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Differences in Pancreatic Cancer Incidence Rates and Temporal Trends Across Asian Subpopulations in California (1988-2015)

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Abstract

Objective: Ethnic disparities in pancreatic cancer (PanCan) incidence exist, but little is known about incidence trends in heterogeneous Asian Americans. We examined PanCan incidence and temporal patterns among detailed ethnic populations, including Asian-American subgroups.

Methods: A total of 71,099 invasive exocrine PanCan cases were identified using the California Cancer Registry between 1988 and 2015. Cases were grouped into mutually exclusive groups of non-Hispanic (NH) white, NH black, Hispanic, NH Asian/Pacific Islander (API), and NH American Indian/Alaska Native. Asians were further identified by specific ethnicity.

Results: The age-adjusted incidence rates (per 100,000) of PanCan varied significantly across racial/ethnic groups, ranging from the highest of 10.4 in NH blacks to 7.6 in NH whites, 7.1 in Hispanics, 6.2 in NH APIs, and to the lowest of 5.2 in NH American Indian/Alaska Native. Despite the relatively low rate in the NH APIs, the rates across Asian subgroups varied significantly, with rates similar to NH whites in Japanese (8.1) and Koreans (7.5) to the low rate in South Asians (4.4).

Conclusions: Significant heterogeneity of PanCan incidence in disaggregated Asian Americans are novel findings. These results fill a gap regarding PanCan burden in Asian Americans and underscore the importance of disaggregating ethnic populations in cancer research.

Keywords

pancreatic cancer; pancreatic ductal adenocarcinoma; disparity; ethnicity; Asians; incidence

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Pancreatic cancer is one of the most fatal cancers with an estimated 55,440 new cases and 44,330 deaths associated with this disease in the United States (US) in 2018.¹ In the last decade, pancreatic cancer death rates have been increasing in the US, which is in sharp contrast to the downward trend in rates for most other major cancers.^{2,3} Pancreatic cancer is a heterogeneous disease of two general types: exocrine and endocrine. Each has unique biology and clinical presentation, with exocrine pancreatic cancer accounting for more than 95% of the incidence of pancreatic malignancies.⁴ In the US, African Americans have the highest incidence of pancreatic cancer⁵⁻⁷; however, incidence rates have been rising among non-Hispanic Whites, Hispanics, and Asians.^{2,5}

Although highly heterogeneous and fast growing,⁸⁻¹⁰ Asian Americans are often regarded as one aggregated racial group, sometimes categorized together with Pacific Islanders. Previous studies have revealed substantial variations in cancer incidence and mortality patterns and trends among disaggregated Asian Americans by ethnic group across many cancer types.¹¹⁻¹⁶ Whereas the etiology of pancreatic cancer is largely unknown, understanding ethnic differences will help identify risk factors to guide targeted interventions to prevent this fatal disease. Therefore, we examined the incidence rates and temporal trends of exocrine pancreatic cancer across disaggregated Asian American subgroups in California in comparison with aggregated racial groups using 1988–2015 data from the population-based California Cancer Registry (CCR).

Patient and tumor information in CCR data, as well as the estimates of corresponding at-risk populations by aggregated and disaggregated racial/ethnic groups, has been previously reported.¹¹ We included only invasive cases of pancreatic cancer (ICD-O-3 site codes of C25.0-C25.9) with exocrine type (ICD-O-3 histology codes 8140, 8144, 8145, 8154, 8255, 8260, 8440, 8441, 8450, 8452, 8453, 8460, 8470, 8471, 8480, 8481, 8490, 8500, 8503, 8504, 8507, 8510, 8514, 8521, 8523, 8550, 8551, 8560, 8570, 8574) for a total of 71,099 cases. We included aggregated racial/ethnic groups of non-Hispanic (NH) white, NH black, Hispanic (any race), NH Asian/Pacific Islander (API), NH American Indian/Alaska Native (AIAN). Asians were disaggregated into the following subgroups: Chinese, Japanese, Filipino, Korean, South Asian (including Asian Indian, Pakistani, Sri Lankan, Bangladeshi and other South Asian groups), Vietnamese, and other Southeast (SE) Asian (including Cambodian, Hmong, Laotian, and Thai). Our preliminary analyses of pancreatic cancer cases identified little differences in risk patterns between males and females across all racial/ethnic groups, except the well-known male predominance.¹⁷ Thus, we combined both sexes together in this study for more robust case counts.

We calculated the age-adjusted (2000 US standard) incidence rates (AAIRs) by race/ethnicity, and time period. The average annual percent changes (AAPC) in annual AAIRs by race/ethnicity from 1988 to 2015 were estimated using Joinpoint Regression Program (Version 4.1.0, NCI, Bethesda, Md.) to describe changes in race/ethnicity-specific incidence trends. Tests for statistical significance were two-sided at 95% confidence level.

Although the AAIR for the aggregated NH API group was 6.24 per 100,000, there were substantial variations among the disaggregated Asian ethnic groups (Fig. 1 and

Supplemental Table 1). Higher AAIRs were found in Japanese (8.13) and Koreans (7.48), similar to that of NH white (7.65); and lower AAIRs were found in South Asians (4.35), Chinese (5.48), and Filipinos (5.88), similar to that of NH AIAN (5.20); these differences were all statistically significant. Such racial/ethnic disparities in AAIR were also largely reflected in ASIRs (Supplemental Fig. 1 and Supplemental Table 1). The temporal trends of the annual race/ethnicity-specific AAIRs revealed statistically significant rising trends among most of the racial/ethnic groups examined (Fig. 2 and Supplemental Table 2). Despite having the lowest AAIR among the major racial/ethnic groups, NH AIAN experienced the faster increase in risk over time (AAPC = 5.6); whereas the highest risk group, NH black, maintained a relatively stable trend.

Further examination of the case distributions by demographic and tumor characteristics show group disparities existed among not only the major aggregated racial/ethnic groups, but also among Asian subgroups (Supplemental Table 3). The temporal trends of tumor stage at diagnosis displayed increased proportions of both localized and remote stages, while the proportions of unknown stage decreased across all races/ethnicities, which likely reflected better staging capability than any true changes in early/delayed diagnoses (Supplemental Table 4).

In summary, using CCR data we documented the significant heterogeneity of invasive exocrine pancreatic cancer incidence patterns and temporal trends across aggregated racial/ethnic populations and Asian-American subpopulations defined by country of origin during 1998–2015. Our findings for the aggregated racial/ethnic groups confirm what has been already known. However, our new analyses among the disaggregated ethnic Asian-Americans uncover heterogeneous risk levels and temporal trends that have never been reported before. We found that Japanese and Koreans have pancreatic cancer risk as high as NH whites, whereas Chinese, Filipinos, and South Asians have similar low risk as NH AIANs. The significant rising incidence trends across almost all of the racial/ethnic groups examined, particularly the fastest risk increase in NH AIANs is very concerning and calls for targeted interventions and further studies to understand its driving causes. Nonetheless, the relatively stable incidence trends among NH blacks may provide valuable clues for etiology. The observations reported here fill a gap in understanding pancreatic cancer, will facilitate hypothesis-generation for future research, and further underscore the importance of disaggregating ethnic populations in cancer research.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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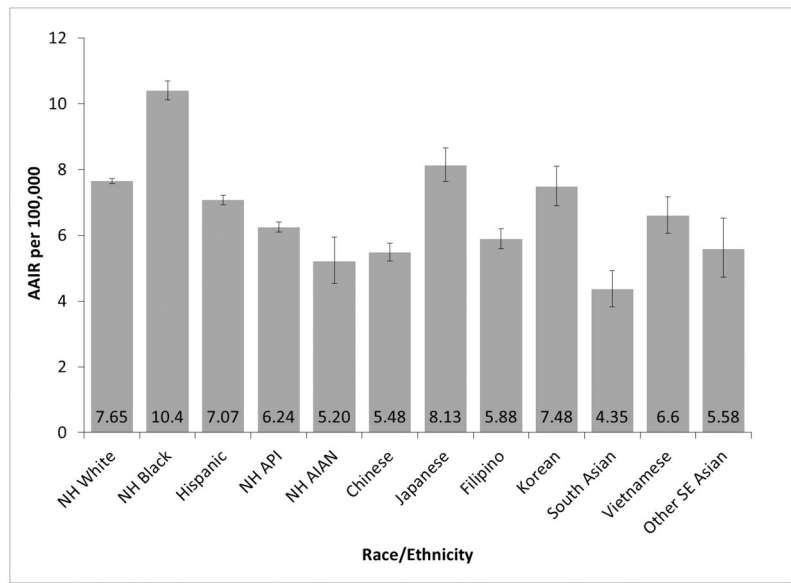


FIGURE 1. Age-adjusted Incidence Rate of Invasive Exocrine Pancreatic with 95% Confidence Intervals by Race/Ethnicity, California, 1988-2015. AAIR indicates age-adjusted Incidence rate; AIAN, American Indian/Alaskan Native; API, Asian/Pacific Islander; NH, non-Hispanic; SE, South East.

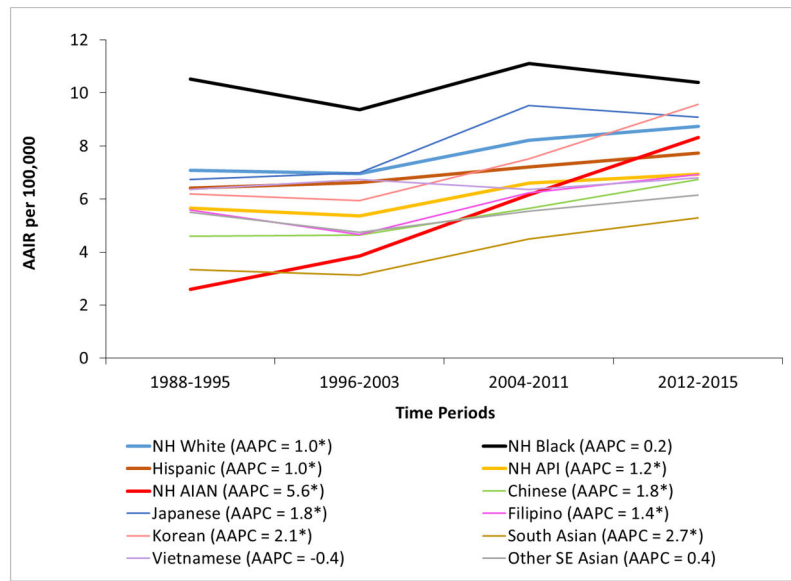


FIGURE 2. Temporal Trends of Age-adjusted Incidence Rate of Invasive Exocrine Pancreatic with Average Annual Percent Change by Race/Ethnicity, California, 1988-2015. AAIR indicates age-adjusted Incidence rate; AAPC, Average Annual Percent Change; AIAN, American Indian/Alaskan Native; API, Asian/Pacific Islander; NH, non-Hispanic; SE, South East. *Indicates statistical significance at 95% confidence level.