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Cancer Research in Asian American, Native Hawaiian, and Pacific Islander Populations: Accelerating Cancer Knowledge by Acknowledging and Leveraging Heterogeneity

Scarlett Lin Gomez[1,2], **Sally L. Glaser**[1,2], **Pamela L. Horn-Ross**[1,2], **Iona Cheng**[1,2], **Thu Quach**[1,2], **Christina A. Clarke**[1,2], **Peggy Reynolds**[1,2], **Salma Shariff-Marco**[1,2], **Juan Yang**[1], **Marion M. Lee**[3], **William A. Satariano**[4], and **Ann W. Hsing**[1,2]

[1]Cancer Prevention Institute of California, Fremont, California

[2]Division of Epidemiology, Department of Health Research and Policy, Stanford University School of Medicine, Stanford, California

[3]University of California, San Francisco, San Francisco, California

[4]University of California, Berkeley, Berkeley, California

Abstract

The Asian American, Native Hawaiian, and Pacific Islander population is large, growing, and extremely heterogeneous. Not only do they bear unique burdens of incidence and outcomes for certain cancer types, they exhibit substantial variability in cancer incidence and survival patterns across the ethnic groups. By acknowledging and leveraging this heterogeneity through investing in cancer research within these populations, we have a unique opportunity to accelerate the availability of useful and impactful cancer knowledge.

Asian Americans, Native Hawaiians, and Pacific Islanders (AANHPI) are collectively the most rapidly growing racial/ethnic group in the United States, recently surpassing Hispanics in rates of population growth (1). In the 2000 Census, AANHPIs were enumerated at 15.8 million individuals (19 million including AANHPIs of multiple race), representing 5.1% or 1 in 20 persons in the United States (2), with the largest populations in California [6.0

Corresponding Author: Scarlett Lin Gomez, Cancer Prevention Institute of California, 2201 Walnut Avenue, Suite 300, Fremont, CA 94538. Phone: 510-608-5041; Fax: 510-608-5085; scarlett@cpic.org.

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Authors' Contributions

Conception and design: S.L. Gomez, S.L. Glaser, I. Cheng, T. Quach, C.A. Clarke, S. Shariff-Marco, M.M. Lee, W.A. Satariano, A.W. Hsing

Development of methodology: S.L. Gomez, S.L. Glaser, T. Quach, W.A. Satariano

Acquisition of data (provided animals, acquired and managed patients, provided facilities, etc.): S.L. Gomez, J. Yang

Analysis and interpretation of data (e.g., statistical analysis, biostatistics, computational analysis): S.L. Gomez, S.L. Glaser, I. Cheng, T. Quach, J. Yang, M.M. Lee

Writing, review, and/or revision of the manuscript: S.L. Gomez, S.L. Glaser, P.L. Horn-Ross, I. Cheng, T. Quach, C.A. Clarke, P. Reynolds, S. Shariff-Marco, J. Yang, M.M. Lee, W.A. Satariano, A.W. Hsing

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million (15.8% of total population)] and New York [1.7 million (8.7% of total population)]. By Census estimates, the number of AANHPIs in the United States will exceed 40 million in 2050 (3). Reflecting recent immigration trends, the proportion of Asian Americans who are foreign born ranges from 28% among Japanese to 70% among Asian Indians and Koreans; 25% of all Asian Americans immigrated within the past decade (4).

AANHPIs include populations from more than 30 different countries, and from strikingly different social and economic backgrounds, speaking more than 100 languages. This diversity is based, in part, on broad historical immigration patterns: Chinese laborers arrived in the United States in the 19th century, Vietnamese refugees in the 1970s, Filipino health professionals starting in the 1970s, and South Asian technology professionals in the 2000s. Furthermore, the many cultures and lifestyles AANHPIs bring from their native countries have been modified to varying degrees through acculturation in the United States. The net result is an aggregate AANHPI population that is highly heterogeneous, varying profoundly in characteristics such as English language proficiency, socioeconomic status, insurance coverage, health beliefs, use of health services, diets, body size, and lifestyles (5, 6). For example, the median household income in 2000 across California AANHPI groups ranged almost 3-fold, from $24,337 among the Hmong population to $68,935 among the Asian Indian population (7). The percentage of AANHPIs with limited English proficiency ranged from 12% among Native Hawaiian and Pacific Islanders (NHPI) to 54% among Vietnamese (3). The percentage of AANHPIs with less than high school education ranged from 7% among Japanese to 56% to 68% among Southeast Asians (Cambodians/Kampucheans, Laotians, and Hmong; ref. 3). Within each AANHPI population, access to health care and cancer behavioral risk factors also differ by immigration, acculturation, and socioeconomic status (8, 9). In addition, differences in residential neighborhoods and types of occupation affect environmental exposures (e.g., air pollution, workplace chemicals, and built environment). All these factors affect cancer risk and associated outcomes, and thus have important implications for health.

Despite this diversity, most cancer research still considers AANHPI populations in the aggregate. Aggregation can mask important differences across specific AANHPI populations that largely have been overlooked (10), such as disparities in cancer incidence/risk and outcomes. This practice of aggregation has persisted, in part, because data (e.g., from the Census) for detailed ethnicities are often not readily available. The lack of disaggregated cancer data for specific AANHPI populations also may be a consequence of the persistent stereotype of attributing positive health profiles to the aggregate group as a single "model minority" (10), and thus of the limited awareness of the need and value of examining specific ethnic groups. Early studies that did focus on specific AANHPI populations and their migration patterns revealed clear differences in cancer incidence between Asians living in their native countries and those living in the United States, as well as changes in rates associated with length of residence and number of generations in the United States. These classic studies are often cited together as evidence for the role of environmental factors in cancer etiology (11–15). However, consistent consideration of specific ethnic populations individually has not typified the AANHPI cancer epidemiology literature within the United States. This failure to disaggregate groups is a disservice to public health by allowing potential disparities and vulnerable populations to go undetected (16). It also has resulted in

lost opportunities to leverage the tremendous heterogeneity across these populations in the United States for the purpose of uncovering potential group-specific cancer risk and prognostic factors.

In two recently published articles using national SEER data to examine cancer rates over nearly 20 years (1990 through 2008), we demonstrated substantial variation in incidence time trends across eight Asian American ethnic populations and three Native Hawaiian and Pacific Islander populations (17, 18). Such patterns had not been examined previously due to lack of availability of population estimates for specific AANHPI ethnic groups. Using California SEER data, we also have examined cancer incidence and survival patterns among Asian American populations by nativity, or immigration status, revealing previously unidentified disparities, and uncovering patterns pointing to new directions for inquiries into etiology and survivorship (11, 16, 19–22). Such data on contemporary trends and patterns in cancer incidence and outcomes, together with the diversity across these ethnic groups, their exposures, and their immigration patterns, provide significant but underutilized opportunities to make discoveries about the relative contributions of environmental and genetic influences on cancer etiology and outcomes. Moreover, emerging research shows that aspects of the biology of cancers may be unique to some AANHPI ethnic groups; examples include the observed higher proportions of $HER2^{+}$ breast cancers among Filipinas, Koreans, and Vietnamese (23); the higher prevalence of EGFR mutations in lung cancer among East Asians (24); the higher Gleason grade prostate tumors among Chinese, Japanese, foreign-born Filipinos, foreign-born Koreans, and foreign-born Vietnamese (22); and the higher incidence of premenopausal breast cancer among U.S.-born Chinese and Filipino women relative to non-Hispanic whites (11). The incidence patterns and variations noted in these descriptive cancer registry-based studies provide a launching point for deeper inquiries into factors underlying potentially unique etiology and prognosis profiles in these groups.

This issue of *Cancer Epidemiology, Biomarkers & Prevention* features two editorials and six original articles on AANHPI populations. Together, they (i) provide insights into cancer etiology and cancer outcomes by studying exposures, exposure levels, and gene–environment interactions for specific AANHPI populations; (ii) expose and debunk the "model minority" myth of positive cancer health profiles among AANHPIs as an aggregate by demonstrating variations both in exposures and in diseases/ outcomes across the specific groups; (iii) feature methodologically novel ways of studying AANHPIs; and (iv) focus on cancers of unique burden to AANHPI groups.

The article by Thompson and colleagues demonstrates the power of existing data from patients' electronic health records (EHR) for studying patient-, provider-, and system- level factors associated with cancer screening in an insured population of seven AANHPI ethnic groups (25). This article illustrates the heterogeneity in cancer screening adherence and associated factors across multiple AANHPI groups even after accounting for health care access. EHRs will be ever more useful as they become the norm for medical record collection and reporting, although they must be designed to capture patient socio-demographic indicators that are meaningful for planning, surveillance, and research (e.g., detailed race/ethnicity based on self-report, birthplace, language, ancestry, and socioeconomic status). Quach and colleagues combined demographics data from the U.S.

Census and air toxics data from the U.S. Environmental Protection Agency to examine average concentrations of hazardous air pollutants in residentially concentrated AANHPI census tracts across California (26). By showing higher air pollutant levels for some tracts with heavily concentrated AANHPI ethnic groups, they highlight potential environmental exposure disparities in ethnic minority neighborhoods.

Pollack and colleagues focus on hepatitis B infection, which in most Asian American groups is a predominant risk factor for hepatocellular carcinoma, a cancer of high burden among many AANHPI populations (27). This article shows that seroprevalence of hepatitis B surface antigen determined in a large New York City screening program varied across foreign-born AANHPIs by ethnic group, ranging from 3% to 15%, as well as by gender, age, and specific place of birth. Park and colleagues, using data from the Multiethnic Cohort (MEC), compared levels of urinary metabolites of 1,3-butadiene among Japanese Americans, Native Hawaiians, and non-Hispanic whites to elucidate differential risks of smoking-associated lung cancers (28). Cheng and colleagues, taking advantage of more than 20 years of cancer incidence data for 10 AANHPI ethnic groups, showed that incidence of adenocarcinoma of the lung has been increasing among Filipino and Korean females and among Chinese men (29); this pattern among Filipino and Korean females are of particular concern, given the low prevalence of smoking in these populations. These findings indicate that research into risk factors other than smoking is warranted and that AANHPI women are an ideal population in which to conduct such research.

Finally, Nguyen and colleagues offer a commentary on the "model minority" myth and why it persists; a multilevel, historical, and life course context for sociocultural factors that shape health and disease for AANHPI populations; and a forward-looking perspective on the approaches and strategies to advance impactful research and public health policy for these populations while addressing methodologic concerns such as small sample sizes (30). They also present a portfolio analysis of grants from the National Cancer Institute’s Division of Cancer Control and Population Sciences (DCCPS), demonstrating the paucity of favorably reviewed and funded grants that focus on AANHPIs. Notably, of the few grants funded, none is focused on cancer etiology.

Not only is federally funded cancer research on AANHPIs sparse, but these groups also are currently underrepresented within the Cancer Epidemiology Cohorts (CEC) of the Epidemiology and Genomics Research Program of the DCCPS. Although Chinese in Shanghai and in Singapore are well represented in the CECs, only in the MEC are AANHPIs in the United States included in high numbers, and even in this cohort, the only specific AANHPI ethnic groups of sufficient size for subgroup-specific analyses are Japanese Americans and Native Hawaiians. The CECs, many with rich biospecimen resources, offer a powerful resource for studying the independent and joint effects on cancer incidence and outcomes of factors over the life course and at multiple levels, from molecular and genetic characteristics to contextual influences. However, without appropriate representation of specific AANHPI ethnic groups in the CECs, these data are unable to provide information that is relevant and targeted to the growing populations of AANHPIs, and also prevents researchers from capitalizing on the heterogeneity in the AANHPI

populations to draw insights into cancer etiology and prognosis/survivorship that will benefit cancer prevention and control efforts in all segments of the population.

The AANHPI populations are diverse, dynamic, and growing in numbers. By acknowledging and leveraging this heterogeneity, we have a unique opportunity to accelerate the availability of useful and impactful cancer knowledge.

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