rate of cancer at a given point in time, the slope between joinpoints or the Annual Percent Change (APC), may not be significantly different from zero, as indicated in the graphs. For each cancer, there are figures illustrating the Joinpoint analysis described in the text. These descriptions are in reference to observed changes in slopes, but not to the statistical significance of APC figures. Statistical significance of APC figures are documented in tables located on the FCDS Website and indicated with a symbol on the graph next to corresponding trend lines. Differences in APCs between groups were not evaluated. Tables of both the observed and modeled joinpoint rates are also available on the FCDS Website (http://fcds.med.miami.edu/inc/statistics.shtml).

When evaluating Joinpoint analyses, decreasing trends of cancer rates are represented by downward sloping trend lines between the start of the analysis period in 1989 and the end in 2006, while upward sloping trend lines represent increasing trends in cancer rates. In some cases, there will be variable trends (e.g. initially increasing and then decreasing, or vice versa) over the entire time interval. Year specific rates reported in the text represent the observed rate, whereas Joinpoint graphs depict the predicted rate. While summaries of each cancer are described by Joinpoint trends over the entire study period, the 2006 observed rates are also included in the text to highlight the most current figures. When comparing cancer rates between Hispanics and non-Hispanic Whites, health disparities can be demonstrated when either the rate of one group is decreasing while the other is increasing or remaining stable, or when the rate of decrease is different between the two groups. With regards to stage at diagnosis comparisons, health disparities would be demonstrated if there are increasing rates of persons diagnosed at distant and regional stage and/or decreasing rates of persons diagnosed at local stage since, in general, early diagnosis of cancer is associated with decreased morbidity and mortality. In particular, early diagnosis at a local stage is the anticipated goal for all screenable cancers (such as breast, colorectal, prostate, and cervical cancers). A particular issue for Hispanics is the unusually high levels of "Not Otherwise Specified (NOS)" cancers with regards to stage. Studies have shown that un-staged NOS cancer cases are more likely to occur among the elderly, minority populations, patients with lower levels of education and income, and those with a history of Medicaid or Medicare enrollment.[37-39] Lack of staging information suggests that patients did not receive full diagnostic evaluations, which inhibit disease management and outcome of care assessments. Therefore, constant or increasing rates of NOS cancers can be indications of health disparities.

D.2.1. All Cancers

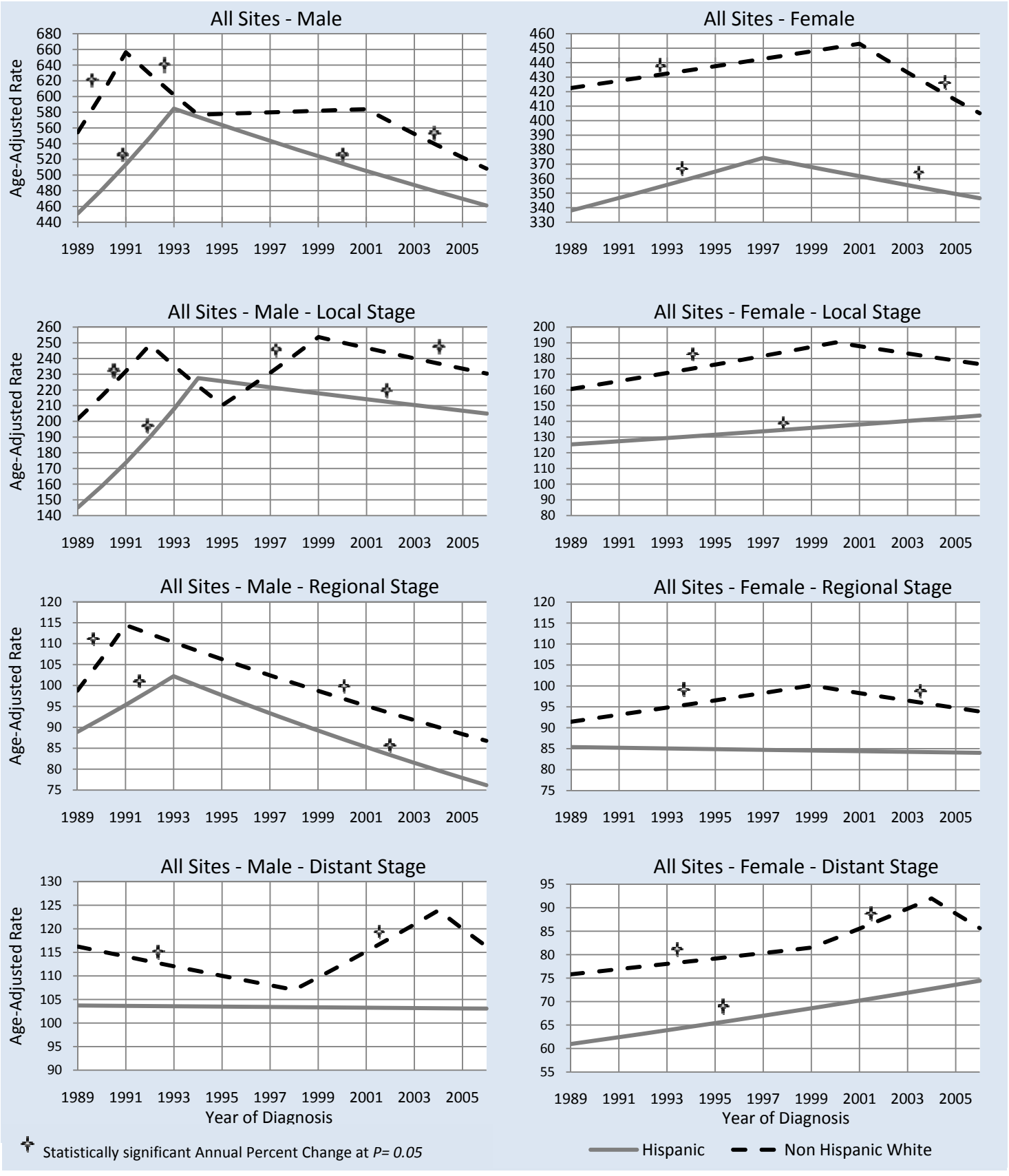
a) All cancers: Hispanic vs. non-Hispanic White by gender

The highest age-adjusted overall cancer rates in 2006 were found in non-Hispanic White males (512 cases/100,000 persons), followed by Hispanic males (448 cases/100,000), then non-Hispanic White females (406 cases/100,000), and Hispanic females (346 cases/100,000). For all cancers, males had higher rates of cancer than females, regardless of ethnicity throughout the 1989-2006 time period. In general, for both Hispanics and non-Hispanic Whites, after an initial increase in the first few years, there were decreasing trends in overall cancer rates over time. There was some indication of health disparities in that the decrease in cancer rates was greater for both non-Hispanic White males and females compared to Hispanic males and females for all cancers.

b) Stage: local, regional, distant: Hispanic vs. non-Hispanic White by gender

Again after an initial increase, there was a decreasing trend in the rates of persons diagnosed at local and regional stage which was greater for non-Hispanic Whites compared to Hispanics; distant stage diagnosis rates increased for non-Hispanic Whites and Hispanic females over the time period. The trends of persons diagnosed as NOS decreased for all cancers for both Hispanics and non-Hispanic Whites, but with a greater decrease for non-Hispanic Whites.

Figure 6. Hispanic and non-Hispanic Joinpoint Incidence Trends, All Cancers by Sex and Stage, 1986-2006

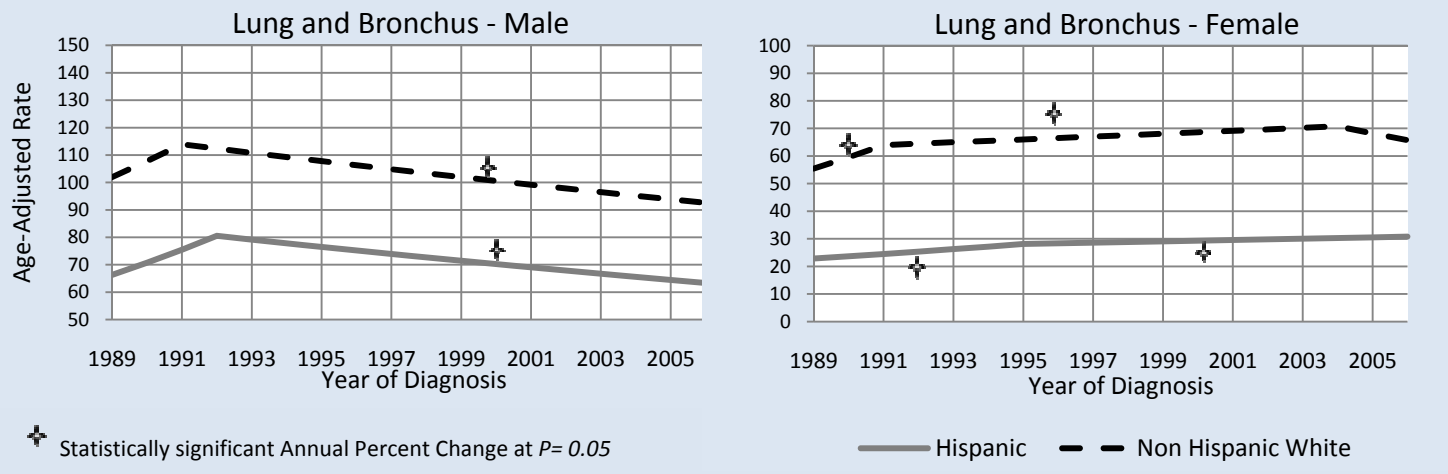


D.2.2. Lung and Bronchus Cancer

a) All lung and bronchus cancers: Hispanic vs. non-Hispanic White by gender

Overall throughout the time period, the age-adjusted rates of lung and bronchus cancer were substantially greater for non-Hispanic White males (2006: 89 cases/100,000) and females (2006: 66 cases/100,000) compared to Hispanic males (2006: 59 cases/100,000) and females (2006: 31 cases/100,000). Initially during this time period, Hispanic and non-Hispanic White males and females experienced increasing trends in the rates of lung and bronchus cancer. However, by the second half of the time period, non-Hispanic White and Hispanic males experienced decreasing rates, while non-Hispanic White and Hispanic females had a substantially slower or no decrease in rates.

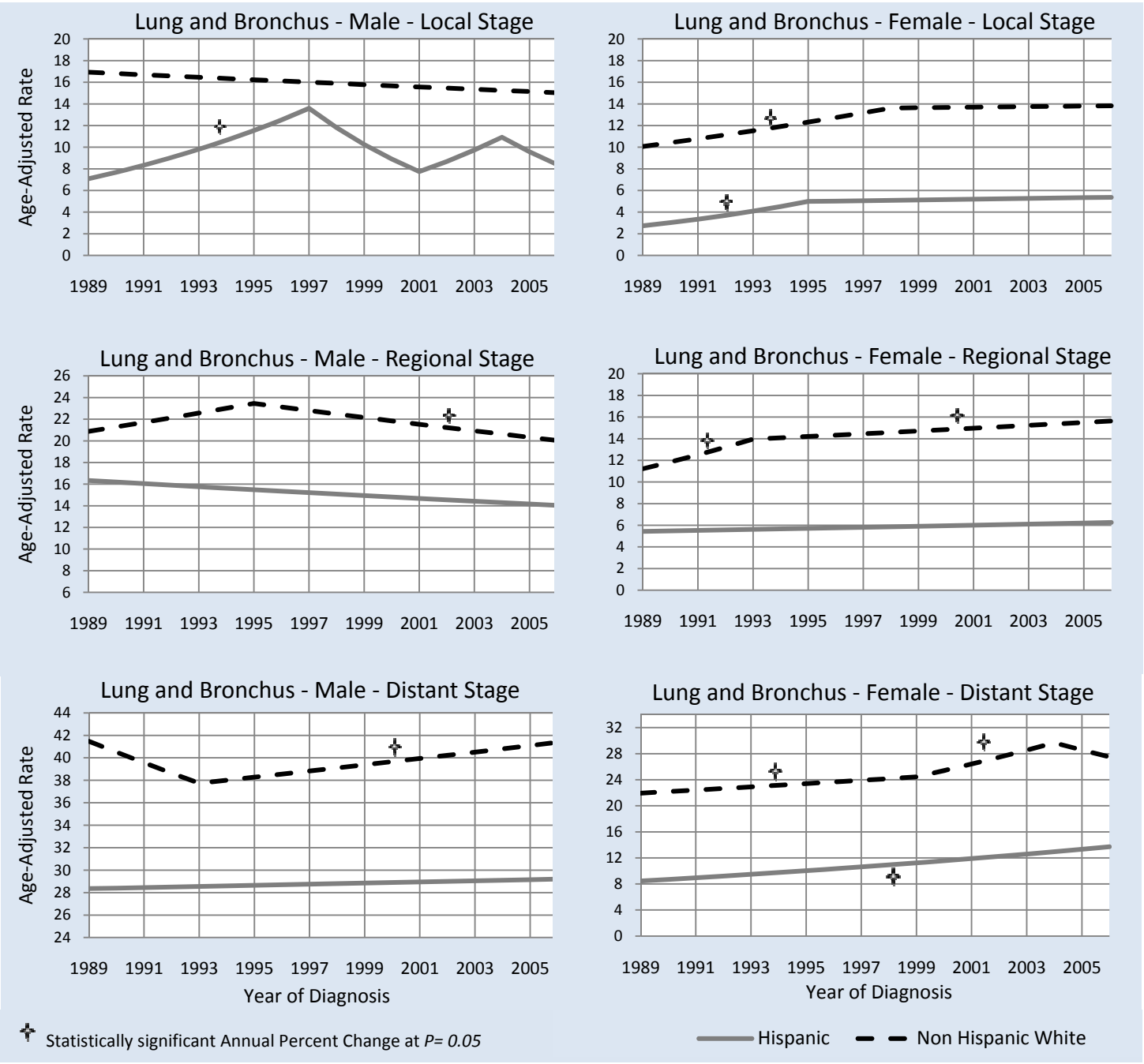
Figure 7. Hispanic and non-Hispanic Joinpoint Incidence Trends, Lung & Bronchus Cancer by Sex, 1986-2006



b) Lung and bronchus cancer stage: local, regional, distant: Hispanic vs. non-Hispanic White by gender

Irrespective of gender and stage, Hispanics had lower rates of lung cancer relative to non-Hispanic Whites. There was a marked increase early in the time period for Hispanic males and females and non-Hispanic White females in diagnosis at the local stage, which had slowed for both female subpopulations and become a decreasing trend for Hispanic males by the end of the time period. There were slight increases for both Hispanic and non-Hispanic White females at the regional stage. Non-Hispanic White males had a gradual decrease in local and regional diagnosis over the time period as did Hispanic males at regional stage. Diagnosis of distant stage increased slightly among all subpopulations following a brief decline among non-Hispanic White males. The rates of persons diagnosed as NOS decreased for both Hispanics and non-Hispanic Whites, but with a greater decrease for non-Hispanic White and Hispanic females.

Figure 8. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Lung & Bronchus Cancer by Sex and Stage, 1986-2006



D.2.3. Prostate Cancer (males only)

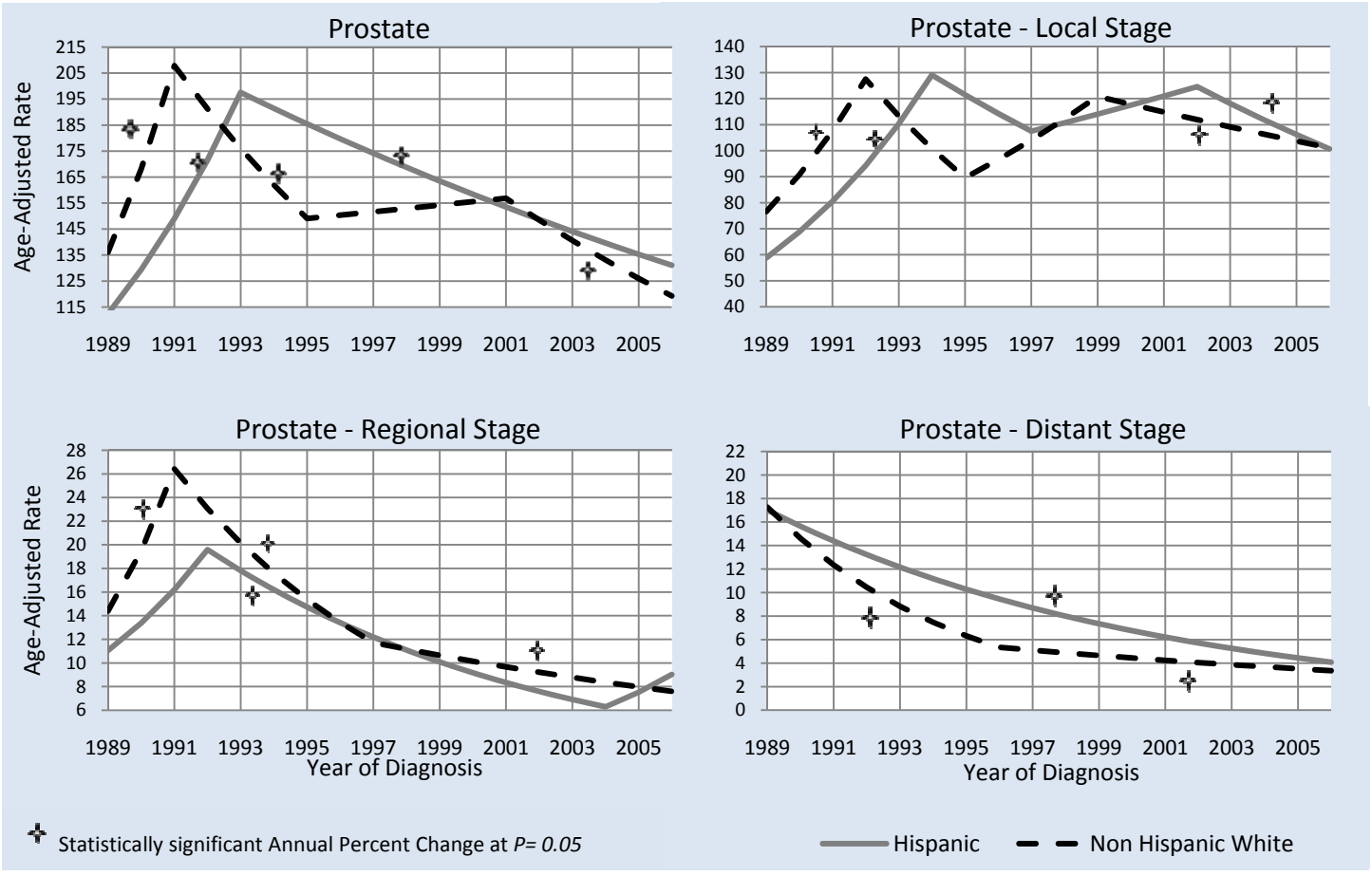
a) All prostate cancers: Hispanic vs. non-Hispanic White males

Overall throughout the time period, the age-adjusted rates of prostate cancer were similar for non-Hispanic White males (2006: 128 cases/100,000) compared to Hispanic males (2006: 128 cases/100,000). Both non-Hispanic White and Hispanic males had substantial increases in prostate cancer at the beginning of the time period, possibly associated with the increased use of PSA as a prostate cancer screening tool. However by the early 1990s, substantial decreases in the prostate cancer trends occurred for both non-Hispanic White and Hispanic males, starting somewhat earlier for non-Hispanic White males.

b) Prostate cancer stage: local, regional, distant: Hispanic vs. non-Hispanic White males

Over the time period, the rates of local prostate cancer variably increased and decreased, ultimately decreasing for both non-Hispanic White and Hispanic males with marked decreases in the regional and distant stage rates, possibly indicating increased early screening for this cancer. Although the rates of persons diagnosed as NOS initially increased for both Hispanics and non-Hispanic Whites, by the end of the time period there were substantial decreases in these rates for both subpopulations.

Figure 9. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Prostate Cancer by Stage, 1986-2006



D.2.4. Breast Cancer (females only)

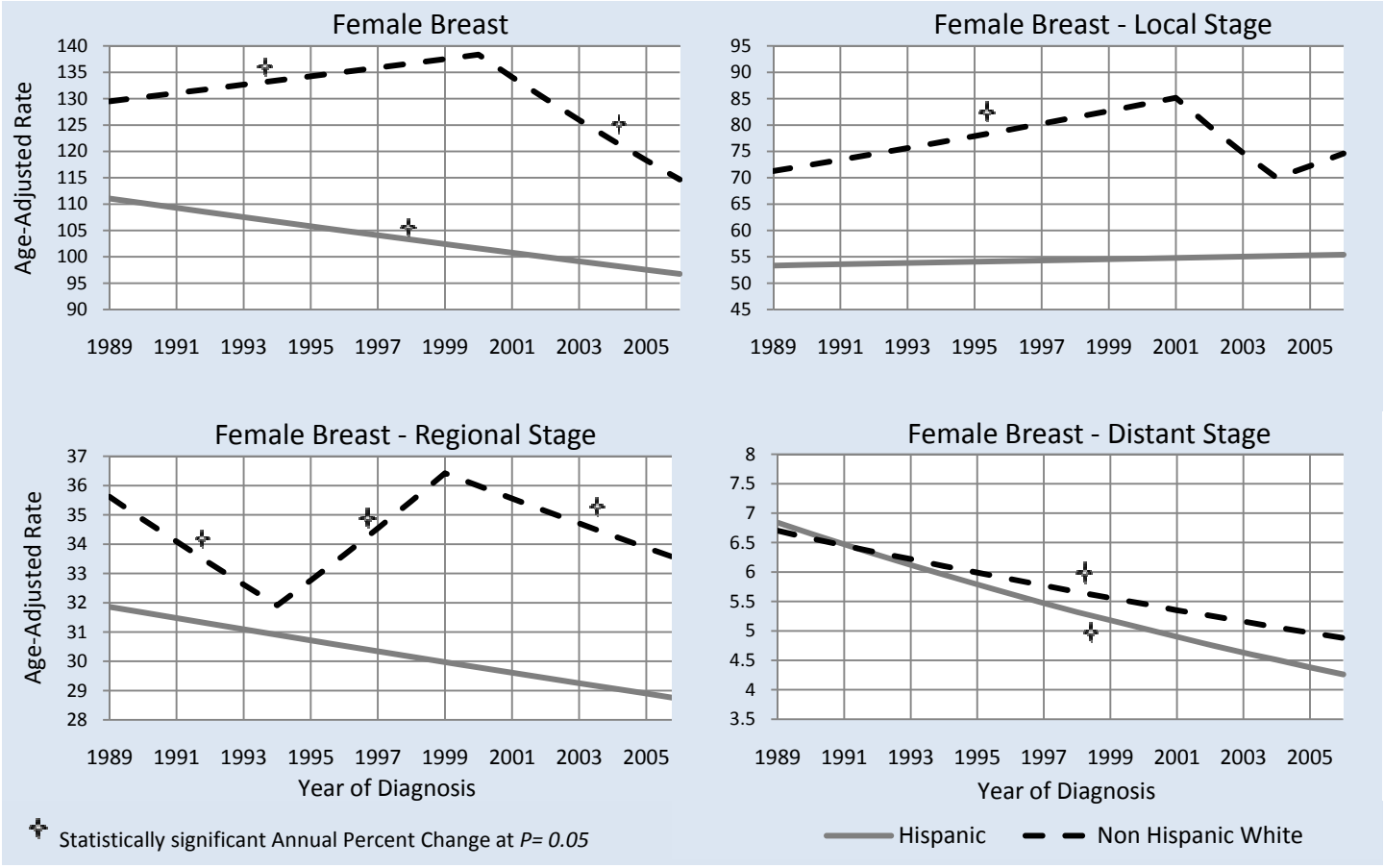
a) All breast cancers: Hispanic vs. non-Hispanic White females

Throughout the time period, the age-adjusted rates of breast cancer were substantially greater for non-Hispanic White females (2006: 118 cases/100,000) compared to Hispanic females (2006: 97 cases/100,000). Over the time period, the breast cancer rate decreased for both Hispanic and non-Hispanic White females, with the largest decrease among non-Hispanic White females.

b) Breast cancer stage: local, regional, distant: Hispanic vs. non-Hispanic White females

Over the time period, both non-Hispanic White and Hispanic females were decreasingly diagnosed at distant and regional stage, and increasingly diagnosed at a local stage particularly for non-Hispanic White females, possibly indicating increased early screening for this cancer. The rates of persons diagnosed as NOS decreased substantially for both Hispanics and non-Hispanic White females throughout the time period.

Figure 10. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Breast Cancer by Stage, 1986-2006

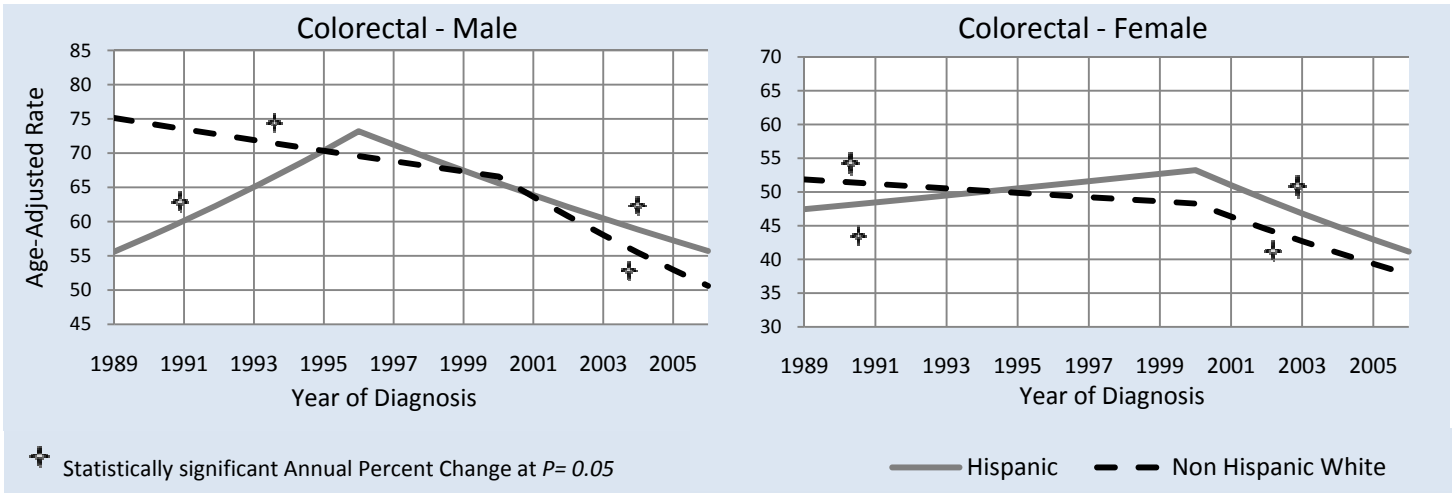


D.2.5. Colorectal Cancer

a) All colorectal cancers: Hispanic vs. non-Hispanic White by gender

The age-adjusted rates of colorectal cancer changed substantially over the time period, ultimately Hispanic males had the highest rates (2006: 56 cases/100,000) compared to non-Hispanic White males (2006: 50 cases/100,000), and Hispanic females had the highest rates (2006: 41 cases/100,000) compared to non-Hispanic White females (2006: 37 cases/100,000). Over the time period, although initially both male and female Hispanics had an increase in cancer trends, there were overall decreases in colorectal cancer trends for both Hispanic and non-Hispanic Whites. The increase in rates for Hispanic males was particularly large from 1989-1996 eliminating the lower relative difference in rates with non-Hispanic males.

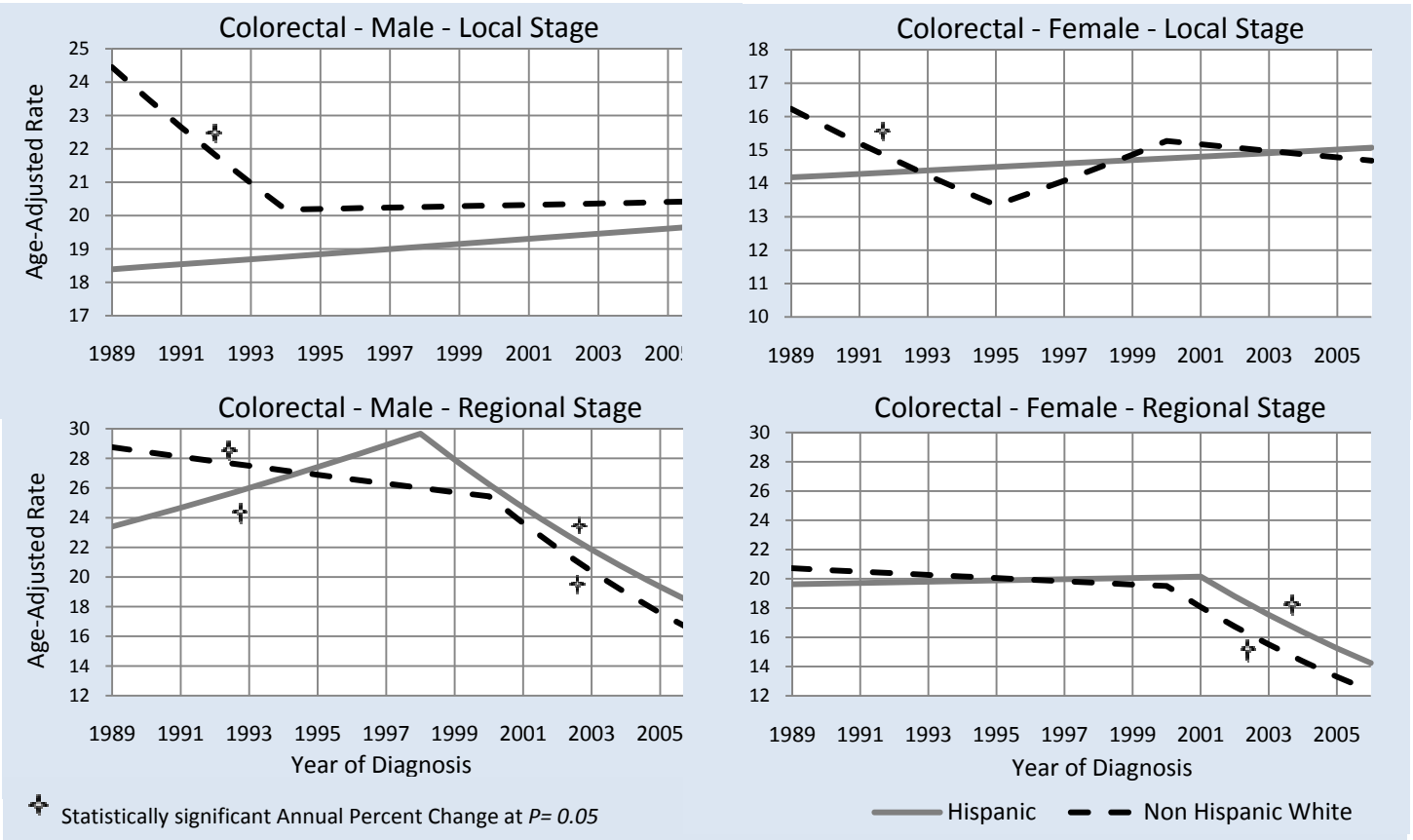
Figure 11. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Colorectal Cancer by Sex, 1986-2006

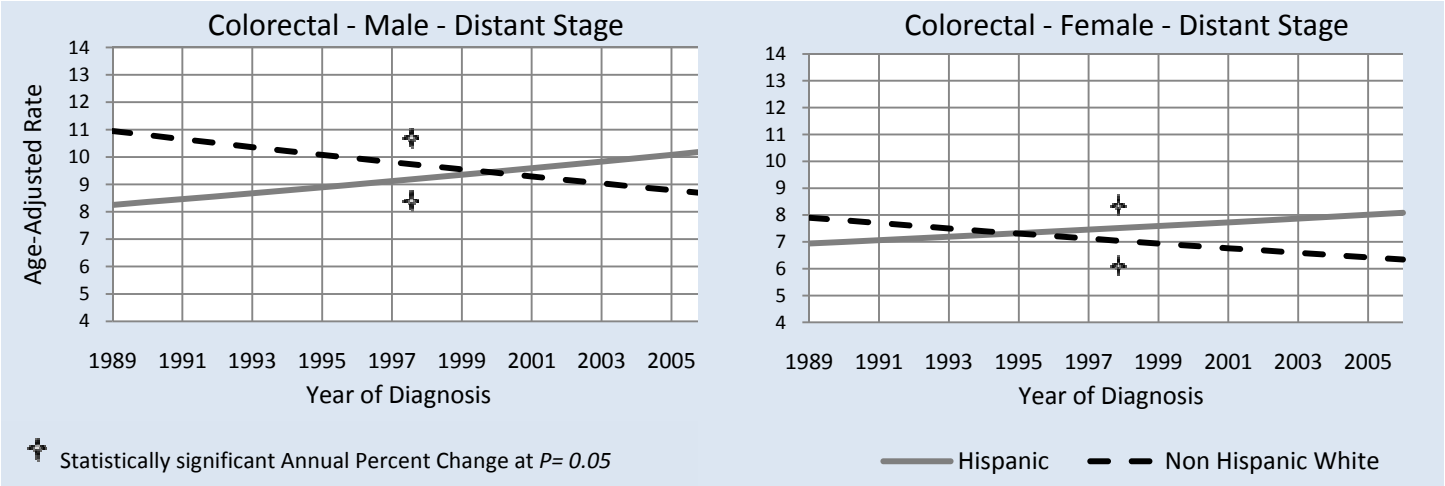


b) Colorectal stage: local, regional, distant: Hispanic vs. non-Hispanic White by gender

Over the time period, both non-Hispanic White and Hispanic males and females were decreasingly diagnosed at regional stage, while the rates of local stage diagnosis mildly increased in all populations towards the end of the time period, possibly indicating a positive screening effect. Hispanic females and males appeared to have increasing rates of diagnosis at distant stage, while non-Hispanics experienced decreasing distant stage diagnoses indicating a possible growing health disparity. Ultimately, the rates of persons diagnosed as NOS decreased substantially for both Hispanics and non-Hispanic White males and females throughout the time period.

Figure 12. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Colorectal Cancer by Sex and Stage, 1986-2006



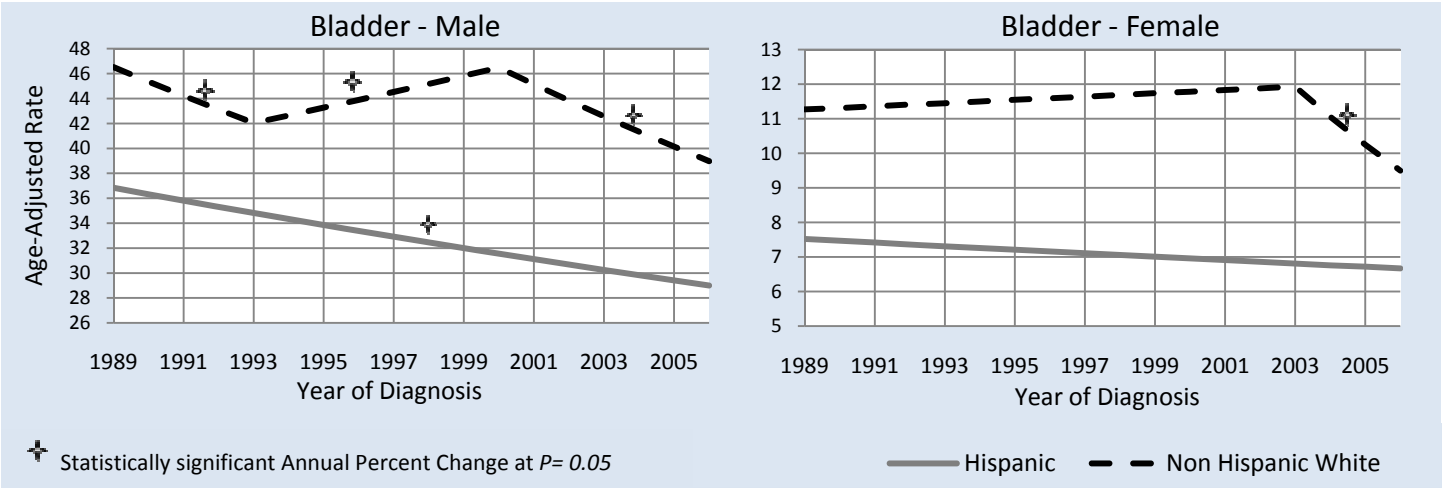


D.2.6. Bladder Cancer (including in situ)

a) All bladder cancers: Hispanic vs. non-Hispanic White by gender

Overall throughout the time period, the age adjusted rates of bladder cancer were substantially greater for non-Hispanic White males (2006: 38 cases/100,000) and females (2006: 10 cases/100,000) compared to Hispanic males (2006: 25 cases/100,000) and females (2006: 5 cases/100,000). Bladder cancer trends decreased among both male and female Hispanics throughout the time period. Despite some variability in trend, ultimately bladder cancer rates decreased among both male and female non-Hispanic Whites.

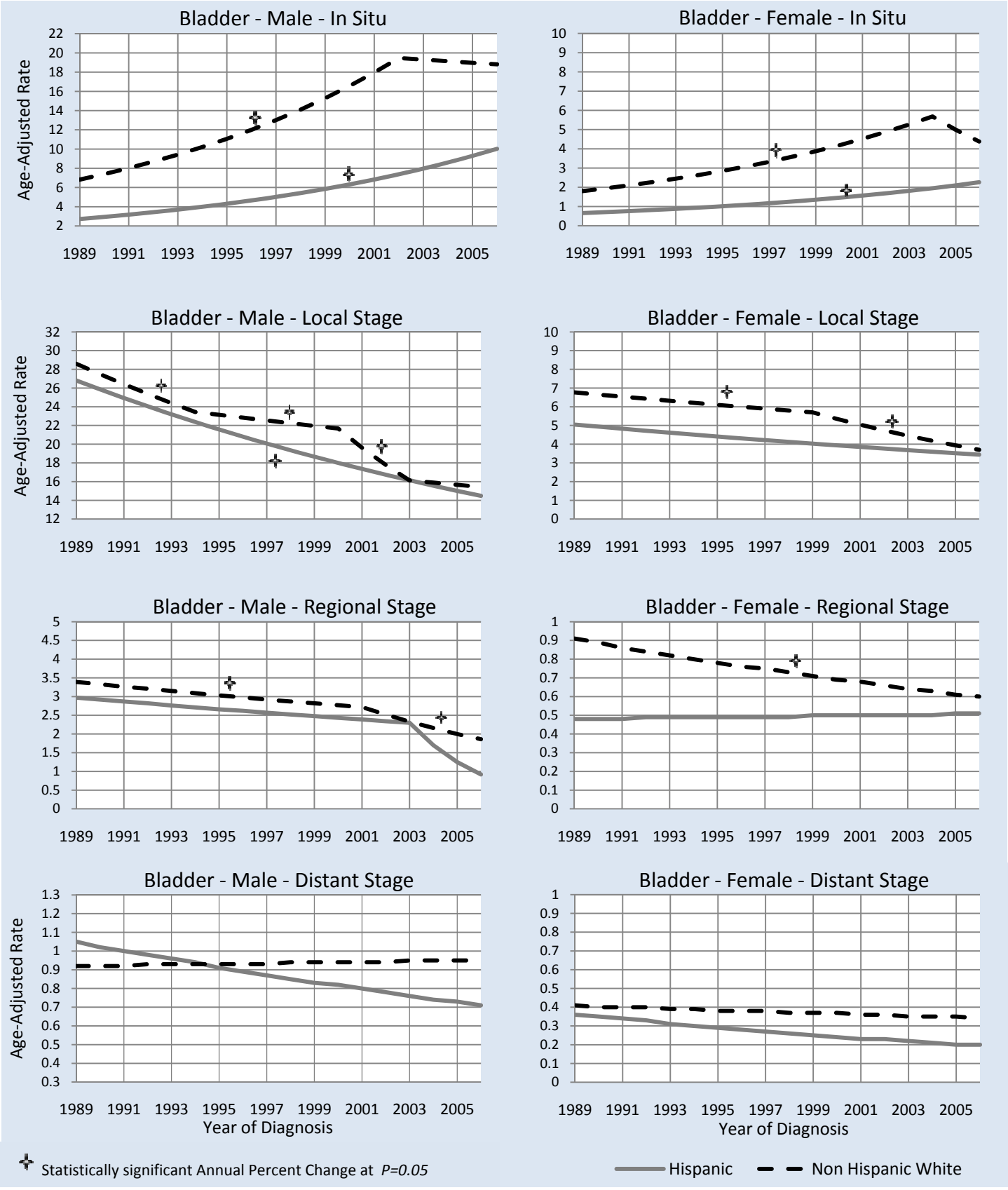
Figure 13. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Bladder Cancer by Sex, 1986-2006



b) Bladder cancer stage: in situ local, regional, distant: Hispanic vs. non-Hispanic White by gender

Over the time period, both Hispanic males and females were increasingly diagnosed at in situ stage with decreased diagnosis at all other stages; non-Hispanic White males and females experienced a similar increasing trend at the beginning of the time period with a decrease in early diagnosis towards the end of the time period particularly for non-Hispanic White females. Regional diagnosis rates decreased for all subgroups except for Hispanic females. There were greater relative reductions in distant diagnoses seen among Hispanic males relative to non-Hispanic White males who saw no change in rates over the time period. Hispanic females also experienced greater reductions in the rate of distant bladder cancer relative to non-Hispanic White females. Ultimately, the rates of persons diagnosed as NOS decreased substantially for both Hispanics and non-Hispanic White males and females throughout the time period.

Figure 14. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Bladder Cancer by Sex and Stage, 1986-2006

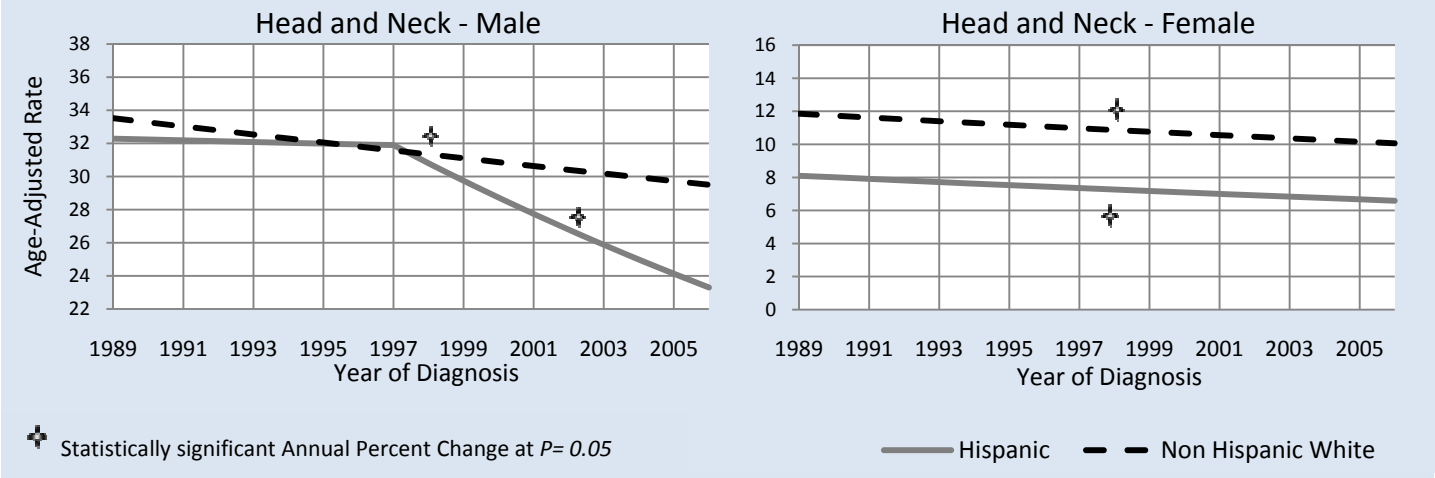


D.2.7. Head and Neck Cancer

a) All head and neck cancers: Hispanic vs. non-Hispanic White by gender

Overall throughout the time period, the age-adjusted rates of head and neck cancer were greater for non-Hispanic White males (2006: 29 cases/100,000) and females (2006: 10 cases/100,000) compared to Hispanic males (2006: 23 cases/100,000) and females (2006: 7 cases/100,000). Over the time period, there was an overall decrease in head and neck cancer trends for both Hispanic and non-Hispanic Whites, with a dramatic reduction in rates noted for Hispanic males which started around 1998.

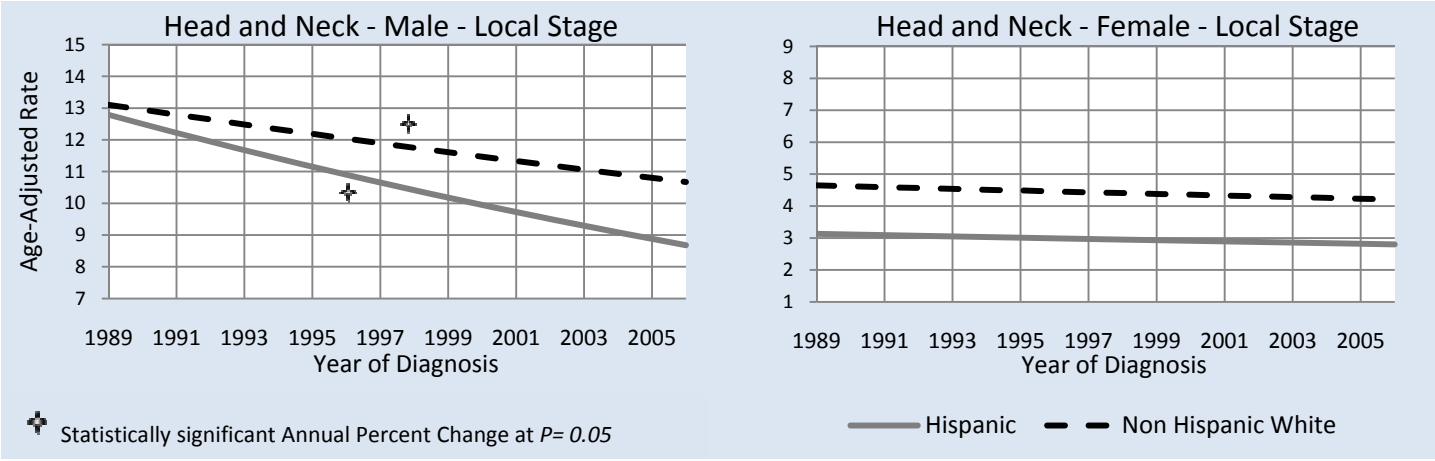
Figure 15. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Head & Neck Cancer by Sex, 1986-2006

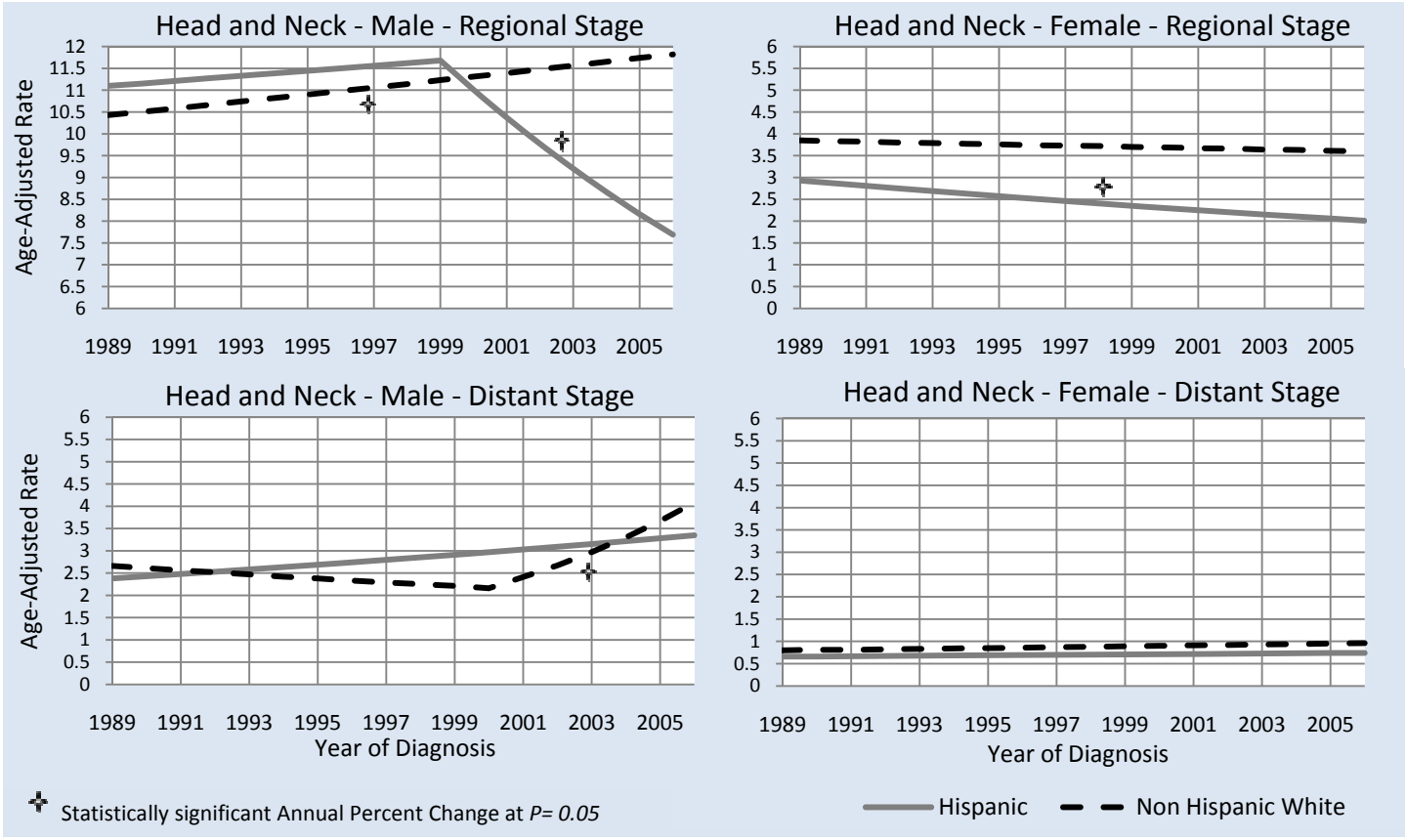


b) Head and neck cancer stage: local, regional, distant: Hispanic vs. non-Hispanic White by gender

Over the time period, the overall trend was decreasing diagnosis at local stage; additionally non-Hispanic White females and Hispanic males and females were decreasingly diagnosed at regional stage. However, non-Hispanic White and Hispanic males had increasing rates of distant stage diagnosis over the time period. Ultimately, the rates of persons diagnosed as NOS decreased for both Hispanics and non-Hispanic White males and females throughout the time period, particularly for Hispanic males.

Figure 16. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Head & Neck Cancer by Sex and Stage, 1986-2006



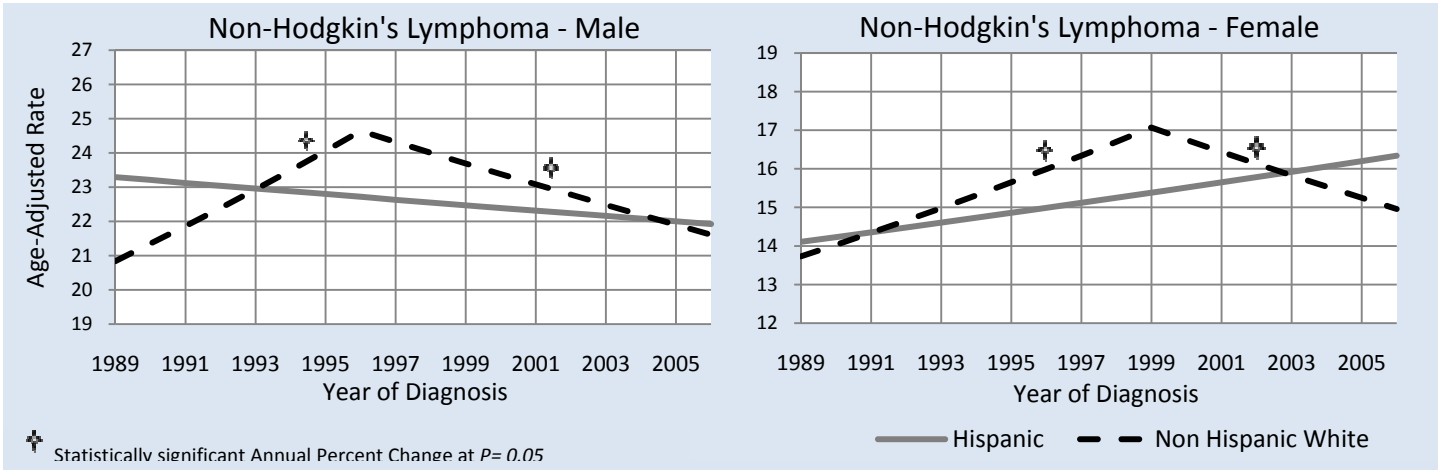


D.2.8. Non Hodgkin's Lymphoma (NHL)

a) All non Hodgkin's lymphoma cancers: Hispanic vs. non-Hispanic White by gender

Overall, the age-adjusted rates of non Hodgkin's lymphoma cancer were variable throughout the time period. Ultimately, however the rates were similar for Hispanic Males (2006: 21 cases/100,000) and non-Hispanic White males (2006: 21 cases/100,000), as well as for non-Hispanic White females (2006: 15 cases/100,000) and Hispanic females (2006: 16 cases/100,000). Over the time period, Hispanic males had decreasing trends in Non Hodgkin's lymphoma, while after initial increasing trends, non-Hispanic White males and females also ultimately had decreasing rates of non Hodgkin's lymphoma. However, Hispanic females experienced increasing trends throughout the time period.

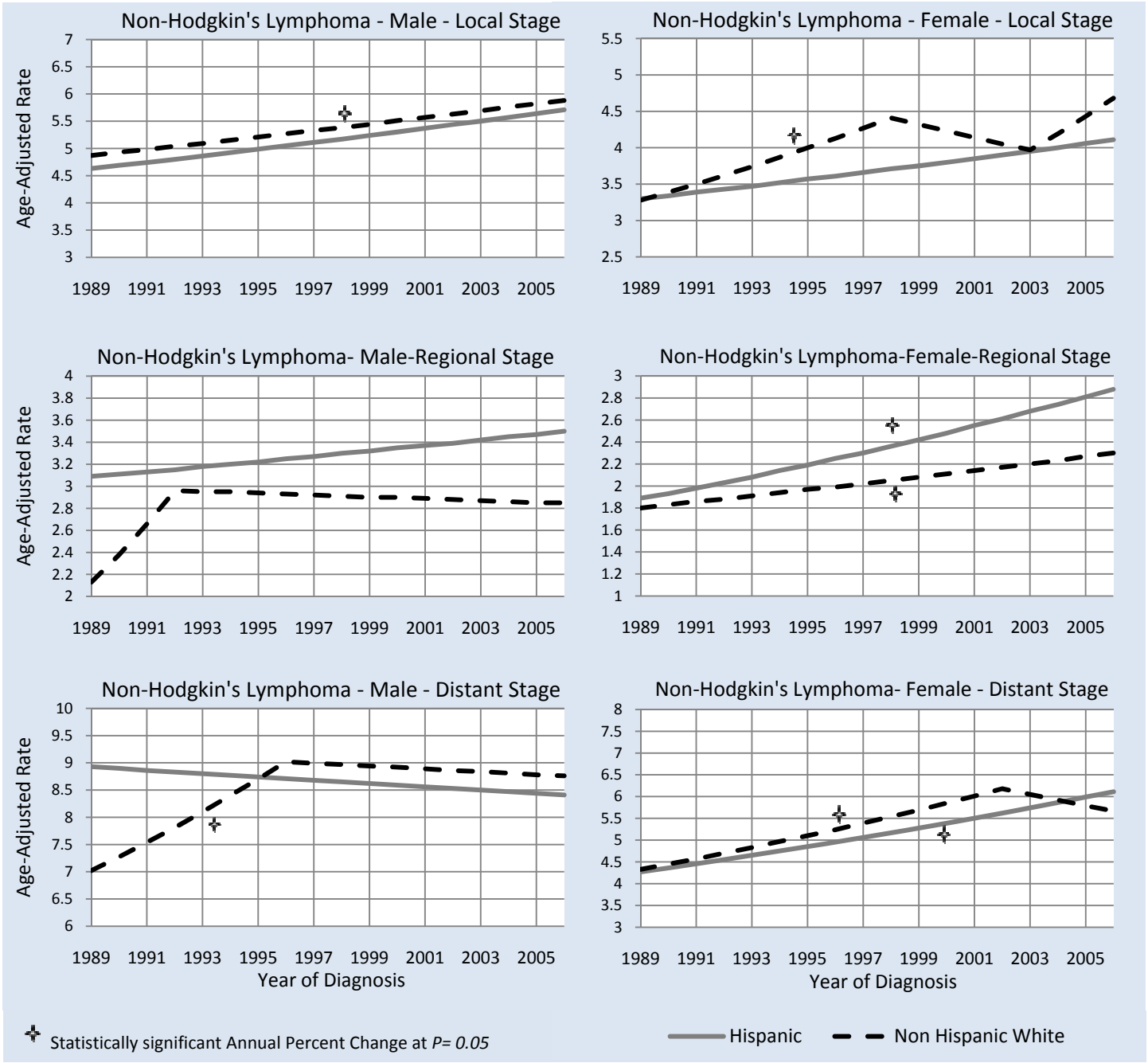
Figure 17. Hispanic vs non-Hispanic Joinpoint Incidence Trends, NHL Cancer by Sex, 1986-2006



Hodgkin's lymphoma stage: local, regional, distant: Hispanic vs. non-Hispanic White by gender

Over the time period, both non-Hispanic White and Hispanic males and females were increasingly diagnosed at local and regional stages. While initially there was an increase in distant stage Non Hodgkin's lymphoma for non-Hispanic White males, there is a general decrease for both non-Hispanic White and Hispanic males throughout the time period. Hispanic and non-Hispanic White females were increasingly diagnosed at distant stage during this time period. The trends of persons diagnosed as NOS decreased for both Hispanics and non-Hispanic White males and females throughout the time period, particularly for non-Hispanic White males and females.

Figure 18. Hispanic vs non-Hispanic Joinpoint Incidence Trends, NHL Cancer by Sex and Stage, 1986-2006

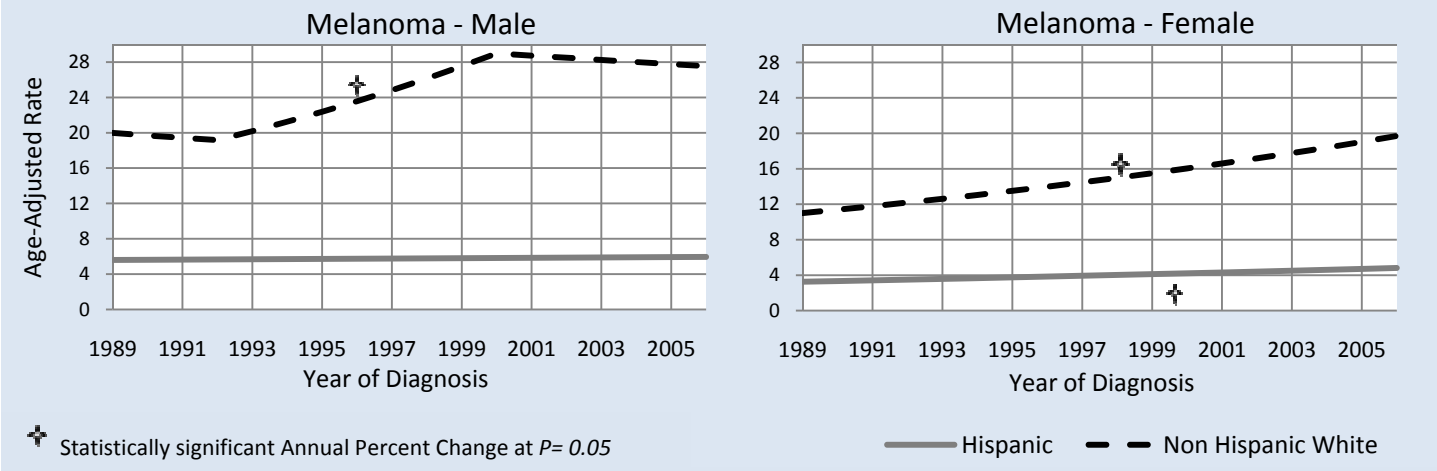


D.2.9. Melanoma

a) All melanoma cancers: Hispanic vs. non-Hispanic White by gender

The age-adjusted rates of melanoma cancer were substantially greater for non-Hispanic White males (2006: 27 cases/100,000) and females (2006: 17 cases/100,000) compared to Hispanic males (2006: 5 cases/100,000) and females (2006: 4 cases/100,000). Over the time period, trends in melanoma increased substantially for male and female non-Hispanic Whites, while rates for Hispanic males and females were generally stable.

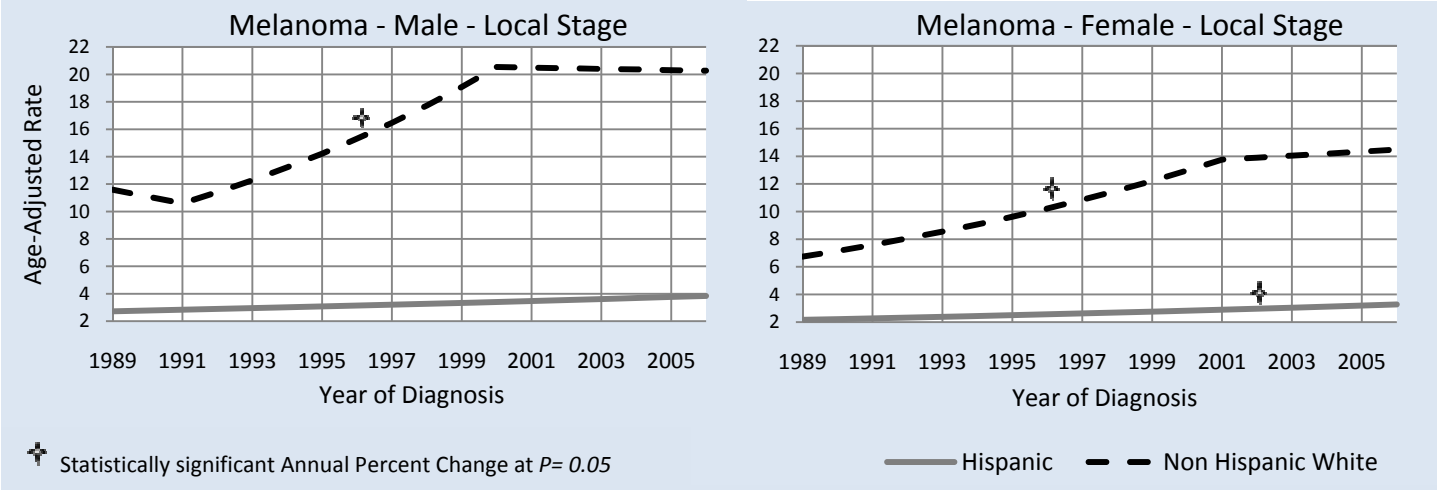
Figure 19. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Melanoma by Sex, 1986-2006

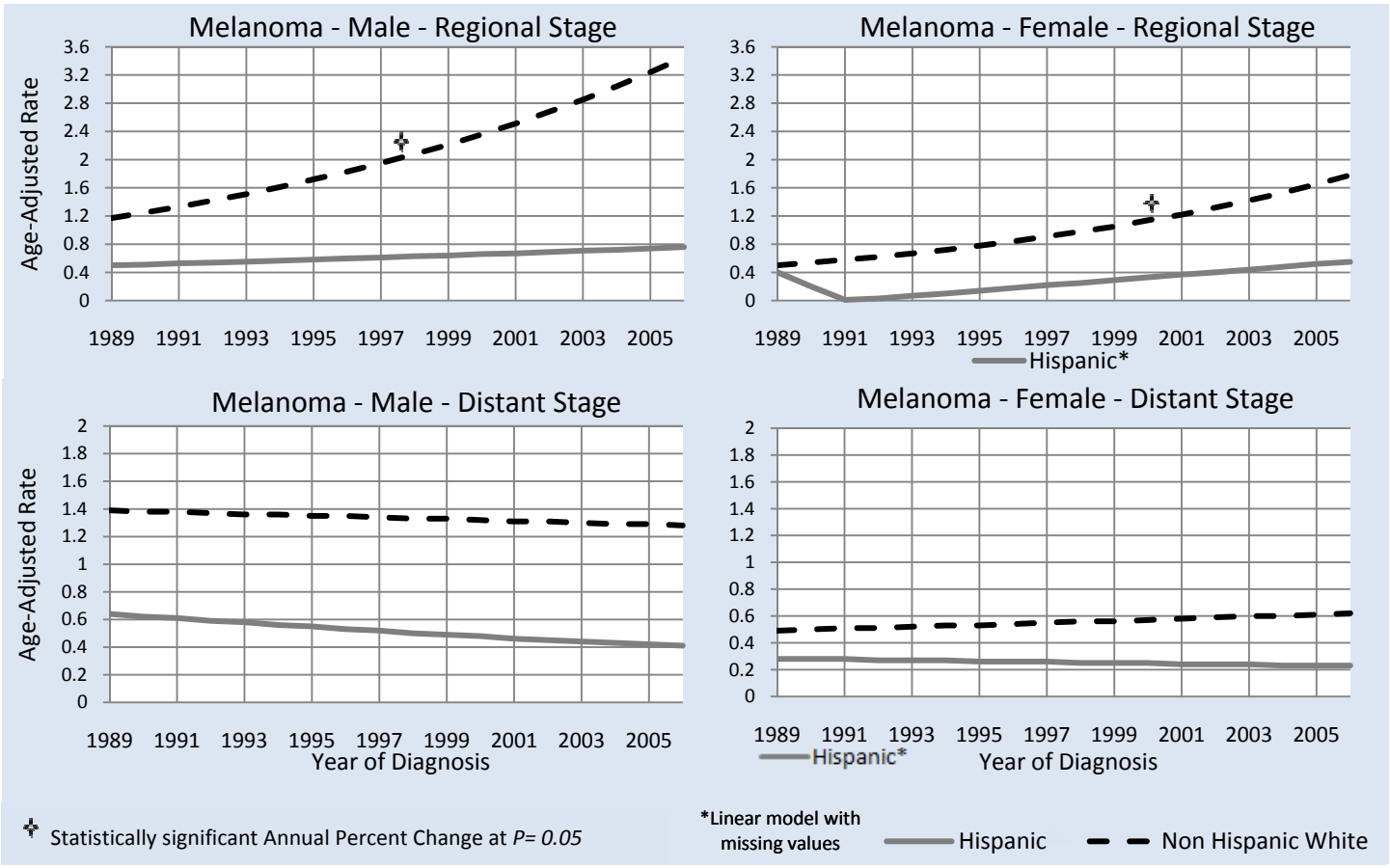


b) Melanoma stage: local, regional, distant: Hispanic vs. non-Hispanic White by gender

Over the time period, both non-Hispanic White females and males were increasingly diagnosed at a local and regional stage, possibly indicating increased early screening for this cancer. Hispanic females had too small numbers to establish trends for distant stage, however, trends for all other groups were generally stable. The trends of persons diagnosed as NOS decreased for Hispanic males and for non-Hispanic White males and females throughout the time period, while Hispanic females experienced a slight increasing trend.

Figure 20. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Melanoma by Sex and Stage, 1986-2006





D.2.10. Ovarian Cancer (females only)

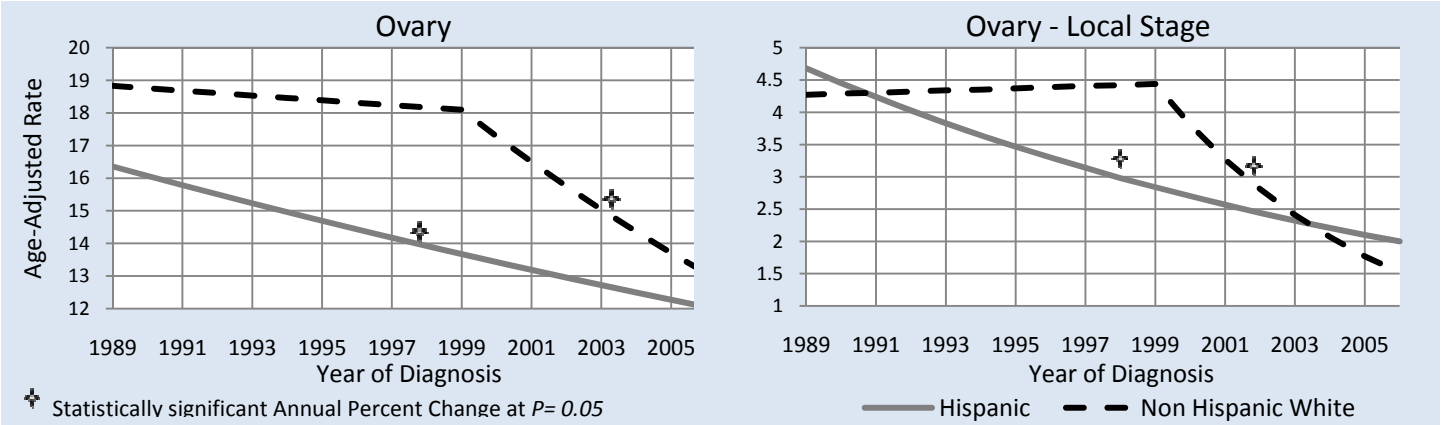
a) All ovarian cancers: Hispanic vs. non-Hispanic White females

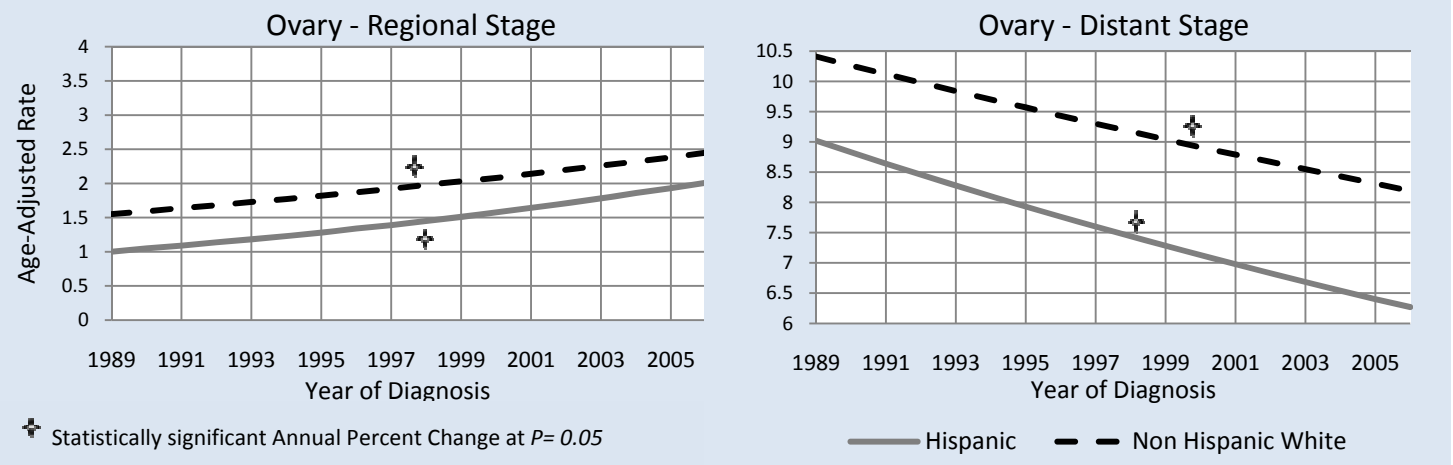
The age-adjusted rates of ovarian cancer were similar between non-Hispanic White females (2006: 13 cases/100,000) and Hispanic females (2006: 12 cases/100,000). Both Hispanic and non-Hispanic White females had decreasing trends in ovarian cancer.

b) Ovarian cancer stage: local, regional, distant: Hispanic vs. non-Hispanic White females

Over the time period, both non-Hispanic White and Hispanic females were decreasingly diagnosed at local stage and increasingly diagnosed at regional stage with a decrease in diagnosis at distant stage for both subpopulations. The trends of persons diagnosed as NOS decreased for both Hispanic and non-Hispanic White females throughout the time period, with a greater decrease among non-Hispanic White females.

Figure 21. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Ovarian Cancer by Stage, 1986-2006





D.2.11. Cervical Cancer (females only)

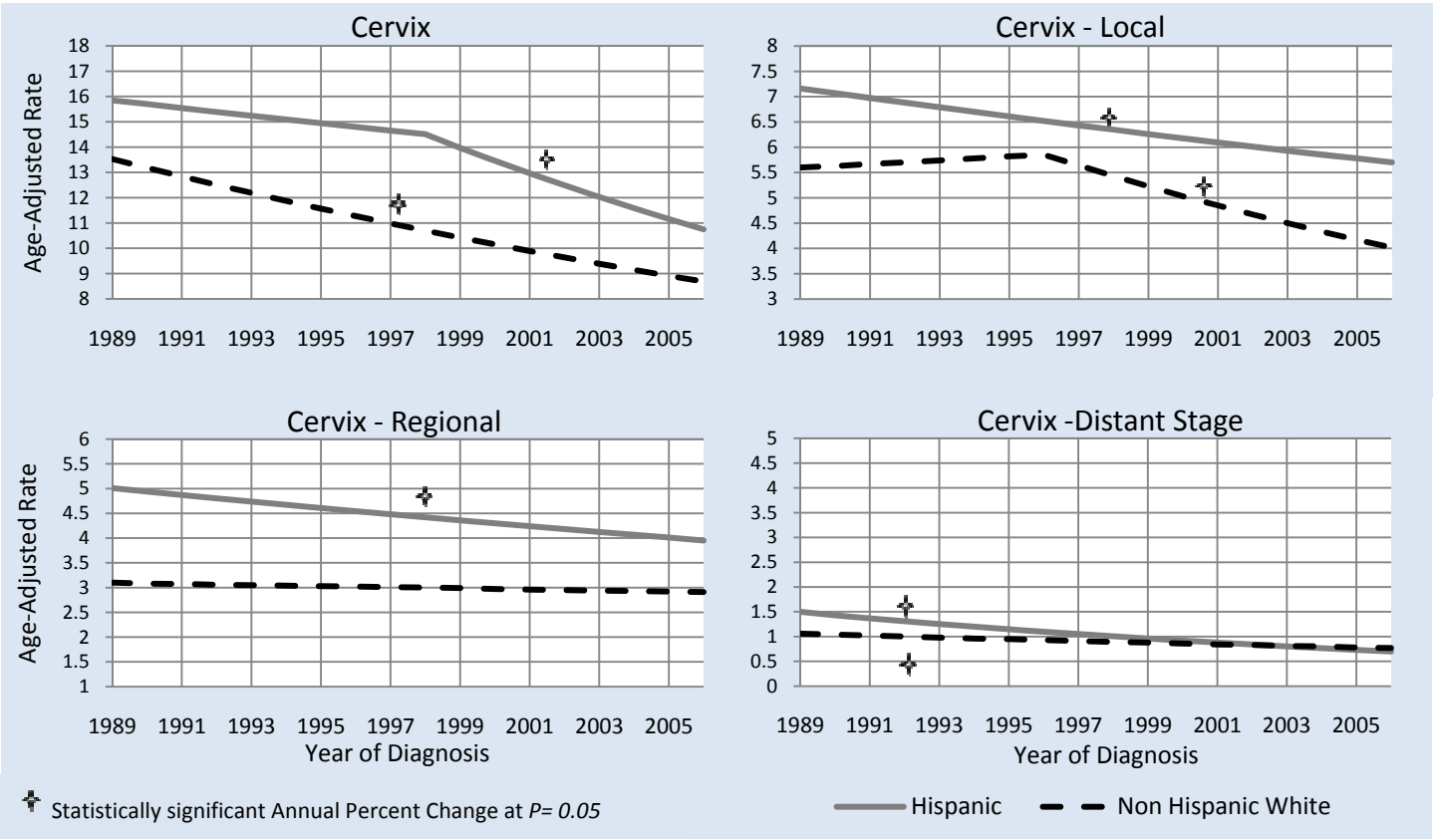
a) All cervical cancers: Hispanic vs. non-Hispanic White females

The age-adjusted rates of cervical cancer were slightly higher for Hispanic females (2006: 11 cases/100,000) compared to non-Hispanic White females (2006: 9 cases/100,000). Over the time period, both Hispanic and non-Hispanic White females experienced decreasing trends of cervical cancer.

b) Cervical cancer stage: local, regional, distant: Hispanic vs. non-Hispanic White females

Over the time period, both non-Hispanic White and Hispanic females were decreasingly diagnosed at local, regional and distant stages with the greatest decreases seen among Hispanic females. The trends of persons diagnosed as NOS decreased for both Hispanic and non-Hispanic White females throughout the time period, with a greater decrease among non-Hispanic White females.

Figure 22. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Cervical Cancer by Stage, 1986-2006

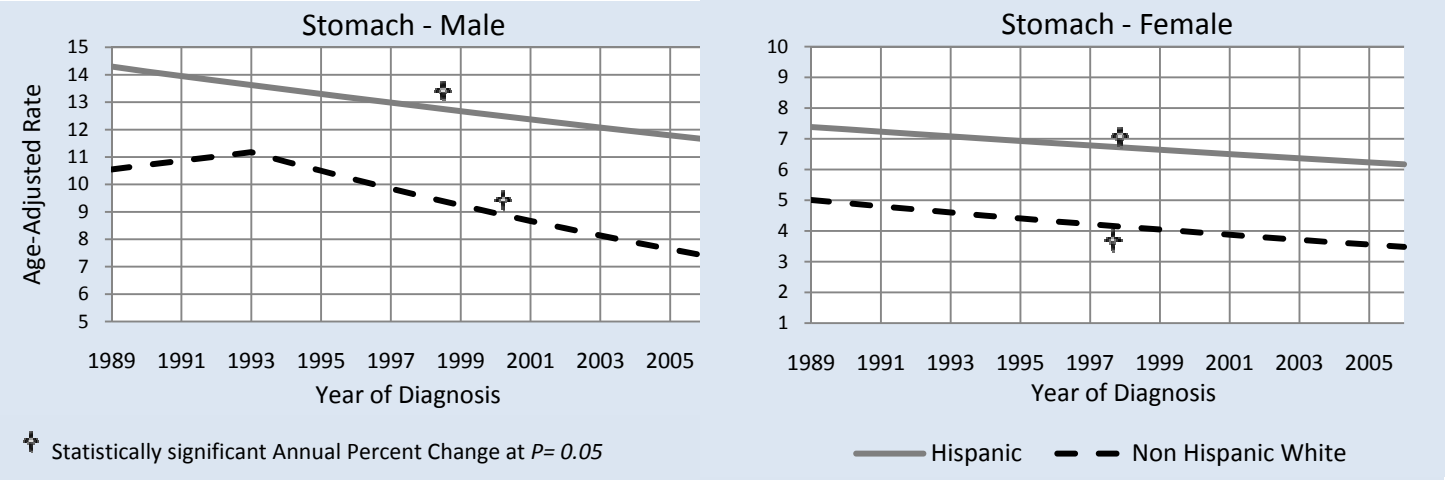


D.2.12. Stomach Cancer

a) All stomach cancers: Hispanic vs. non-Hispanic White by gender

Overall throughout the time period, the age-adjusted rates of stomach cancer were higher among Hispanic males (2006: 11 cases/100,000) compared to non-Hispanic White males (2006: 7 cases/100,000) and Hispanic females (2006: 6 cases/100,000) compared to non-Hispanic White females (2006: 3 cases/100,000). Over the time period, both male and female Hispanics and non-Hispanic White females had a decreasing trend in stomach cancer rates. Despite an initial increasing trend in non-Hispanic White males, ultimately there was a decreasing trend by the end of the time period. For both males and females, the rate of decline in stomach cancer incidence was similar in Hispanics versus non-Hispanic Whites over the 1989-2006 time period.

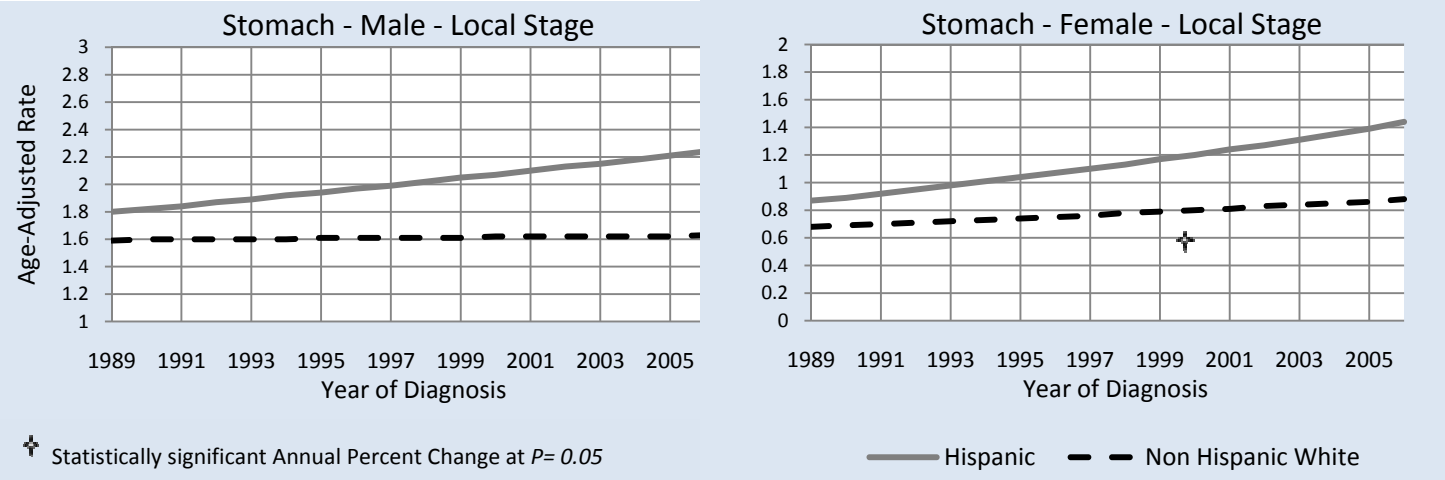
Figure 23. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Stomach Cancer by Sex, 1986-2006

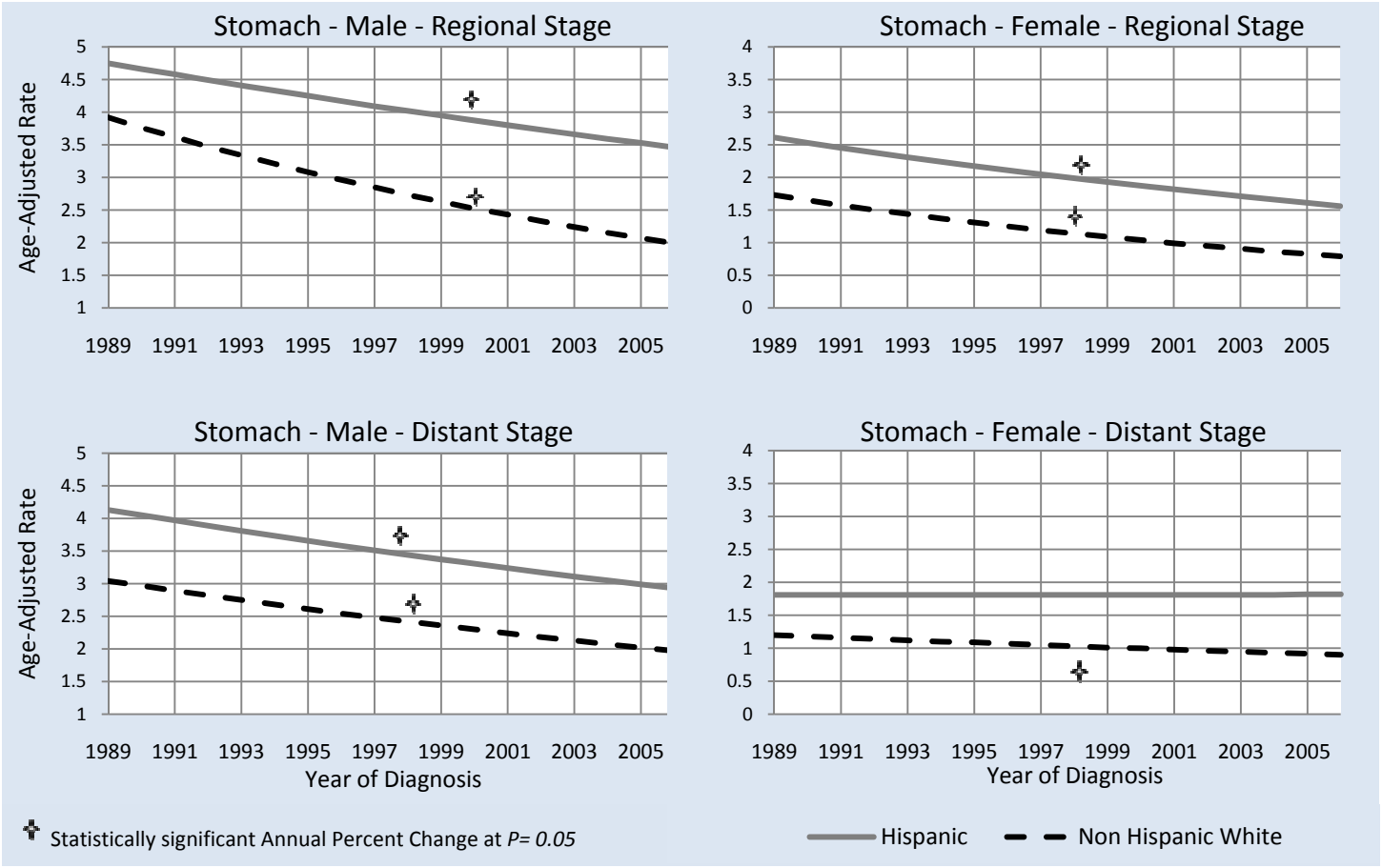


b) Stomach cancer stage: local, regional, distant: Hispanic vs. non-Hispanic White by gender

Over the time period, there was a slight increasing trend in local stage rates among Hispanics and a generally stable trend among non-Hispanic Whites. Rates for regional stage decreased for all subpopulations and decreases in distant stage rates are observed among males and non-Hispanic White females. The trends of persons diagnosed as NOS decreased for both Hispanic and non-Hispanic White males and females throughout the time period.

Figure 24. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Stomach Cancer by Sex and Stage, 1986-2006



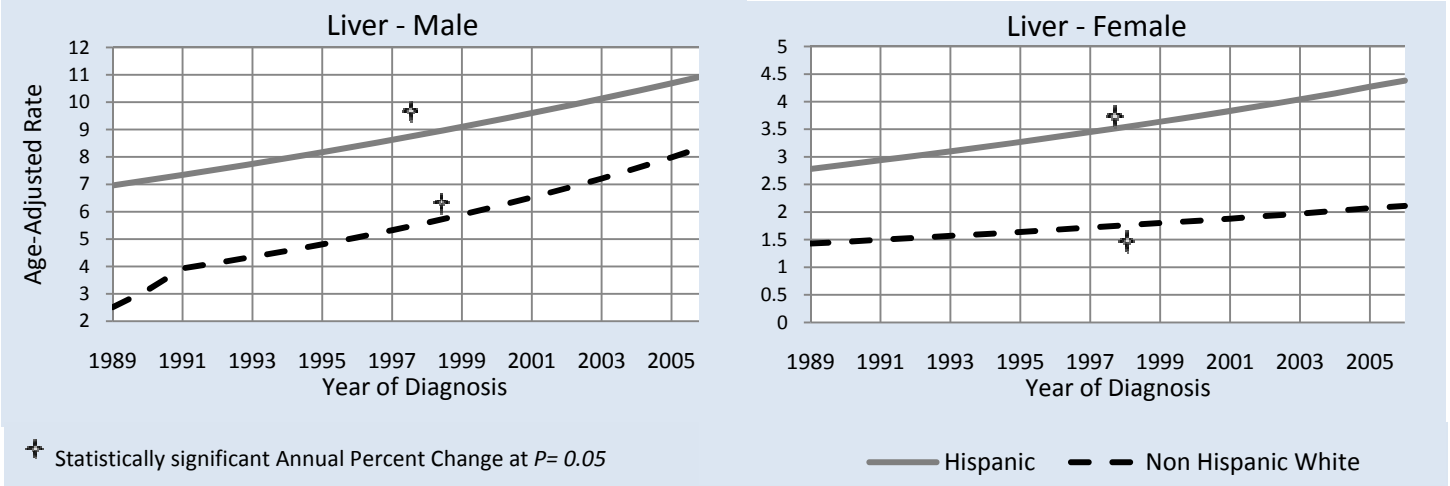


D.2.13. Liver Cancer

a) All liver cancers: Hispanic vs. non-Hispanic White by gender

Overall throughout the time period, the age-adjusted rates of liver cancer were higher among Hispanic males (2006: 10 cases/100,000) compared to non-Hispanic White males (2006: 8 cases/100,000) and Hispanic females (2006: 5 cases/100,000) compared to non-Hispanic White females (2006: 2 cases/100,000). Over the time period, there were increasing trends in the liver cancer rates for both Hispanic and non-Hispanic Whites.

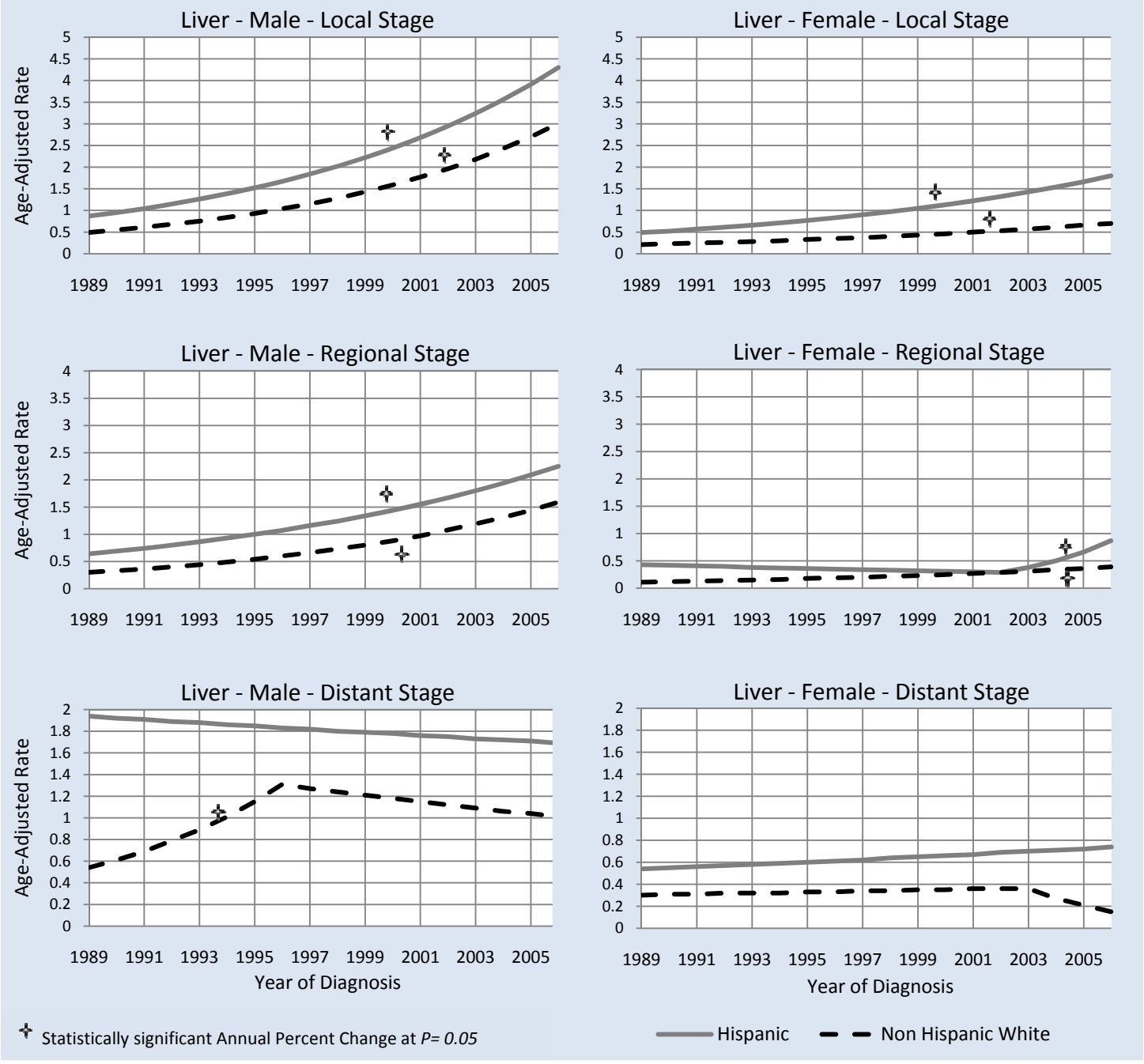
Figure 25. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Liver Cancer by Sex, 1986-2006



b) Liver cancer stage: local, regional, distant: Hispanic vs. non-Hispanic White by gender

Over the time period, both non-Hispanic White and Hispanic males and females were increasingly diagnosed at a local and regional stage. Trends in rates for distant stage diagnoses were generally stable among females and were slightly decreasing among males. The trends of persons diagnosed as NOS decreased for both Hispanic and non-Hispanic White males and females throughout the time period.

Figure 26. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Liver Cancer by Sex and Stage, 1986-2006

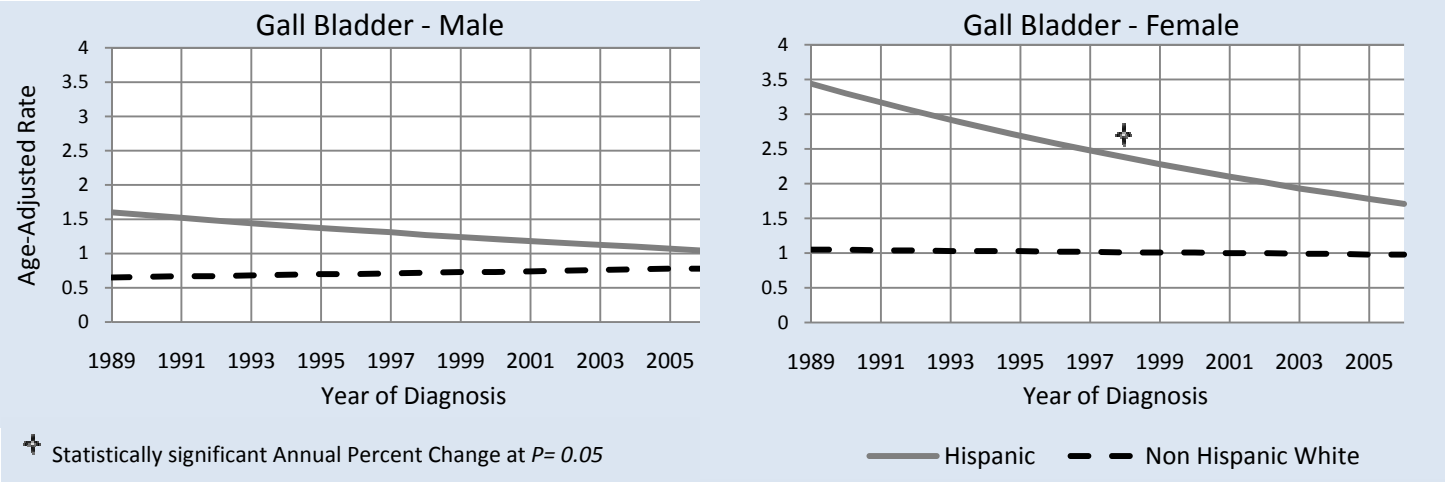


D.2.14. Gall Bladder Cancer

a) All gall bladder cancers: Hispanic vs. non-Hispanic White by gender

Ethnic differences in the rates of gall bladder cancer diminished over time. Overall, the age-adjusted rates of gall bladder cancer were similar between Hispanic males (2006: 0.82/100,000) and non-Hispanic White males (2006: 0.75 cases/100,000), as well as Hispanic females (2006: 2 cases/100,000) and non-Hispanic White females (2006: 1 cases/100,000). Over the time period, there was a decreasing trend in gall bladder cancer for both Hispanic males and females in contrast to the rates for non-Hispanic Whites which remained stable through the study period.

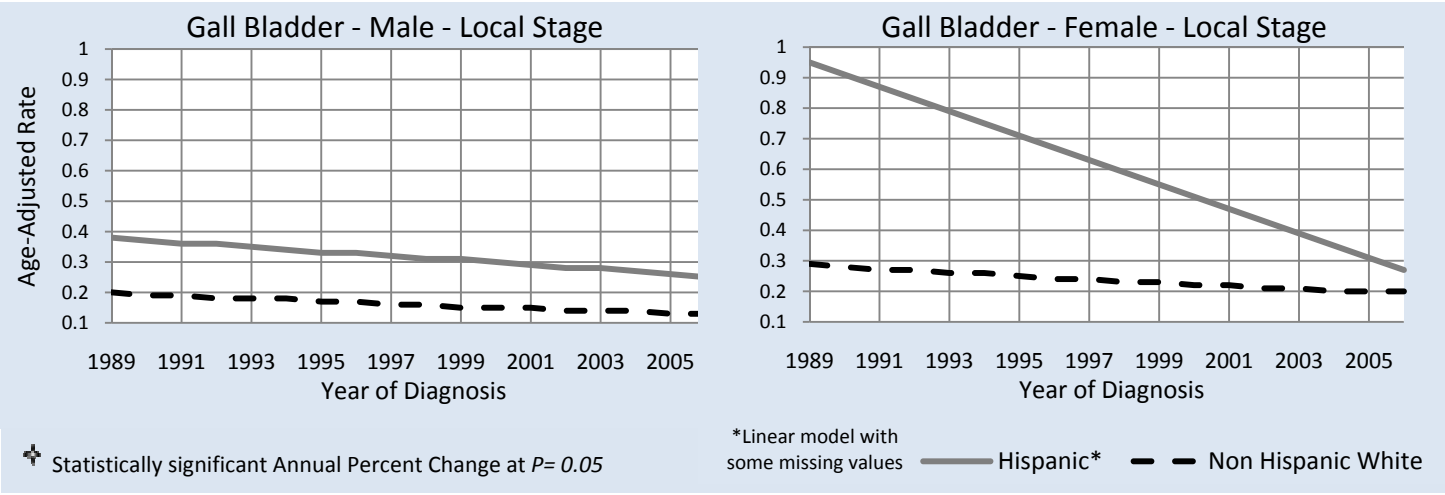
Figure 27. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Gall Bladder Cancer by Sex, 1986-2006

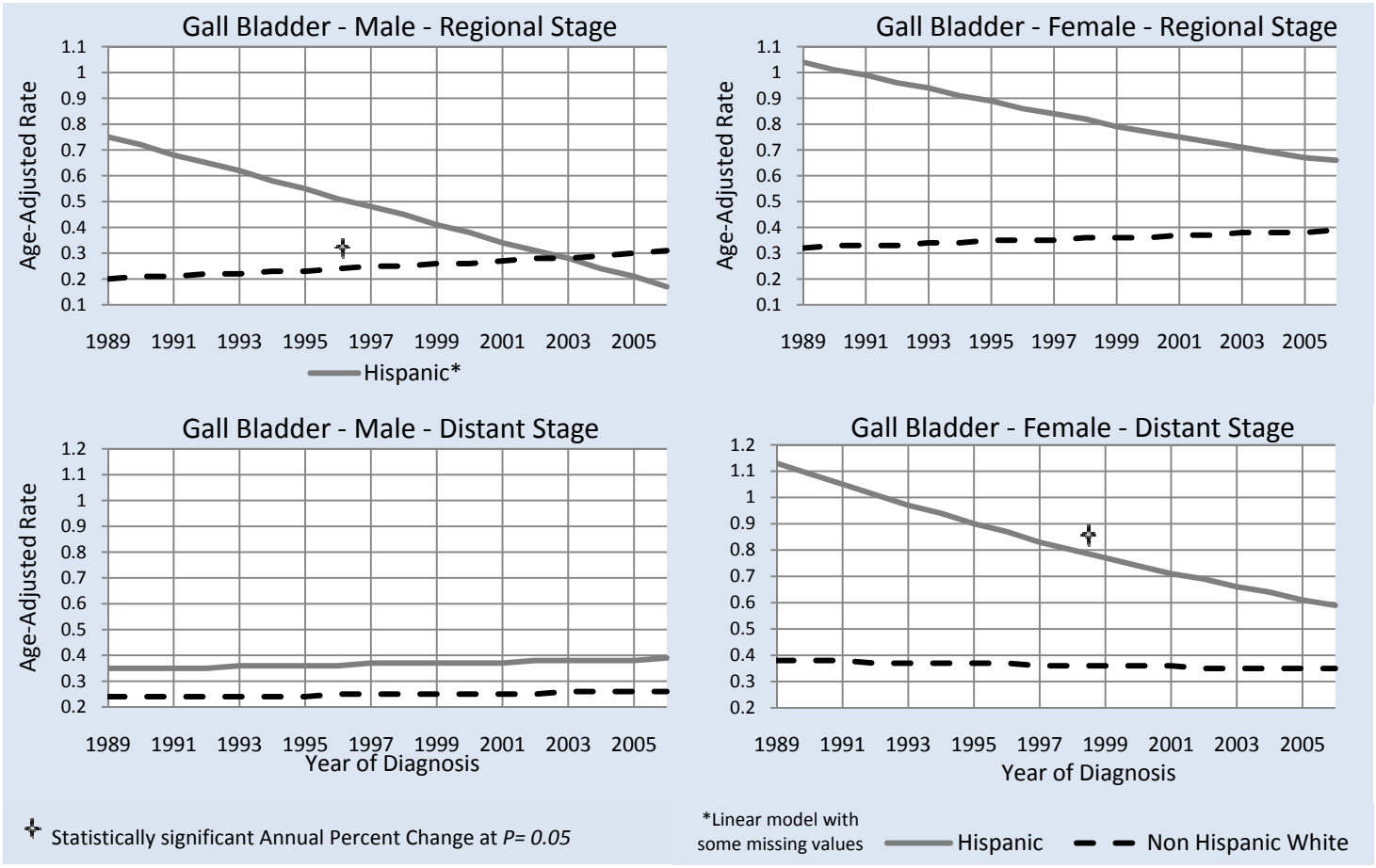


b) Gall bladder cancer stage: local, regional, distant: Hispanic vs. non-Hispanic White by gender

Non-Hispanic White males and females had relatively stable trends of diagnosis at local, regional, and distant stages. Hispanic females experienced reductions in the incidence of gall bladder cancer at all stages, while Hispanic males experienced incidence reductions for local and regional stage only. The numbers of cancers were relatively small, leading to unstable trends for Hispanics by stage.

Figure 28. Hispanic vs non-Hispanic Joinpoint Incidence Trends, Gall Bladder Cancer by Sex and Stage, 1986-2006





D.3. Percentage Distributions for All Cancer

D.3.1. Hispanics Versus non-Hispanic Whites by Gender

The total number of cancers (with Hispanic females having the fewest and non-Hispanic White males have the largest number of cancers) was substantially greater for the non-Hispanic Whites compared to the Hispanics, as would be expected based on the number of non-Hispanic Whites and Hispanics residing the Florida population as well as their individual cancer rates: Hispanic female cases (75,580), Hispanic male cases (83,866), non-Hispanic White female cases (619,517), and non-Hispanic White male cases (719,261). The percentage distribution of the major cancers by gender and by ethnicity is displayed in both tabular and graphic form (Table 1 and Figure 29). Hispanic males and females had fewer of the tobacco-related cancers (i.e. lung, head and neck, and bladder) than non-Hispanic White males and females, respectively (except for head and neck in Hispanic males). Hispanic females had a higher percentage of cervical, colorectal, gall bladder, liver, non Hodgkin's lymphoma, and stomach cancers, while non-Hispanic White females had a higher percentage of melanoma; there were basically equal percentages of breast and ovarian cancers. Hispanic males had a higher percentage of colorectal, gall bladder, liver, non Hodgkin's lymphoma, and prostate and stomach cancers, while non-Hispanic White males had a higher percentage of melanoma. Hispanic females had the greatest percentage of cancers from other sites, while non-Hispanic White males had the fewest.

Figure 29. Hispanic vs. non-Hispanic Percent Cancer Distribution by Site and Sex, 1989-2006

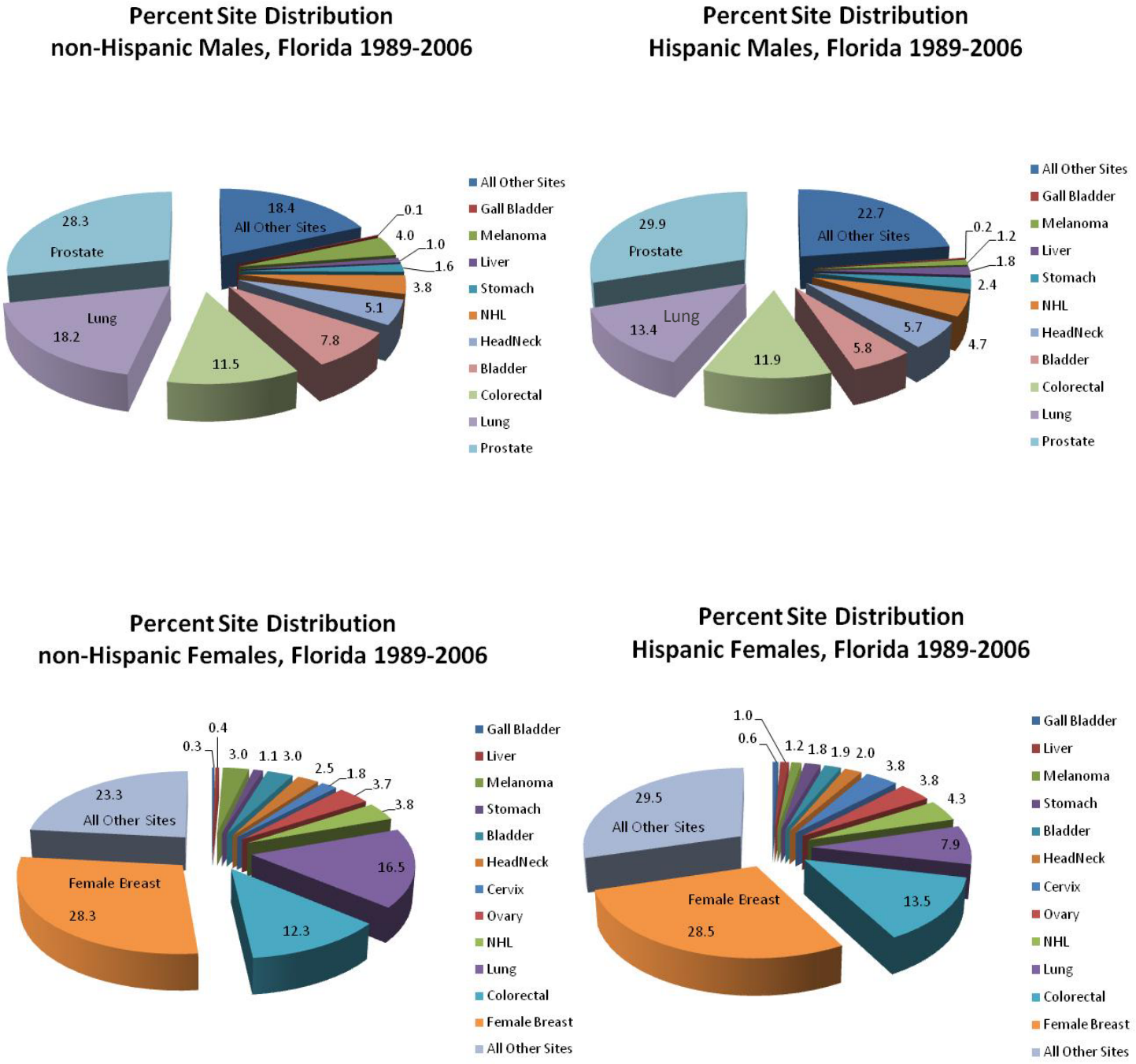


Table 1. Percent Distribution of Major Cancers by Ethnicity and Sex

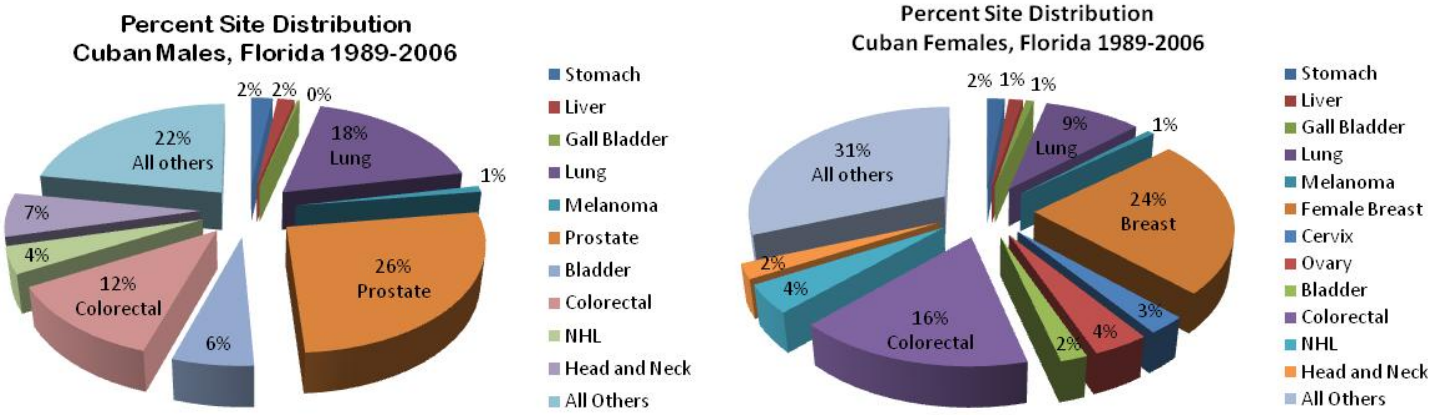
Cancer type (%)	Female		Male	
	Hispanic	non-Hispanic White	Hispanic	non-Hispanic White
Lung	7.9	16.5	13.4	18.2
Prostate			29.9	28.3
Breast (female)	28.5	28.3		
Colorectal	13.5	12.3	11.9	11.5
Bladder	1.9	3.0	5.8	7.8
Head & Neck	2.0	2.5	5.7	5.1
Non Hodgkin's Lymphoma	4.3	3.8	4.7	3.8
Melanoma	1.2	3.0	1.2	4.0
Ovarian	3.8	3.7		
Cervical	3.8	1.8		
Stomach	1.8	1.1	2.4	1.6
Liver	1.0	0.4	1.8	1.0
Gall bladder	0.6	0.3	0.2	0.1
All other sites	29.5	23.3	22.7	18.4
All Cancers (N)	75,580	619,517	83,866	719,261

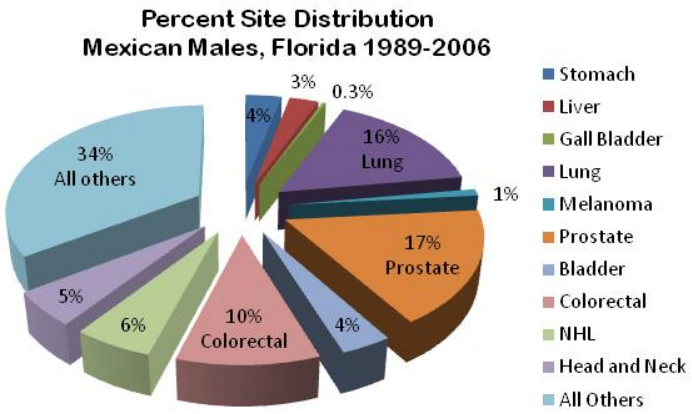
D.3.2. Proportional Distribution of Cancers by Hispanic Subpopulation and Gender

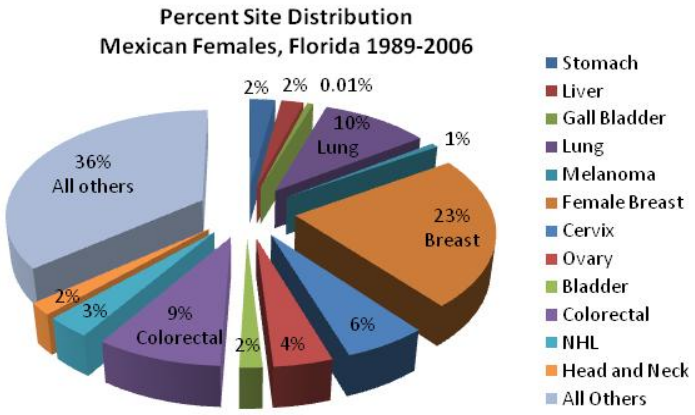
The distribution of the selected cancers for each Hispanic subpopulation was compared to Non-Hispanic Whites by gender using the proportional incidence ratio methodology.[36] The proportions that make up these ratios are presented by Hispanic subgroups shown in figure 30. Among both Hispanic females and males, in general the proportions of the relatively rare "Hispanic" cancers (i.e. stomach, liver, and gall bladder) were substantially elevated compared to Non-Hispanic Whites. In addition, the proportion of cervical cancer was elevated among all the Hispanic females subpopulations, while there was an increased proportion of non Hodgkin's lymphoma and of all other cancers for many of the Hispanic subpopulations for both males and females.

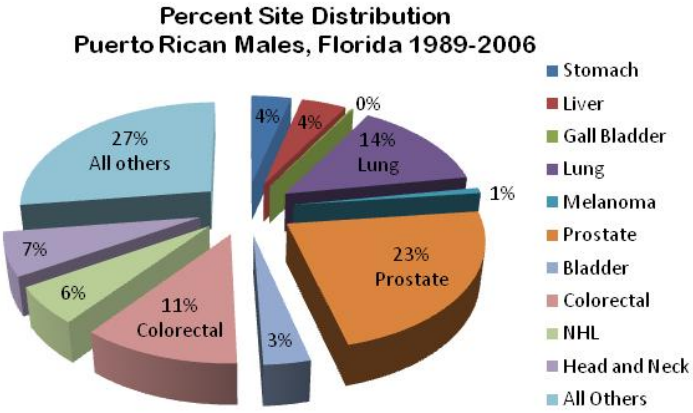
Among the Hispanic subpopulations by gender, South and Central American Hispanic females had the highest proportions of stomach, gall bladder, cervix, and all other cancers, while Mexican females had the highest proportion of liver cancer; Puerto Rican females the highest non Hodgkin's lymphoma; and Cuban and not otherwise specified Hispanic females had the highest proportion of colorectal cancer. Somewhat similar patterns were seen for the Hispanic subpopulation males: South and Central American Hispanic males had the highest proportions of stomach, gallbladder, non Hodgkin's lymphoma, and all other cancers; while Puerto Rican males had the highest proportion of liver cancer, and not otherwise specified Hispanic males had the highest colorectal and prostate cancer proportions.

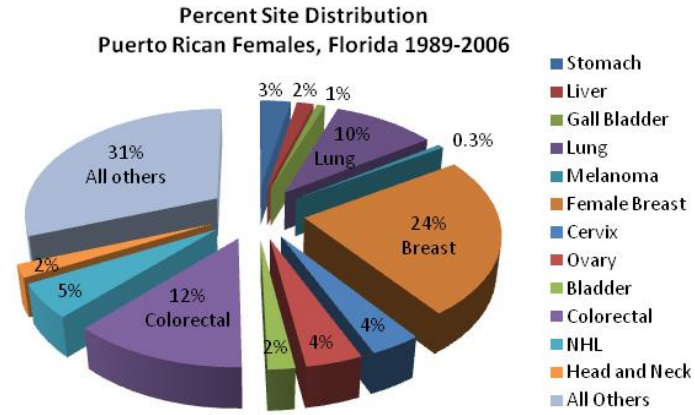
Figure 30. Percent Cancer Site Distribution for Hispanic Sub-Groups, by Site, and Sex, 1989-2006

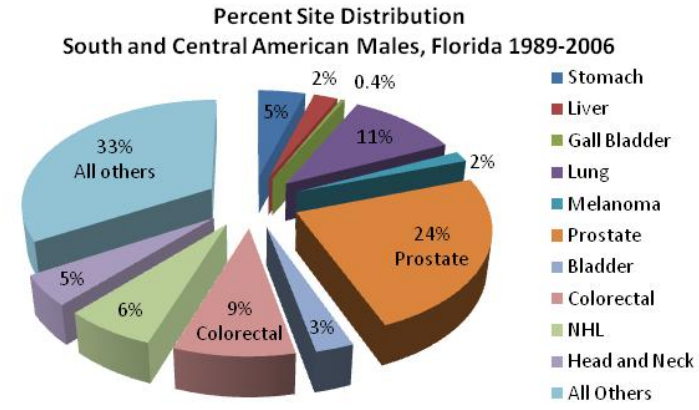


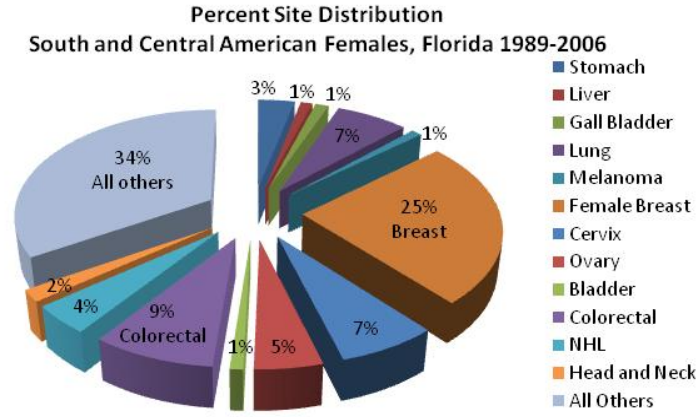

Percent Site Distribution
Mexican Males, Florida 1989-2006
4%
3%
0.3%
16%
Lung
1%
17%
Prostate
4%
10%
Colorectal
6%
5%
34%
All others
Stomach
Liver
Gall Bladder
Lung
Melanoma
Prostate
Bladder
Colorectal
NHL
Head and Neck
All Others

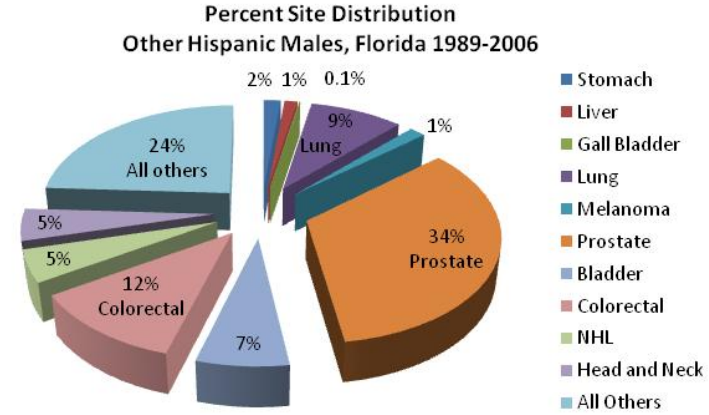

Percent Site Distribution
Mexican Females, Florida 1989-2006
2%
2%
0.01%
10%
Lung
1%
23%
Breast
6%
4%
2%
9%
Colorectal
3%
2%
36%
All others
Stomach
Liver
Gall Bladder
Lung
Melanoma
Female Breast
Cervix
Ovary
Bladder
Colorectal
NHL
Head and Neck
All Others

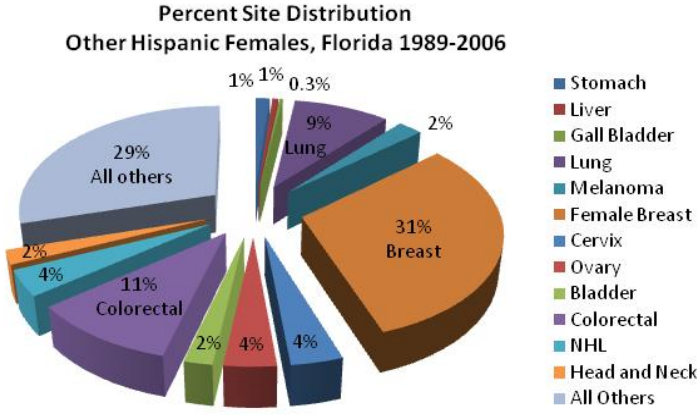

Percent Site Distribution
Puerto Rican Males, Florida 1989-2006
4%
4%
0%
14%
Lung
1%
23%
Prostate
3%
11%
Colorectal
6%
7%
27%
All others
Stomach
Liver
Gall Bladder
Lung
Melanoma
Prostate
Bladder
Colorectal
NHL
Head and Neck
All Others


Percent Site Distribution
Puerto Rican Females, Florida 1989-2006
3%
2%
1%
10%
Lung
0.3%
24%
Breast
4%
4%
2%
12%
Colorectal
5%
2%
31%
All others
Stomach
Liver
Gall Bladder
Lung
Melanoma
Female Breast
Cervix
Ovary
Bladder
Colorectal
NHL
Head and Neck
All Others


Percent Site Distribution
South and Central American Males, Florida 1989-2006
2%
0.4%
5%
11%
2%
24%
Prostate
3%
9%
Colorectal
6%
5%
33%
All others
Stomach
Liver
Gall Bladder
Lung
Melanoma
Prostate
Bladder
Colorectal
NHL
Head and Neck
All Others


Percent Site Distribution
South and Central American Females, Florida 1989-2006
3%
1%
1%
7%
1%
25%
Breast
7%
1%
5%
9%
Colorectal
4%
2%
34%
All others
Stomach
Liver
Gall Bladder
Lung
Melanoma
Female Breast
Cervix
Ovary
Bladder
Colorectal
NHL
Head and Neck
All Others


Percent Site Distribution
Other Hispanic Males, Florida 1989-2006
2%
1%
0.1%
9%
Lung
1%
34%
Prostate
7%
12%
Colorectal
5%
5%
24%
All others
Stomach
Liver
Gall Bladder
Lung
Melanoma
Prostate
Bladder
Colorectal
NHL
Head and Neck
All Others

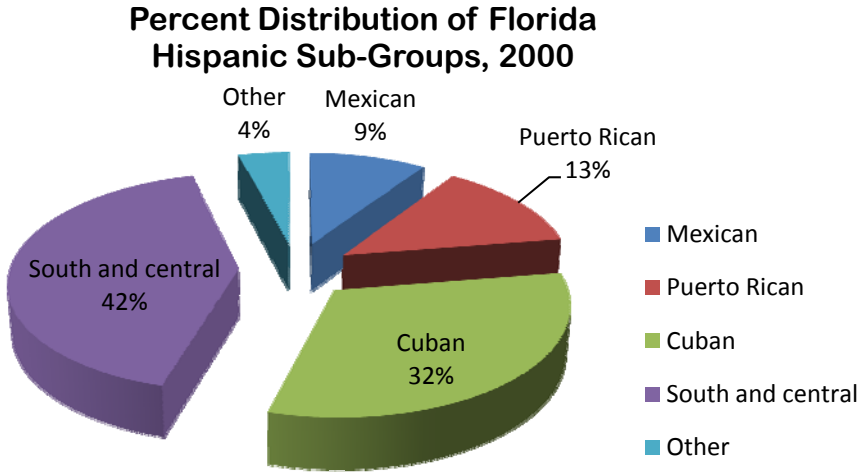

Percent Site Distribution
Other Hispanic Females, Florida 1989-2006
1%
1%
0.3%
9%
Lung
2%
31%
Breast
4%
4%
2%
11%
Colorectal
4%
2%
29%
All others
Stomach
Liver
Gall Bladder
Lung
Melanoma
Female Breast
Cervix
Ovary
Bladder
Colorectal
NHL
Head and Neck
All Others

D.3.3. Hispanic Subpopulations by Gender

As described above in the Methods section, HOIA provided increased ascertainment of Hispanic ethnicity in the following Hispanic subpopulations: Mexican Hispanics, Puerto Ricans, Cubans, and New Latinos (all other Hispanics).[9] HOIA was not able to reclassify all Hispanics into these subpopulations; in this case, these Hispanics were categorized as a subgroup denoted as "Hispanic NOS" or "not otherwise specified." Of note, in 2000, there were 2.7 million Hispanics among Florida's rapidly growing population of 16 million, with an estimated 14% Mexican, 19% Puerto Rican, 33% Cuban, and 34% other Hispanic subpopulations.[1-3] For all cancers, the largest percentages of Hispanic cancers were found among the Cubans, for both males and females; this means that this subgroup representing approximately 33% of the Florida Hispanics experienced 43% of Hispanic cancers for males and 35% for females. The other Hispanic subgroups had a much smaller percentage of the Hispanic cancers for both males and females. Although these results again reflect the increased demographic contributions of Cubans and Puerto Ricans to the Florida population compared to other Hispanic subgroups, it is also clear that the rates of cancer among Cubans are substantially higher than for other Hispanic subgroups.[9] Part of this effect could be due to the higher median age of Cubans compared to other Hispanic subgroups in the United States.[40] Among Florida Hispanics diagnosed with cancer, Cubans had the highest median age at 70 years, followed by Puerto Ricans at 66 years; South and Central Americans had the lowest median at 60 years.

In particular, Cubans appeared to have a substantial burden of the tobacco-related cancers among all Hispanics for both males and females, including lung cancer (59% and 42%, males and females respectively), bladder cancer (44% and 35%), head and neck (51% and 41%). Cubans also dominated the percentage contribution to liver and gall bladder cancers, for both males and females (41% and 48%, and 51% and 43%, respectively) and for prostate (39%) and ovarian (37%). South or Central American Hispanics, particularly the females, contributed increased percentages of cervical, stomach, and gall bladder cancers, while Other Hispanics and Hispanic NOS (particularly the females) contributed substantial portions to the melanoma burden as well as the tobacco-related cancers. In general, the Mexicans and Puerto Ricans had very small percentages of the Hispanic cancers, with the exception of male liver cancer in Puerto Ricans (21%).

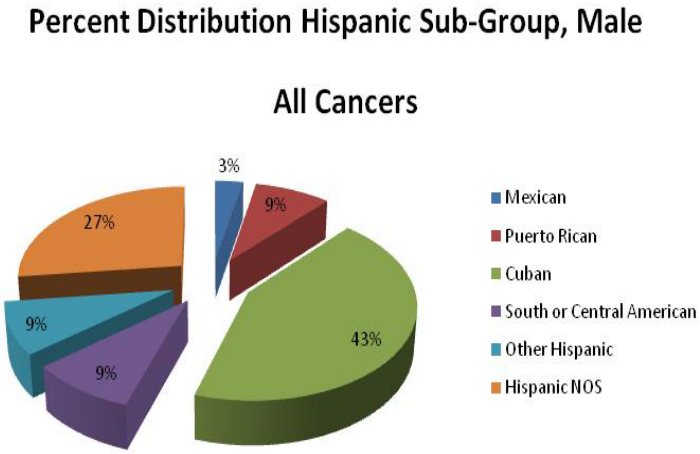
Figure 31. Percent Distribution of Florida Hispanic Sub-Groups, 2000*

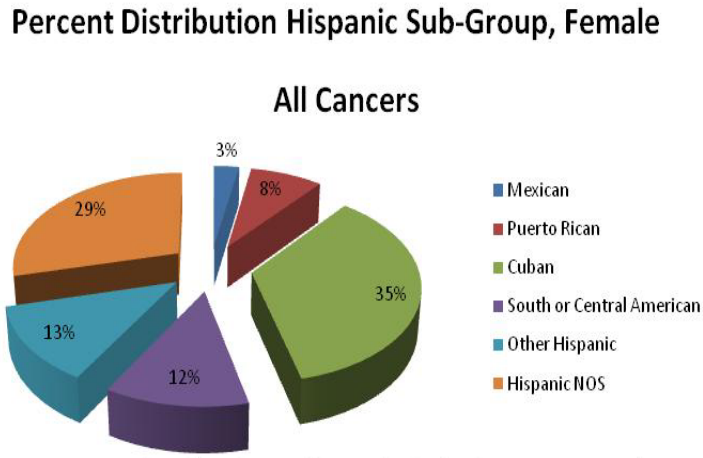


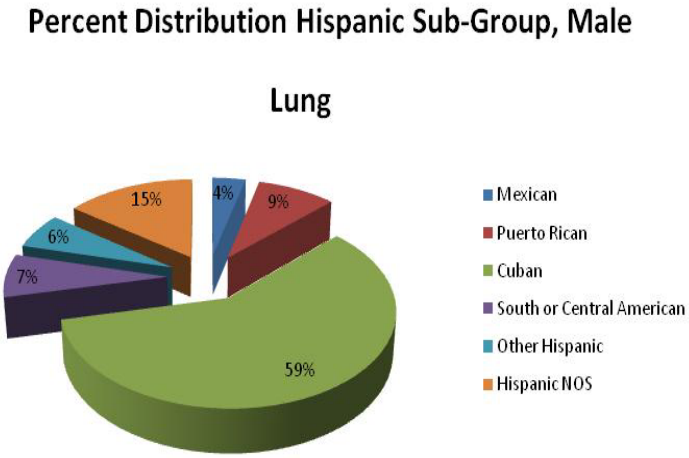
Source: US Census 2000. SF3. Place of Birth for Foreign Born

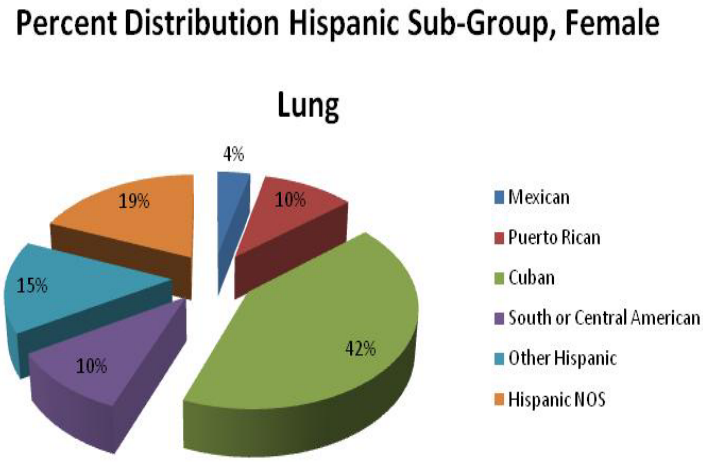
*Population percentages represented in this diagram are for foreign born residents only, whereas FCDS subgroups are derived from nativity and ancestral identification.

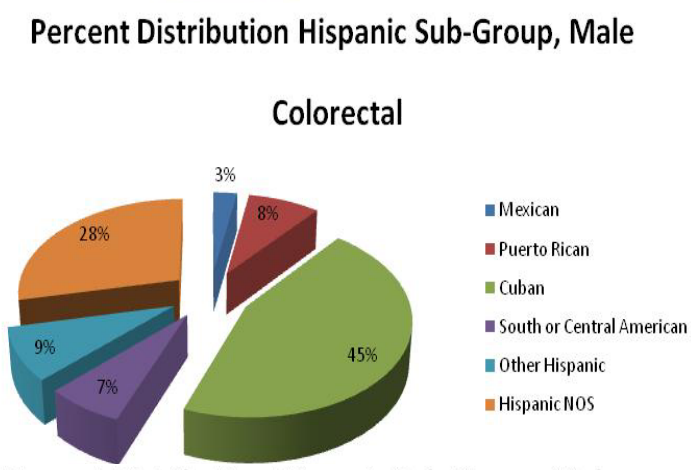
Figure 32. Percent Cancer Distribution for Hispanic Sub-Groups, by Site and Sex, 1989-2006

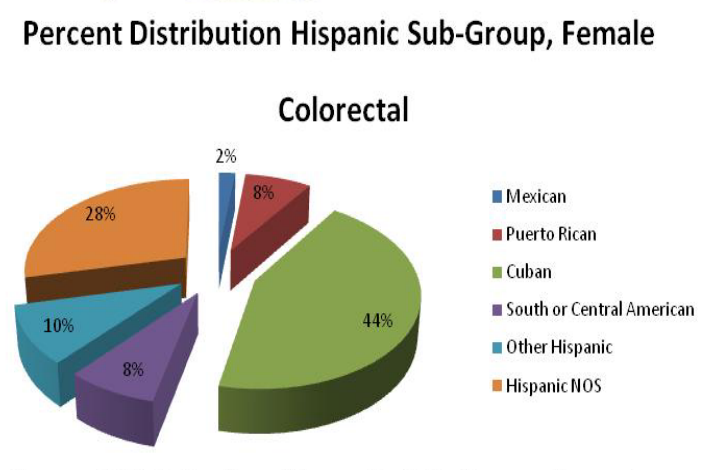


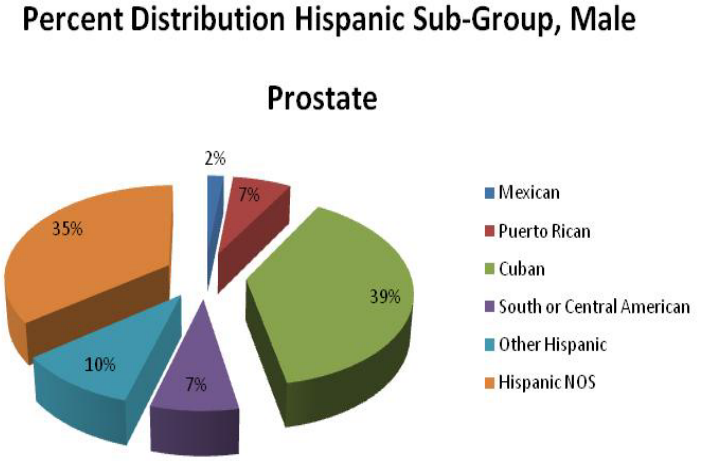


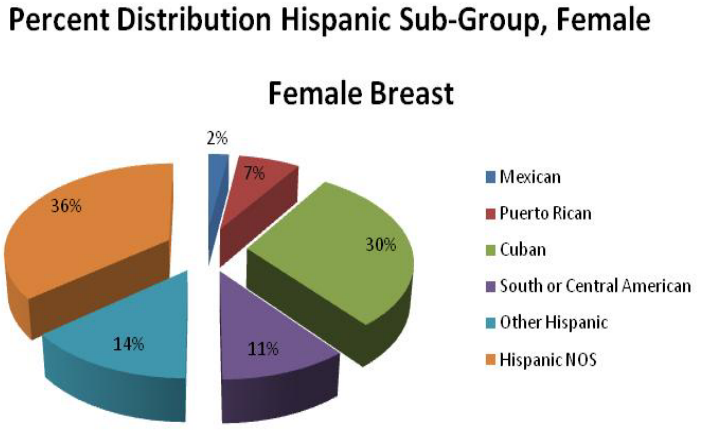






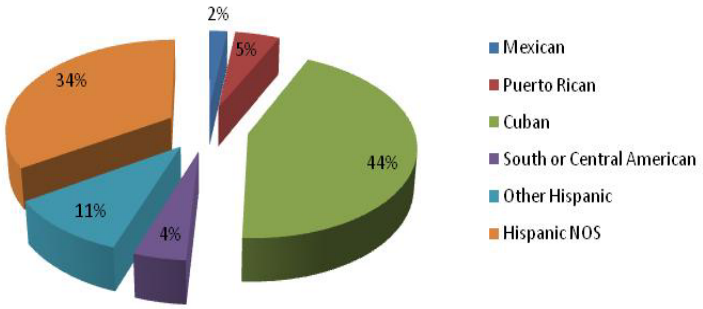






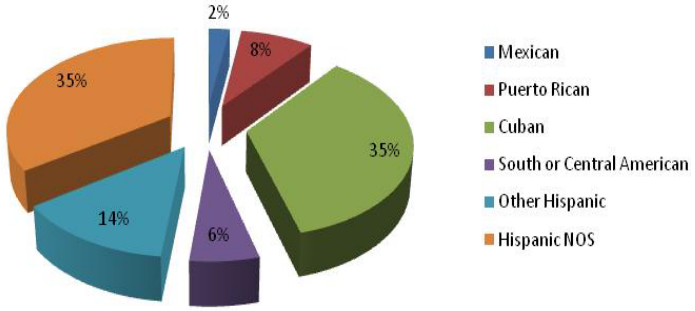
Percent Distribution Hispanic Sub-Group, Male

Bladder



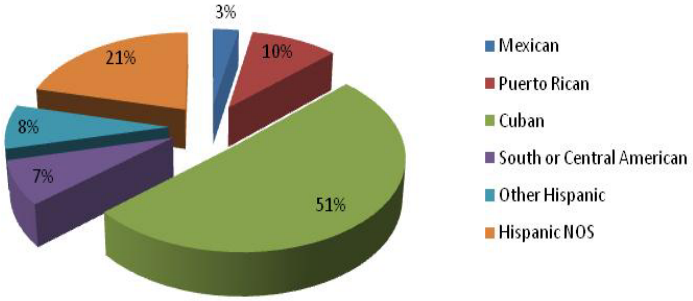
Percent Distribution Hispanic Sub-Group, Female

Bladder



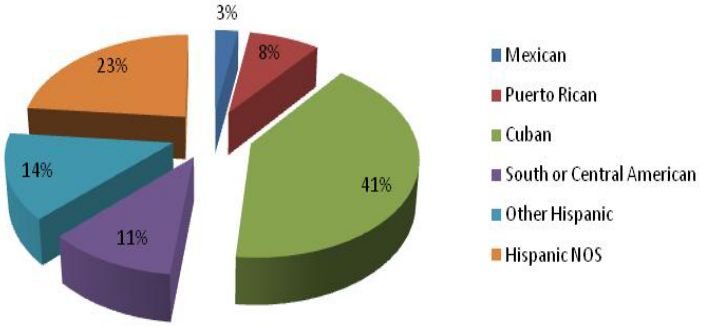
Percent Distribution Hispanic Sub-Group, Male

Head and Neck



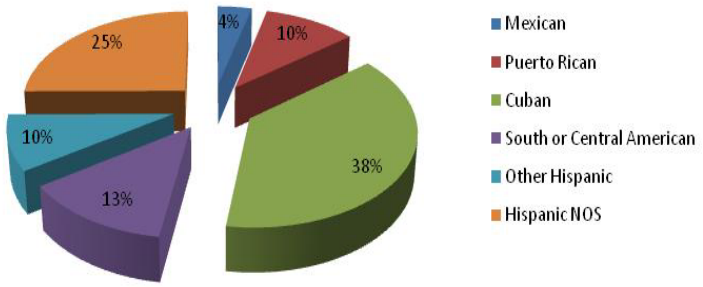
Percent Distribution Hispanic Sub-Group, Female

Head and Neck



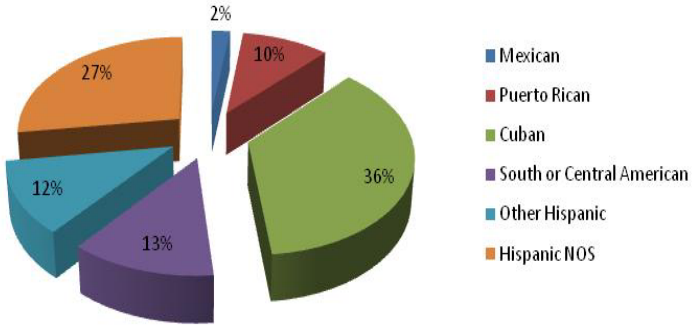
Percent Distribution Hispanic Sub-Group, Male

NHL



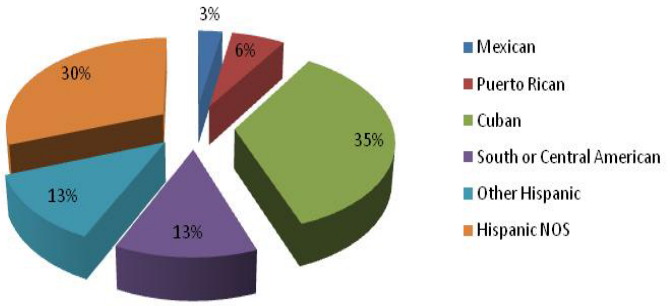
Percent Distribution Hispanic Sub-Group, Female

NHL



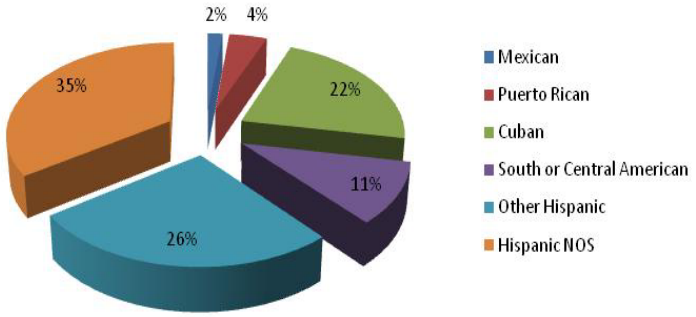
Percent Distribution Hispanic Sub-Group, Male

Melanoma



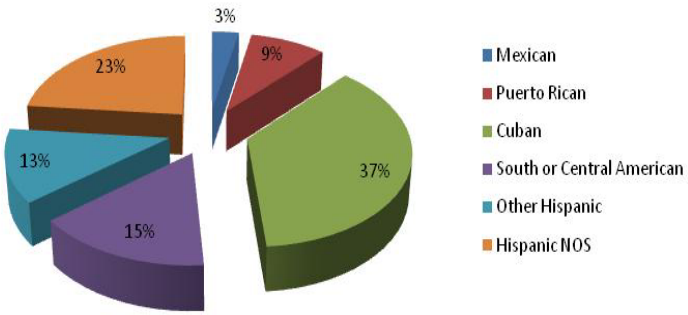
Percent Distribution Hispanic Sub-Group, Female

Melanoma



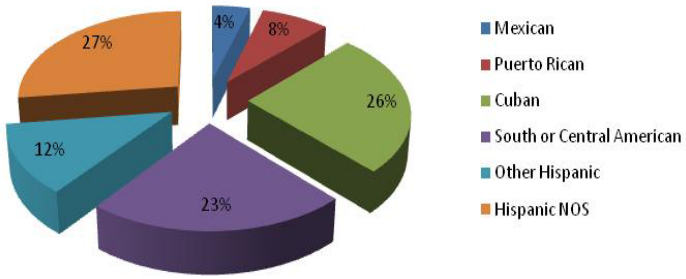
Percent Distribution Hispanic Sub-Group, Female

Ovary



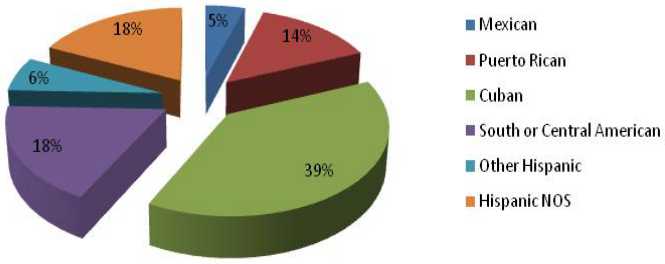
Percent Distribution Hispanic Sub-Group, Female

Cervix



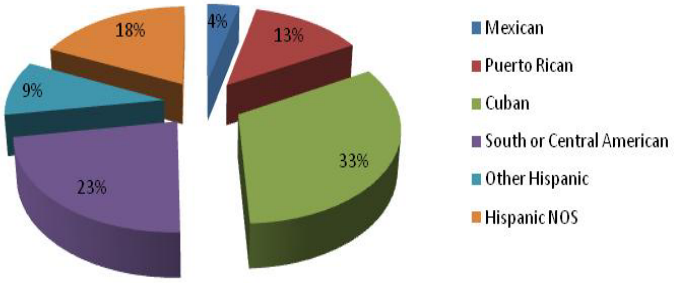
Percent Distribution Hispanic Sub-Group, Male

Stomach



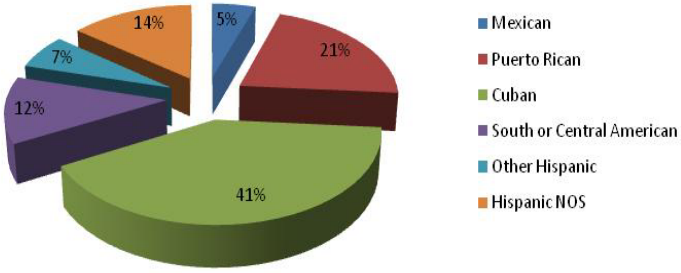
Percent Distribution Hispanic Sub-Group, Female

Stomach



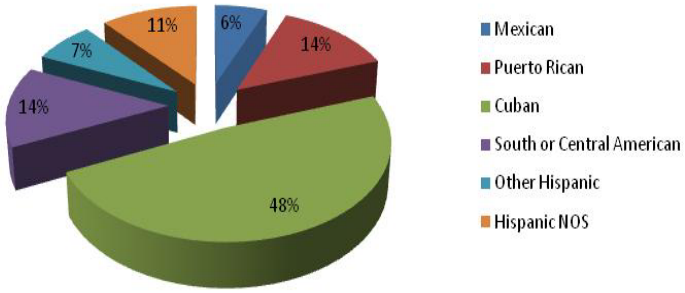
Percent Distribution Hispanic Sub-Group, Male

Liver



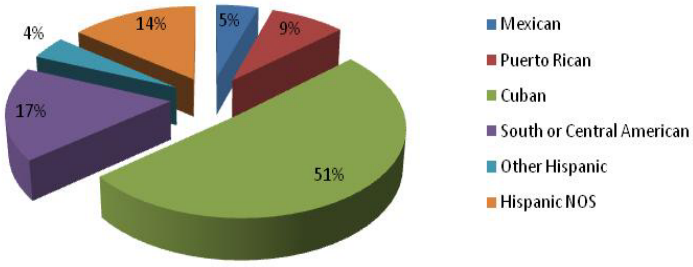
Percent Distribution Hispanic Sub-Group, Female

Liver



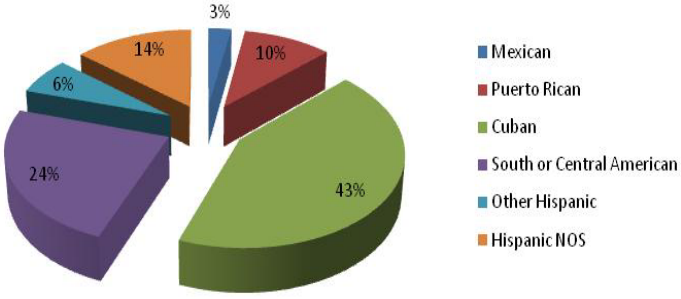
Percent Distribution Hispanic Sub-Group, Male

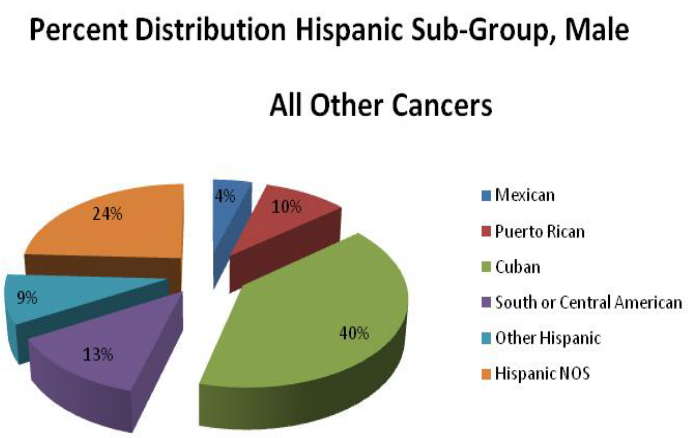
Gall Bladder

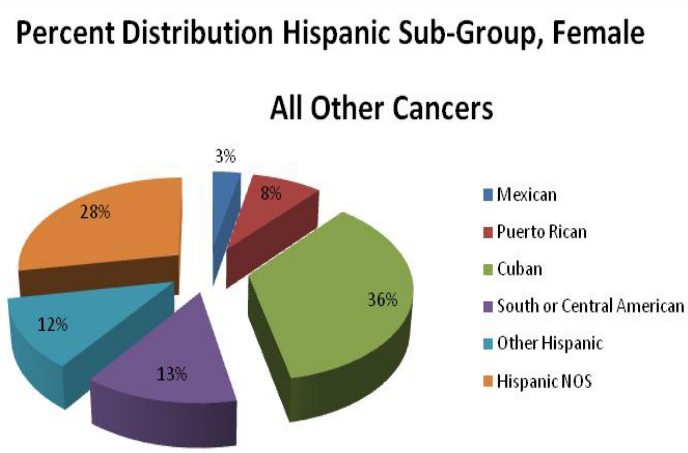


Percent Distribution Hispanic Sub-Group, Female

Gall Bladder







E. DISCUSSION

This Report extends our knowledge of the epidemiology of cancer in Hispanics in several ways: 1) it provides the first detailed examination of the cancer experience in a state with a large, diverse and rapidly growing Hispanic population; 2) it applies new methodology to classify ethnicity and Hispanic subgroups; and 3) it presents the relative distribution of cancer cases across Hispanic sub-groups. Below, we integrate our findings with the existing literature on cancer in Hispanics, including the broader question of the Hispanic paradox, and discuss implications for cancer control in this growing segment of the US population.

E.1. Cancer Trends in Florida Hispanics

The overall cancer incidence rate for Hispanics increased in the early years of the Registry, peaking in 1993 for males and in 1997 for females. Thereafter, rates in both genders steadily declined. Despite these declines, the overall sex-specific incidence rates in 2006 were slightly higher than the 1989 rates. However, based on the linear negative slopes of the cancer rate trends, it is expected that overall incidence rates in Florida Hispanics will continue to decline in the foreseeable future. Site-specific incidence rates for most cancers declined over the survey, with some notable exceptions. Lung cancer incidence increased in Hispanic females from just over 20/100,000 to 31/100,000 during the survey period. Rates of non-Hodgkin's lymphoma increased in Hispanic females, despite a downward trend in rates for Hispanic males. Liver cancer incidence increased steadily in Hispanic males and females during the survey period.

E.2. Stage-Specific Cancer Trends in Florida Hispanics

Despite declines in the overall cancer incidence burden between 1989 and 2006 in Florida Hispanics, the trend in rates of all cancers diagnosed at the distant stage remained relatively flat in males (~104/100,000) and actually increased in females from 61/100,000 in 1989 to 71/100,000 in 2005. Factors contributing to an increase can be attributed to the rising rates of lung, colorectal, and non-Hodgkin's lymphoma diagnosed at the distant stage. Factors contributing to a decrease can be the success of early detection programs. Incidence rates for distant breast cancer and cervical cancer have fallen in Hispanic females over the years 1989-2006 (6.5/100,000 to 5.2/100,000 and 1.4/100,000 to 0.5/100,000). The incidence of distant prostate cancer diagnoses in males also fell sharply from 17.0/100,000 to 4.4/100,000 over the survey period. As a screenable cancer, the increase in distant colorectal cancer incidence in Hispanic males and females is particularly troubling, particularly against a backdrop of substantially declining rates of distant diagnoses for non-Hispanic Whites over the survey period. From 1989-2006, these rates increased from 8.0/100,000 to 10.6/100,000 in Hispanic males and from 6.8/100,000 to 7.3/100,000 in Hispanic females in contrast to a decline among non-Hispanic White males and females (10/100,000 to 8.4/100,00 and 7.9/100,000 to 6.3/100,000 respectively).

E.3. Comparison of Select 2006 Florida Incidence Rates with Pooled Data from 38 State Registries

The 2006 annual American Cancer Society report included detailed tables summarizing the cancer experience of Hispanics relative to non-Hispanics residing in 38 states, using data pooled over years 1999-2003 (including data from the FDCS registry).[17] A table comparing these rate ratios is provided below along with the direction of Hispanic to non-Hispanic incidence rates in Florida in 2006. Findings from Florida largely reflect the cancer experience in other states with lower cancer rates for Hispanics relative to non-Hispanics, with the exceptions of cervical, stomach, and liver cancers, all which are higher in Hispanics. There were, however some notable inconsistencies in the rate ratios in Florida versus pooled data from the 38 states. In 2006, the Florida prostate cancer incidence rates in Hispanics and non-Hispanics were virtually identical (127 vs. 128 per 100,000, respectively), while substantially lower rates in Hispanics relative to non-Hispanics were documented in the 38-state analysis (rate ratio [RR]= 0.89).

Table 2. Directionality of Selected Hispanic/non-Hispanic Cancer Incidence Rate Ratios: Pooled Data from 38 States (1999-2003) versus Florida (2006)

	Male Hispanic/non-Hispanic Cancer Incidence Rate Ratio			Female Hispanic/non-Hispanic Cancer Incidence Rate Ratio	
Cancer Site	38 States†	Florida		38 States†	Florida
All Sites	↓	↓		↓	↓
Lung and Bronchus	↓	↓		↓	↓
Prostate (males only)	↓	↔			
Breast (females only)				↓	↓
Colorectal	↓	↑		↓	↑
Bladder	↓	↓		↓	↓
Head and Neck	↓	↓		↓	↓
Non-Hodgkin's Lymphoma	↓	↔		↓	↑
Melanoma	↓	↓		↓	↓
Ovarian (females only)				↓	↓
Cervical (females only)				↑	↑
Stomach	↑	↑		↑	↑
Liver	↑	↑		↑	↑
Gall Bladder	--	↔		--	↑

†Data from American Cancer Society 2006 report[17]
--data not included in ACS report

Irrespective of gender, colorectal cancer incidence rates were higher in Florida Hispanics versus non-Hispanics with the opposite pattern noted in the pooled data (RR= 0.81 and 0.82 in males and females, respectively). In Florida Hispanic males, the trend for colorectal cancer rates increased sharply in the early 1990s, surpassing the rates for non-Hispanics in 1996 (See Section D.2.5). The rate of increase in Hispanic females was less dramatic, albeit against the backdrop of slowly decreasing rates in non-Hispanics leading to a crossover in rates in 1996. Finally, the rates of non-Hodgkin's lymphoma were lower in Hispanics versus non-Hispanics in the 38-state data (RR= 0.85 and 0.80 in males and females, respectively), while in Florida rates were similar for Hispanics and non-Hispanics, irrespective of gender (16 versus 15/100,000).

E.4. Cancer Distribution within Hispanic Subgroups

Use of the newly developed Hispanic Origin Identification Algorithm (HOIA) helped to reduce the proportion of Hispanics classified into discrete sub-group categories from approximately 40% to 70%, as well as increasing the overall accuracy of the Hispanic ethnicity designation.[11] Unfortunately, the lack of detailed census population estimates for the major Hispanic subgroups in Florida prevented us from calculating cancer incidence rates for comparative purposes. Nevertheless, a comparison of the distribution of cancer subtypes across major Hispanic subgroups is informative of potentially disproportionate cancer risk factor burdens and for targeted studies. For example, Cuban-American males experienced a cancer burden which was larger than would be expected based on the estimated number of Cuban-American males residing in Florida (31% of the total Hispanic population in Florida in 2000). This may be due to the older average age of Florida Cuban-Americans relative to the average age of the other major Hispanic sub-groups residing in Florida.[40] This seemingly excess burden of cancer could be due to higher rates of the tobacco-associated cancers as a comparison of the site-specific pie charts indicates that the most disproportionate distribution attributed to Cuban-Americans was noted for lung cancer for both males and females (59% and 42% of the total Hispanic lung cancer burden, respectively). The burden of head and neck cancers, which also have a high tobacco attributable risk to cancer (73% and 43% in males and females, respectively)[41], was also high in Cuban-Americans accounting for 52% of all Hispanic head and neck cancers in males and 41% of all head and neck cancers in Hispanic females. Of note, a variety of surveys which include the assessment of the prevalence of tobacco use in Hispanic sub-populations have failed to document higher rates of smoking in Cuban-American males and females relative to other Hispanic subgroups[42-44]— even when taking into consideration the higher prevalence of cigar smoking in Cuban-American males.[42]

One non-tobacco associated cancer which seems to disproportionally impact Cuban-Americans was gall bladder cancer which accounted for 51% and 43% of the total burden of this cancer in Florida Hispanic males and females, respectively. The etiology of gall bladder cancer is poorly understood, although gall bladder cancer is typically more common in older adults, in females than in males (2-6 times), and is associated with the presence of gallstones.[45, 46]

Hispanic subpopulations are at increased risk of the relatively rare “Hispanic” cancers (i.e. stomach, liver, and gallbladder), although there are differential distributions of these cancers among the different subpopulations (with South and Central Americans having the highest proportion of these cancers). Screenable cancers (i.e. cervical, prostate and colorectal cancers) are also proportionally increased among some of the Hispanic subpopulations which suggests the importance of implementing more targeted screening interventions among these subpopulations. Of note, these distributions of different cancer types among the Hispanic subpopulations by gender are similar to those found in the SEER database, although our analysis did not include as many different cancer types and the underlying distribution of the Hispanic subpopulations were somewhat different.[17]

E.5. The Hispanic Paradox and Cancer in Florida

Analysis of FCDS data confirms that Hispanics residing in Florida have lower overall cancer rates relative to non-Hispanics (with a few notable exceptions the site specific cancers examined in this Monograph were lower in Hispanics and in non-Hispanics). Overall, these findings are in support of the presence of the Hispanic paradox, especially given that a higher percentage of Hispanics in Florida are uninsured (54.4%) and are more likely to live below the poverty line (16.7%)[47, 48] relative to non-Hispanics (30.2% and 8.6% respectively). [47, 48] This finding is all the more notable given that some investigators have questioned whether the Hispanic Paradox exists beyond subgroups other than lower income Mexican Americans.[15]

Analysis of pooled 1999-2001 FCDS data and the application of the HOIA algorithm did permit calculation of Hispanic subgroup-specific incidence data utilizing 2000 US census denominator data.[9] In comparison to

White non-Hispanics, all major Hispanic subgroups, with the exception of Puerto Rican males, had lower age-adjusted cancer incidence ratios. Among male Hispanic subgroups, the largest difference in rates was seen in non-Hispanic whites versus Mexican-Americans (incidence rate ratio=0.6). Misclassification of ethnicity in cancer registry records is one possible explanation for these incidence rate differences in Hispanics versus non-Hispanics, although we did apply the most advanced algorithm to our Florida data in order to correctly characterize this important data field.[9]

E.6. Study Limitations

Several study limitations should be noted. Although the FCDS has received Gold Certification from the North American Association of Central Cancer Registries (NAACCR) since 2003, all cancer registry data can be limited by the accuracy and completeness of the data. For exampling, staging data are not always complete which can affect interpretation of stage at diagnosis data (e.g., gall bladder). Cancer records from the Florida Veteran's Administration medical facilities are presently not obtained by the FCDS. The denominator data needed for the calculation of incidence rates was based on US Census estimates, which can also be subject to inaccuracies. The percentage of cases not classified by Hispanic sub-group was reduced by the application of the HOIA algorithm to the FCDS data to approximately 30%. This represents a dramatic improvement over previous attempts to document the cancer experience in Hispanic sub-groups. For example, in the previously mentioned 36-state analysis, the proportion of Hispanic cases which was designated "other/unknown origin" was 62%.[17] Despite this notable improvement, it must be acknowledged that misclassification of Hispanic subgroups is still present, especially if the distribution of Hispanic sub-groups within the 30% undesignated in the present analysis differs from the 'true' underlying sub-group proportions of Hispanics with cancer in Florida. Also, as noted above, the lack of annual census estimates for Hispanic subgroups within Florida prevented us from calculating cancer incidence estimates for our pooled data.

E.7. Future Research and Prevention Activities

Cuban-American males have the highest incidence rates for lung cancer relative to other Florida Hispanic subgroups residing in Florida.[10] The apparent excess proportion of tobacco-associated cancers noted for Cuban-Americans in relation to published reports of tobacco use (which suggest that this sub-group does not have elevated smoking rates in relation to other Hispanic subgroups) is a research question which could be addressed by undertaking a careful study documenting the prevalence of tobacco use in all major Hispanic sub-groups residing in Florida. The possibility that Cuban-Americans have a higher incidence of gall bladder cancer relative to other Hispanic sub-groups residing in Florida requires documentation, and possibly further research employing case-control study designs to explore possible risk factors. Rising incidence rates of distant colorectal cancers in Hispanic males and females is of great concern, especially given that rates in White non-Hispanics were declining during the same time period. Additional efforts designed to increase compliance with screening guidelines in Florida Hispanics may be necessary to reverse this trend in a screenable cancer.

APPENDIX 1. Major Hispanic Cancers: International Classification of Disease (ICD) and FCDS Coding

Cancer Site and FCDS Number		Incidence ICD-0-3 Codes	Mortality ICD-9 codes (1979-1998)	Mortality ICD-10 codes (1998 +)
All				
		C00-C97	140-208, 238.6	C00-C97
Lung/Bronchus				
36	Lung and Bronchus	C34	162.2-162.5, 162.8-162.9	C34
Prostate				
51	Prostate	C61.9	185	C61.9
Breast				
43	Breast	C50	174-175	C50
Colorectal				
14-22	Colon	C18, C26	153, 159.0	C18, C26.0
23-24	Rectum and Rectosigmoid Junction	C19.9, C20.9	154.0-154.1	C19.9-C20.9
Bladder (includes in situ)				
55	Bladder	C67	188	C67
Head and Neck				
1	Lip	C00	140	C00
2	Tongue	C01-C02	141	C01-C02
3	Salivary Gland	C07.9-C08	142	C07-C08
4	Floor of Mouth	C04	144	C04
5	Gum and Other Mouth	C03, C05-C06	143, 145	
6	Nasopharynx	C11	147	C11
7	Tonsil	C09	146.0-146.2	C09
8	Oropharynx	C10	146.3-146.9	C10
9	Hypopharynx	C12, C13	148	C12-C13
10	Other Buccal Cavity and Pharynx	C14, C14.2-C14.8	149	C14
34	Nasal Cavities, Middle Ear and Accessory Sinuses	C30- C31	160	C30-C31
35	Larynx	C32	161	C32

Non Hodgkin's				
66	NHL Nodal	C02.4, C09.8, C09.9, C11.1, C14.2, C37.9, C42.2, C77	200	C82-C85, B21.1, B21.2
67	NHL Extra-nodal	C00-C02.3, C02.5-C09.7, C10-C11, C11.2-C14.1, C14.3-C38.7, C38-C42.1-C42.3-C76.9, C78-C99	202.0-202.2, 202.8-202.9	Not available
Melanoma				
41		C44 (Histology 8720-8790	172	C43
Ovary				
47	Ovary	C56.9	183	C56.9
Cervix				
44	Cervix	C53	180	C53
Stomach				
12	Stomach	C16	151	C16
Liver				
26	Liver	C22	155.0, 155.2	C22
Gall Bladder				
28	Gall Bladder	C23.9	156	C23.9

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