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Tobacco use among Asian Americans, Native Hawaiians/Pacific Islanders, and mixed-race individuals: 2002–2010

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Abstract

Background—Non-Hispanic Asian Americans, Native Hawaiians/Pacific Islanders (NHs/Pis), and mixed-race individuals are the fastest growing segments of the US population. We examined prevalences and correlates of tobacco use among these understudied groups. Prevalences among whites were included as a comparison.

Methods—Data were drawn from the 2002–2010 National Surveys on Drug Use and Health. Respondents aged 12 years were assessed for current (past-month) use of cigarettes, cigars, smokeless tobacco (chewing tobacco, snuff), and pipe tobacco. Respondents' race/ethnicity, age, sex, household income, government assistance, urbanicity of residence, residential stability, self-rated health, alcohol use, and drug use were examined as correlates.

Results—Between 2002 and 2010, there was a decline in the prevalence of cigarette smoking among whites (26.9% in 2002; 24.3% in 2010) and Asian Americans (18.0% in 2002; 11.1% in 2010). Prevalence of pipe tobacco use among mixed-race individuals increased from 0.2% in 2002 to 1.6% in 2010; there was little change in the prevalence of cigar and smokeless tobacco use in these racial/ethnic groups. Adjusted analyses showed that, compared with Asian Americans, mixed-race individuals had greater odds of using four tobacco products, and NHs/Pis had greater odds of using cigarettes, cigars, and smokeless tobacco. Regardless of race/ethnicity, male sex was a correlate of use of cigars, smokeless tobacco, and pipe tobacco; alcohol and drug use increased the odds of cigarette and cigar smoking.

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Contributors: LT Wu originated the study and drafted the manuscripts. MS Swartz and DG Blazer helped conceptualize the aims. LT Wu and B Burchett conducted data analyses. All coauthors contributed to writing of the manuscripts resulting in the final version.

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Conclusions—These new findings show prevalent tobacco use among NHs/PIs and mixed-race individuals, and highlight the importance of including these populations in future research and reporting.

Keywords

Asian Americans; mixed race; Pacific Islanders; cigarette smoking; tobacco use; National Survey on Drug Use and Health (NSDUH)

1. INTRODUCTION

The 2010 census reveals that Asian Americans (14.7 million; 4.8% of the US population), Native Hawaiians/Pacific Islanders (NHs/PIs, 0.5 million; 0.2%), and mixed-race persons or people of multiple races (9.0 million; 2.9%) are the fastest growing US populations (Hoeffel et al., 2012; US Census Bureau, 2011). Growth rates of these racial/ethnic populations (32.0–43.3%) were about three times greater than that of the total US population (9.7%). Of all mixed-race individuals in 2010, 83% were white in combination with 1 other race (black, Hispanic, Asian American, NH/PI, native American); NHs/PIs, Asian Americans, and native Americans were more likely than other nonwhites to be mixed-race individuals (US Census Bureau, 2011). Recognizing the need to improve health statistics to inform health policy, the Office of Management and Budget issued standards in 1997 to call for separating Asian Americans and NHs/PIs in reports on race/ethnicity for federal data sources. In 2000, the US census started the collection of mixed-race status (Srinivasan and Guillermo, 2000). However, these standards have not been completely used in federal sources, and they do not apply to nonfederal sources. Mixed-race individuals have often been omitted from reports; Asian Americans and NHs/PIs have frequently been pooled as “others,” making the results less interpretable. Thus, there are limited epidemiological data on the use of tobacco products for these populations, especially mixed-race individuals (Centers for Disease Control and Prevention [CDC], 2011, 2012a; US Department of Health and Human Services [USDHHS], 2000).

Tobacco use is the single most preventable cause of diseases, disabilities, and deaths in the United States. Half of cigarette smokers who continue to smoke are estimated to die prematurely from smoking-related causes; the remaining users may suffer from nicotine-related diseases (CDC, 2008; USDHHS, 2012). Use of noncigarette tobacco (cigars, pipe, chewing, snuff tobacco) also confers a high risk for cancer, cardiovascular, and respiratory diseases (Akl et al., 2011; Levitz et al., 2004; Sarna et al., 2003). Tobacco use prevalences hence are among the leading indicators of national health in the Healthy People reports. To improve the health for the whole US population, the Healthy People initiatives have been implemented to identify and eliminate health disparities (USDHHS, 2000). Due to the scarcity of reliable population-based data on use of noncigarette tobacco products for Asian Americans, NHs/PIs, and mixed-race individuals, evaluations of disparities in tobacco use have relied mainly on cigarette smoking data (CDC, 2011, 2012b; USDHHS, 2000). The new targets of Healthy People 2020 include reducing tobacco use prevalences among adults from 20.6% to 12.0% for cigarette smoking, from 2.3% to 0.3% for smokeless tobacco, and from 2.2% to 0.2% for cigar use by 2020. Given the increasing size of these populations, population-based data on the trends, prevalences, and correlates of use of these tobacco products are needed to gauge the extent of tobacco use and to guide research and evaluation of tobacco-related disparities for these understudied populations (Ryskulova and Keppel, 2011).

Specifically, community-based studies have regularly reported tobacco use prevalences for whites, blacks, and Hispanics, but the sample size from a single study is frequently too small

to generate reliable results of noncigarette tobacco use for Asian Americans, NHs/PIs, and mixed-race individuals (CDC, 2012b; Johnston et al., 2012). For example, Monitoring the Future studies have not regularly tracked tobacco use for Asian Americans, NHs/PIs, and mixed-race individuals (Johnston et al., 2012). Prevalences of current cigarette smoking in the United States have decreased in adults (24% in 1998; 21% in 2008) and adolescents (35% in 1999; 19% in 2009); declines are noted for whites, blacks, and Hispanics (CDC, 2011; Johnston et al., 2012). However, there are limited data to evaluate the trend in tobacco use by Asian Americans, NHs/PIs, and mixed-race individuals. In the past decade, cigarette sales have declined, but sales of noncigarette tobacco (cigar, snuff) have increased (Connolly and Alpert, 2008). The tobacco industry has been aggressively promoting tobacco use by spending \$8.05 billion in 2010 on cigarette marketing and \$444.2 million on smokeless tobacco advertisements to attract new users and retain existing users (US Federal Trade Commission, 2012a, 2012b). New smokeless, oral tobacco products are perceived as less harmful than cigarettes (Choi et al., 2012; Tomar and Hatsukami, 2007); they can circumvent smoke-free policies, decrease tobacco cessation efforts, and promote tobacco use, leading to addiction, cardiovascular disease, and oral cancer risk (Ebbert et al., 2004; Rankin et al., 2010).

There has been a rise in noncigarette tobacco advertising, including smokeless tobacco and cigar use videos in social media (Bromberg et al., 2012; CDC, 2011; Richardson and Vallone, 2012). Recent findings show elevated odds of cigar use among young adults and “other races” (pooling NHs/PIs, mixed-race individuals, and others; King et al., 2012). Emerging data also indicate an increased popularity of pipe tobacco smoking, which also increases cancer risk (Tverdal and Bjartveit, 2011; Wald and Watt, 1997). All these findings point to an elevated use of noncigarette tobacco; however, little is known about the prevalences, trends, and correlates of use of various tobacco products among Asian Americans, NHs/PIs, and mixed-race individuals.

Given the lack of specific tobacco use data among Asian Americans, NHs/PIs, and mixed-race individuals to inform research, intervention, and health policy, we examined national trends in prevalence of tobacco use (cigarettes, cigars, smokeless tobacco, pipe tobacco), and determined their correlates of use among non-Hispanic Asian Americans, non-Hispanic NHs/PIs, and non-Hispanic mixed-race individuals. To address the small sample size issue limiting prior analyses of these groups, we used data from the largest national surveys of substance use—National Survey on Drug Use and Health (NSDUH)—and aggregated 2002–2010 data. This enabled us to generate reliable estimates for correlates of tobacco use to inform prevention foci. We examined all respondents aged 12 years to provide a fuller picture on age-related changes in use of different tobacco products. Whites are often used as a reference group for racial/ethnic disparity; their tobacco use prevalences were included for comparison (CDC, 2011).

2. METHODS

2.1. Data source

NSDUH is the only survey designed to provide ongoing national estimates of substance use in the United States (Substance Abuse and Mental Health Services Administration [SAMHSA], 2003, 2011). For the 2002–2010 surveys, from which we used data, the sampling frame covered approximately 98% of the noninstitutionalized US population aged 12 years and used multistage area probability sampling methods to select a representative sample of the civilian, noninstitutionalized population. The target population included residents of households from the 50 states (including shelters, rooming houses, and group homes) and civilians residing on military bases. The design oversampled people aged 12–25

years. Due to a large sample size, there was no need to oversample racial/ethnic groups as was done prior to 1999.

Respondents were interviewed at their home for about an hour. Prospective respondents were assured that their names would not be recorded and their responses would be kept strictly confidential. All study procedures and protections were carefully explained. To increase respondents' willingness to report substance use honestly, NSDUH used a combination of computer-assisted personal interviewing for sociodemographic questions and audio computer-assisted self-interviewing methodologies for substance use questions of a sensitive nature. The latter allowed respondents to either read the questions silently on a computer screen or to listen to the questions read aloud by the computer through headphones, and then entered their responses directly into a computer provided by the interviewer.

NSDUH's annual sample of respondents was considered representative of the US general population aged 12 years. To include sufficient numbers of Asian Americans, NHs/PIs, and mixed-race individuals for detecting meaningful racial/ethnic differences in tobacco use, we pooled the public use data files ($N = 500,914$) from 2002–2010 ($n = 54,079$ – $57,873$ /yearly). These years used similar designs, allowing use of pooled samples for the analysis of the same variables (SAMHSA, 2003, 2011). Weighted response rates for household screening and interviewing were 89–90% and 73–79%, respectively, for these years. The aggregate sample included 16,678 Asian Americans, 2,310 NHs/PIs, 13,960 mixed-race individuals, and 322,550 whites.

2.2. Study variables

Respondents' age, sex, self-reported race/ethnicity, annual household income, government assistance, urbanicity of residence (large, small, nonmetropolitan area), and residential stability ("How many times in the past 12 months have you moved?") were examined. Race was evaluated separately from ethnicity. Four mutually exclusive racial/ethnic groups were examined: non-Hispanic white, non-Hispanic Asian American, non-Hispanic NH/PI, and mixed-race individuals (2 races). The data do not distinguish between specific racial/ethnic groups of mixed-race individuals. Government assistance included participation in any government assistance programs (e.g., supplemental security income, food stamps, cash assistance). To control for differences in socioeconomic and residential factors related to race/ethnicity, annual household income, government assistance status, urbanicity of residence, and residential stability were included as control variables in the adjusted analysis (Duncan et al., 2002; USDHHS, 2000; Wilson and Donnermeyer, 2006).

Tobacco use included use of cigarettes, chewing tobacco (coarsely shredded tobacco that is sold in pouches of loose leaves or in a "plug" or "twist" form), snuff or dip (a finely ground form of tobacco that usually comes in a container called a tin), cigars (including cigarillos), and pipe tobacco. We examined current use (in the past month) to reflect active use (CDC, 2012b). Smokeless tobacco included chewing tobacco and snuff or dip (including use of snus from tobacco brand questions). Any current tobacco use included past-month use of any cigarettes, smokeless tobacco, or pipe tobacco.

The survey instrument also assessed each respondent's use of alcohol as well as illicit or nonmedical use of nine drug classes (marijuana/hashish, cocaine/crack, heroin, hallucinogens, inhalants, prescription opioids, stimulants, tranquilizers, sedatives). Past-year use of alcohol and past-year use of drugs were included in the analysis as control variables to adjust for their confounding effects on the associations between tobacco use and race/ethnicity.

Self-rated health was assessed by the widely supported measure of general health (“Would you say your health in general is excellent, very good, good, fair, or poor?”), which was associated with substance use and minority status (Smith et al., 2010; Vingilis et al., 1998). It was included as a control variable.

2.3. Data analysis

We examined racial/ethnic differences in sociodemographics, self-rated health, and substance use by Chi2. We then determined prevalences of tobacco use by survey year. We conducted adjusted logistic regression analyses to estimate associations between race/ethnicity and tobacco use, when adjusting for age, sex, household income, government assistance, urbanicity of residence, residential stability, self-rated health, alcohol use, drug use, and survey year to mitigate for their confounding effects. Analyses were conducted with SUDAAN software, taking into account NSDUH’s complex designs, such as weighting and clustering (Research Triangle Institute, 2006). All results are weighted except for sample sizes, which are unweighted.

3. RESULTS

3.1. Sociodemographics (Table 1)

Compared with whites, higher proportions of mixed-race individuals were adolescents or in the low-income groups, received government assistance, reported fair/poor health, and used illicit drugs. There were more NHs/PIs than whites in the lowest household income and government assistance groups. Fewer whites experienced residential moves than Asian Americans, NHs/PIs, and mixed-race individuals. Whites had the highest proportion of past-year alcohol use.

3.2. Prevalence of current tobacco use: 2002–2010 (Table 2)

Any tobacco—Between 2002 and 2010, there was a significant decline in any tobacco use among whites (32.0% in 2002; 29.5% in 2010, $p < .05$) and Asian Americans (19.0% in 2002; 11.8% in 2009, $p < .05$). There were no significant changes in the prevalence of any tobacco use among NHs/PIs and mixed-race individuals. In 2010, prevalences of tobacco use among NHs/PIs (26.7%) and mixed-race individuals (32.2%) resembled prevalence among whites (29.5%) and were higher than Asian Americans’ prevalence (12.8%).

Cigarettes—NHs/PIs and mixed-raced individuals showed a declining trend in use, but the changes were not statistically significant. The decline between 2002 and 2010 was significant among whites (26.9% in 2002; 24.3% in 2010, $p < .05$) and Asian Americans (18.0% in 2002; 11.1% in 2010, $p < .05$).

Cigars—There were no significant changes in the prevalence of cigar smoking in 2002–2010. In 2010, fewer Asian Americans (2.1%) than whites (5.2%) used cigars; the latter group’s prevalence did not differ from prevalences among NHs/PIs (4.2%) and mixed-race individuals (5.2%).

Smokeless tobacco—From 2002 to 2010, there were no significant changes in the prevalence of smokeless tobacco use. In 2010, fewer Asian Americans (0.6%) than whites (4.6%) used smokeless tobacco; the latter group’s prevalence did not differ from prevalences among NHs/PIs (2.8%) and mixed-race individuals (3.3 %).

Pipe tobacco—Mixed-race individuals were the only group showing significant changes in use of pipe tobacco (0.2% in 2002; 1.6% in 2010, $p < .05$). In 2010, fewer Asian

Americans (0.3%) than whites (0.9%) used pipe tobacco; prevalences among NHs/PIs (2.9%) and mixed-race individuals (1.6%) did not differ from whites.

3.3. Adjusted analysis of racial/ethnic differences in tobacco use (Table 3)

To adjust for potentially confounding influences of age, sex, household income, county type, government assistance, residential stability, self-rated health, alcohol use, drug use, and survey year on the estimates of racial/ethnic differences in tobacco use, we conducted logistic regression analyses of tobacco use.

Asian Americans had lower odds than whites in all types of tobacco product use. NHs/PIs did not differ from whites in cigar smoking and pipe tobacco use, but they had a lower adjusted odds ratio (AOR) than whites in the use of any tobacco (AOR=0.71, 95% CI=0.56–0.91), cigarettes (AOR=0.74, 95% CI=0.59–0.93), and smokeless tobacco (AOR=0.61, 95% CI=0.41–0.89). Mixed-race individuals had higher odds of cigar smoking than whites (AOR=1.20, 95% CI=1.05–1.38) but resembled whites in the odds of other tobacco product use. When comparing with Asian Americans, mixed-race individuals had greater odds of using the four tobacco products, and NHs/PIs had greater odds of using three tobacco products (not pipe tobacco). Mixed-race individuals also had greater odds of cigarette smoking than NHs/PIs.

3.4. Correlates of tobacco product use (Tables 4–5)

Adjusted logistic regression analyses were conducted to determine correlates of specific tobacco product use for Asian Americans, NHs/PIs, and mixed-race individuals. Survey year was included as a control variable.

Cigarettes—In all three racial/ethnic groups, nonelderly adults (18–64 years), persons of lower-income families, and users of alcohol or drugs in the past year showed elevated odds of cigarette smoking. Male sex (Asian Americans), government assistance (NHs/PIs, mixed-race individuals), residence in a nonmetropolitan area (Asian Americans, NHs/PIs), residential moves (mixed-race individuals), and fair/poor health (Asian Americans, mixed-race individuals) also were associated with increased odds of cigarette smoking.

Cigars—In all three racial/ethnic groups, male sex, alcohol use, and drug use increased odds of cigar smoking. Additionally, ages 18–25 (Asian Americans), ages 18–49 (mixed-race individuals), residence in a small metropolitan area (Asian Americans), and absence of residential moves (NHs/PIs) were associated with elevated odds of cigar smoking.

Smokeless tobacco—Male sex (regardless of race/ethnicity), ages 18–49 (Asian Americans, mixed-race individuals), ages 65 (mixed-race individuals), residence in a small (NHs/PIs, mixed-race individuals) or nonmetropolitan (mixed-race individuals) area, absence of residential moves (Asian Americans), alcohol use (mixed-race individuals), and drug use (Asian Americans) were associated with increased odds of smokeless tobacco use.

Pipe tobacco—Male sex (regardless of race/ethnicity), household income <\$20,000 (NHs/PIs, mixed-race individuals), government assistance (NHs/PIs), residence in a large metropolitan area (NHs/PIs), fair/poor health (NHs/PIs), and drug use (Asian Americans, mixed-race individuals) were associated with increased odds of pipe tobacco use.

4. DISCUSSION

This study used the largest national samples of non-Hispanic Asian Americans, non-Hispanic NHs/PIs, and non-Hispanic mixed-race individuals available and examined various

tobacco products to provide the most recent and comprehensive national estimates of tobacco use for these fast growing but understudied populations. Our findings have implications for informing research, tobacco cessation efforts, and health policy. *First*, more NHs/PIs and mixed-race individuals than whites resided in low-income households, received public assistance, and experienced residential moves; more mixed-race individuals than whites reported poor/fair health and used illicit drugs. *Second*, prevalences of cigarette smoking declined among Asian Americans and whites only, and prevalences of pipe tobacco use increased among mixed-race individuals. *Third*, adjusted analyses revealed that mixed-race individuals had elevated odds of using cigarettes (vs. Asian Americans, NHs/PIs), cigars (vs. Asian Americans, whites), smokeless tobacco (vs. Asian Americans), and pipe tobacco (vs. Asian Americans). Additionally, NHs/PIs had greater odds than Asian Americans of using cigarettes, cigars, and smokeless tobacco. *Fourth*, regardless of race/ethnicity, male sex was a robust correlate of use of noncigarette tobacco products; alcohol or drug use was associated with cigarette and cigar smoking. *Fifth*, there were some variations in correlates of use across racial/ethnic groups. Drug use was associated with smokeless and pipe tobacco use among Asian Americans and with pipe tobacco use among mixed-race individuals.

4.1. What this study adds to our knowledge

The most salient and new finding is the prevalent rate of current cigarette smoking (27.9%) and any tobacco use (32.2%) among mixed-race individuals in 2010, which resembled that of whites (24.3%, 29.5%, respectively). While the 9 years of data revealed a significant decline in any tobacco use among whites, rates of any tobacco use among mixed-race individuals did not decrease over time. Of note, mixed-race individuals' rates of current tobacco use exceeded that of whites in 3 years (2004, 2008, 2009: 33.8%–37.7% vs. 29.8%–31.8%). Adjusted analyses also showed that mixed-race individuals were more likely than Asian Americans and NHs/PIs to use tobacco. Prevalent tobacco use combined with comparatively high proportions of mixed-race individuals reporting illicit/nonmedical drug use, poor/fair self-rated health, and low household income reveal that this a particularly disadvantaged group, warranting research to consider tobacco use behaviors within a larger psychosocial and economic context. Although there is a lack of population-based, reliable trend data on tobacco use to make comparisons, these analyses of national samples suggest stable prevalences in use of cigarettes, cigars, and smokeless tobacco over a span of 9 years and an increased rate of pipe tobacco smoking among mixed-race individuals. The fact that mixed-race individuals are a much larger US population (9 million) than NHs/PIs (0.5 million) and one that is growing fast supports the inclusion of mixed-race individuals in future studies and reports on tobacco use. It also highlights a need for additional research to evaluate and track tobacco use and health risk, especially among male and low-income mixed-race individuals (US Census Bureau, 2011; CDC 2011).

These inclusive findings on correlates for four tobacco products reveal associations between all forms of tobacco use and alcohol/drug use. Emerging findings have suggested that mixed-race individuals and whites have similarly high prevalences of alcohol/drug use and related disorders (Wu et al., 2006, 2011a, 2011b). Tobacco use prevalences among mixed-race individuals also are more similar to whites than to NHs/PIs and Asian Americans. However, the reasons for their prevalent substance use are not known because of a lack of research. Of all mixed-race individuals in the 2010 census data, 92% had two races (8% with 3 races); most mixed-race individuals (83%) were white in combination with 1 other race. One direction for research is to explore whether and why one of the races represented may increase tobacco use, as well as cultural/ethnic factors (e.g., acculturation). Additionally, co-usage of tobacco and other substances deserves research to examine how use of tobacco and other substances interact in influencing initiation and escalation of substance problems; this

research would also delineate potentially greater medical consequences of tobacco-using mixed-race individuals. Further, very little is known about how tobacco-control measures (smoke-free laws, tobacco taxes, anti-tobacco campaigns) influence mixed-race individuals' tobacco use and cessation behaviors. Concerted efforts are needed to improve data collection and reporting on mixed-race individuals' sociodemographic and health status to guide prevention and intervention efforts.

Another critical finding is the salient differences in health indicators between NHs/PIs and Asian Americans. NHs/PIs had much higher prevalences of tobacco (cigarettes, cigars, smokeless tobacco) and drug use (16.4% vs. 7.5%) than Asian Americans. Regional surveys of adolescents have also found higher prevalences of cigarette smoking among NHs/PIs than among Asian Americans (Kim and McCarthy, 2006; Wong et al., 2004). This study adds new findings by including the trend data and correlates of use for noncigarette tobacco from national samples and by expanding the findings to include adolescents and adults. The differences in tobacco and drug use point to the need to disaggregate Asian Americans and NHs/PIs in the research and reports on tobacco and other substance use. Of note, these national estimates show evidence that tobacco use estimates from the combined populations of Asian Americans and NHs/PIs obscure crucial differences between the groups and can present inaccurate intervention needs and health policy implications for either population. Finally, among Asian Americans, tobacco use appeared to affect mainly lower-income adults, men, and alcohol/drug users; these subgroups can be the foci of research and intervention for this population.

4.2. Limitations and strengths

Like other surveys, NSDUH relies on self-reports, which can be influenced by memory error and under-reporting (Nasim et al., 2012). Despite the largest samples available, the sample size of NHs/PIs ($n = 2,310$) is moderate, which can limit the power to detect reliable differences between groups. There were more variations in tobacco use over time and across ages among NHs/PIs than Asian Americans, which may be due to a smaller sample of NHs/PIs. Because of space constraints, we focus on prevalences and correlates of four tobacco products in Asian Americans, NHs/PIs, and mixed-race individuals; each population also includes diverse racial/ethnic groups that may differ in tobacco use (Caraballo et al., 2008). Another limitation is that this study was not able to assess all types of tobacco use (e.g., water pipes; Akl et al., 2011). Results are considered "conservative estimates" of tobacco use for Asian Americans, NHs/PIs, and mixed-race individuals in the sample of the general population. Further, findings do not apply to institutionalized or homeless adults (about 2% of the population), who were not included in the survey. Because of the very small proportion of institutionalized/homeless individuals relative to the large size of the noninstitutionalized population, excluding institutionalized/homeless persons may not affect substantially the overall population estimates (Anthony and Helzer, 1991).

NSDUH has unique strengths unavailable from small-scale studies. It uses audio computer-assisted self-interviewing to increase the privacy and accuracy of self-reports and includes detailed probes to augment assessments for substance use (SAMHSA, 2011). Its data quality is further improved by incorporating consistency checks, statistical computation, and analysis weights to minimize response inconsistency and adjust for nonresponse bias. NSDUH produces more valid estimates of substance use than telephone surveys (Gfroerer and Hughes, 1992). Methodological studies also indicate support of the validity for use of NSDUH data in providing national estimates of substance use (Gfroerer et al., 2002; Harrison et al., 2007; SAMHSA, 2010).

4.3. Conclusions

By disaggregating Asian Americans, NHs/PIs, and mixed-race individuals, this study is among the first to provide national estimates and correlates of noncigarette tobacco use for these fast growing but understudied populations. Aggregating Asian Americans and NHs/PIs as a single group in research reports may mischaracterize intervention needs and misinform health policy for either population. These estimates highlight the need to improve data collection and reports to better delineate socioeconomic profiles of NHs/PIs and mixed-race individuals as well as their tobacco use and health risks.

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Table 1

Selected characteristics among non-Hispanic whites, non-Hispanic Asian Americans, non-Hispanic Native Hawaiians/Pacific Islanders (NHs/PIs), and non-Hispanic mixed-race individuals.

	White (N = 322,550)			Asian American (n = 16,678)			NHs/PIs (n = 2,310)			Mixed-race (n = 13,960)		
	%	95% CI	%	%	95% CI	%	%	95% CI	%	%	95% CI	%
Age in years												
12–17	9.0	8.9–9.0	9.8	9.4–10.3	10.9	9.5–12.3	16.1	15.3–17.0				
18–25	11.9	11.7–12.1	14.2	13.5–15.0	18.3	16.0–20.6	14.7	13.9–15.6				
26–34	12.7	12.5–12.9	19.5	18.3–20.7	17.6	14.7–20.6	14.2	12.7–15.7				
35–49	26.0	25.7–26.3	29.5	27.9–31.0	29.7	25.5–33.9	21.2	19.8–22.6				
50–64	23.1	22.7–23.4	17.5	16.1–19.0	18.6	14.6–24.1	20.4	18.3–22.7				
65	17.4	17.0–17.7	9.5	8.1–11.1	4.6	2.5–8.4	13.3	11.4–15.4				
Sex												
Male	48.6	48.3–48.8	47.6	46.1–49.1	48.9	44.2–53.6	47.8	45.4–50.2				
Female	51.4	51.2–51.7	52.4	50.9–53.9	51.1	46.4–55.8	52.2	49.8–54.6				
Total family income												
< \$20,000	14.4	14.1–14.7	14.3	13.2–15.5	19.9	16.3–23.5	24.5	22.6–26.3				
\$20K–\$49,999	32.6	32.2–33.0	27.8	26.5–29.2	37.7	33.5–41.9	35.7	33.6–37.8				
\$50K–\$74,999	19.6	19.3–19.8	18.7	17.5–20.0	17.5	13.9–21.0	16.5	15.1–18.0				
\$75,000	33.4	33.0–33.9	39.1	37.5–40.7	24.9	20.0–29.8	23.3	21.3–25.3				
Government assistance, yes	10.8	10.6–11.0	9.2	8.2–10.3	20.0	16.8–23.1	21.7	19.9–23.6				
County type												
Large metro	43.3	42.8–43.9	75.0	73.6–76.4	58.0	53.3–62.7	43.9	41.6–46.1				
Small metro	42.6	42.1–43.2	23.3	21.9–24.7	38.8	34.3–43.4	45.6	43.1–48.1				
Non metro	14.0	13.7–14.4	1.7	1.3–2.1	3.2	2.0–4.3	10.5	8.9–12.1				
Times moved												
1	13.3	13.1–13.5	19.3	18.2–20.4	20.4	17.4–23.4	16.9	15.6–18.2				
2 or more	6.3	6.1–6.4	7.5	6.8–8.3	10.1	8.4–12.2	9.7	8.8–10.7				
None	80.4	80.2–80.7	73.2	71.8–74.5	69.5	65.8–73.2	73.4	71.7–75.1				
Self-rated health												
Very good/good	89.1	88.9–89.3	91.9	90.9–93.0	87.6	85.0–90.2	83.7	81.9–85.4				

	White (N = 322,550)		Asian American (n = 16,678)		NHs/PIs (n = 2,310)		Mixed-race (n = 13,960)	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Fair/poor	10.9	10.7–11.1	8.1	7.0–9.1	12.4	9.8–15.0	16.3	14.6–18.1
Alcohol use, yes	70.3	70.1–70.6	51.8	50.4–53.2	58.8	53.1–64.5	64.0	62.1–66.0
Drug use, yes	14.9	14.7–15.2	7.5	6.7–8.2	16.4	13.2–19.5	21.1	19.6–22.7

Table 2

Prevalences of current tobacco use among non-Hispanic whites, non-Hispanic Asians, non-Hispanic Native Hawaiians/Pacific Islanders, and non-Hispanic mixed-race individuals aged 12 or older, 2002–2010.

	2002 % 95% CI	2003 % 95% CI	2004 % 95% CI	2005 % 95% CI	2006 % 95% CI	2007 % 95% CI	2008 % 95% CI	2009 % 95% CI	2010 % 95% CI
Any Tobacco									
White	32.0 31.1–32.9	31.3 30.5–32.2	31.8 30.9–32.6	31.5 30.7–32.7	31.3 30.6–32.1	30.7 29.8–31.6	30.5 29.6–31.4	29.8 29.0–30.6	29.5 28.7–30.4
Asian American	19.0 15.4–23.2	13.8 11.4–16.6	11.1 9.2–13.4	14.9 12.1–18.4	16.2 13.6–19.2	15.7 12.9–18.9	13.6 11.1–16.4	11.8 9.9–13.9	12.8 10.3–15.8
Native	28.2	35.4	32.2	31.4	29.8	30.8	23.1	26.6	26.7
Hawaiian/Pacific Islander	18.6–40.7	25.5–46.8	20.6–46.6	21.5–43.2	19.1–43.2	20.7–43.2	12.8–37.9	15.3–42.1	15.5–39.4
Mixed-Race	37.4	36.0	33.8	31.5	36.6	35.7	37.7	37.3	32.2
	30.8–44.5	30.9–41.4	33.7–44.2	27.2–36.3	30.8–42.9	30.3–41.6	31.6–44.3	31.3–43.8	27.2–37.8
Cigarettes									
White	26.9 26.0–27.7	26.4 25.6–27.3	26.7 26.0–27.4	26.3 25.4–27.2	26.0 25.3–26.7	25.5 24.7–26.3	25.1 24.3–25.9	24.8 24.0–25.7	24.3 23.4–25.1
Asian American	18.0 14.5–22.2	12.8 10.6–15.5	9.8 8.0–12.0	13.9 11.1–17.3	14.8 12.0–18.1	14.5 11.8–17.6	11.7 9.4–14.6	10.9 9.1–12.9	11.1 8.7–14.1
Native	26.9	31.6	25.4	29.7	27.0	29.6	22.1	16.6	18.5
Hawaiian/Pacific Islander	17.0–39.7	22.3–42.5	15.3–39.0	20.1–41.5	17.0–40.2	19.6–42.1	12.0–37.2	9.1–28.4	11.0–29.6
Mixed-Race	34.1	32.2	35.8	28.6	32.7	29.7	32.5	31.0	27.9
	27.6–41.3	27.2–37.6	30.7–41.3	24.2–33.5	27.1–38.8	24.8–35.2	26.7–39.1	26.1–36.4	23.0–33.4
Cigars									
White	5.4	5.3	6.0	5.9	5.7	5.6	5.5	5.2	5.2
	5.1–5.8	5.0–5.7	5.6–6.4	5.5–6.2	5.3–6.0	5.2–5.9	5.1–5.9	4.9–5.5	4.9–5.6
Asian American	1.1	1.7	1.8	1.5	1.3	1.4	0.9	1.2	2.1
	0.7–1.8	1.0–2.9	1.0–3.2	1.1–2.0	0.8–2.0	0.9–2.3	0.6–1.6	0.7–2.1	1.5–3.0

	2002 % 95% CI	2003 % 95% CI	2004 % 95% CI	2005 % 95% CI	2006 % 95% CI	2007 % 95% CI	2008 % 95% CI	2009 % 95% CI	2010 % 95% CI
Native	3.9	6.4	12.0	3.3	2.0	5.7	2.2	9.7	4.2
Hawaiian/Pacific Islander	2.0–7.6	3.4–13.0	5.5–24.2	1.2–8.5	0.8–4.8	2.0–15.0	0.9–5.0	2.8–28.9	0.7–20.9
Mixed-Race	5.7	6.6	9.1	7.7	7.1	8.3	7.3	7.4	5.2
	3.8–8.4	4.6–9.3	6.3–13.0	5.3–13.0	5.0–10.0	5.5–12.5	5.2–10.2	5.6–9.8	3.7–7.1
Smokeless Tobacco									
White	4.2	3.9	3.8	4.1	4.3	4.3	4.7	4.4	4.6
	3.9–4.6	3.6–4.3	3.5–4.2	3.7–4.4	4.0–4.7	4.0–4.7	4.3–5.1	4.1–4.8	4.2–4.9
Asian American	0.2	0.1	0.5	0.6	1.4	0.6	1.1	0.4	0.6
	0.1–0.6	0.06–3.0	0.2–1.2	0.2–1.3	0.6–3.3	0.3–1.1	0.3–3.2	0.2–0.9	0.3–1.4
Native	0.7	2.6	5.3	2.7	3.5	2.7	2.0	2.9	2.8
Hawaiian/Pacific Islander	0.2–2.1	0.9–7.0	1.8–15.0	0.8–8.4	1.3–8.9	1.4–5.4	0.5–7.0	1.0–8.0	1.3–5.7
Mixed-Race	3.7	3.3	3.5	3.0	2.3	3.7	4.0	5.3	3.3
	2.0–6.9	1.9–5.6	1.8–5.9	1.5–5.8	1.4–3.7	1.6–8.3	2.1–7.4	3.1–8.9	2.0–5.6
Pipe Tobacco									
White	0.9	0.8	1.0	0.8	0.9	1.0	0.8	0.9	0.9
	0.7–1.1	0.7–1.0	0.8–1.3	0.6–1.0	0.7–1.1	0.8–1.3	0.6–1.0	0.7–1.1	0.8–1.1
Asian American	0.5	0.1	0.2	0.4	0.3	0.4	0.5	0.4	0.3
	0.06–3.1	0.02–3.9	0.04–1.4	0.1–0.9	0.1–0.7	0.1–1.0	0.1–1.9	0.2–0.8	0.1–0.6
Native	0.6	1.3	2.4	0.04	 ^a	0.1	0.3	 ^a	2.9
Hawaiian/Pacific Islander	0.2–1.9	0.4–4.6	0.8–7.4	0.01–0.03		0.01–0.7	0.1–0.9		0.6–11.9
Mixed-Race	0.2	1.6	0.9	0.7	1.5	0.9	0.5	1.1	1.6
	0.1–0.5	0.7–3.6	0.5–1.7	0.3–1.6	0.7–3.4	0.3–2.5	0.3–1.0	0.6–2.0	0.8–3.1

Boldface indicates that the estimate in a given year differed from the estimate in 2002.

^aEstimates are not reported due to a small sample size.

Table 3

Adjusted logistic regression of current tobacco use among non-Hispanic whites, non-Hispanic Asian Americans, non-Hispanic Native Hawaiians/Pacific Islanders, and non-Hispanic mixed-race individuals aged 12 or older.

Adjusted model	Any tobacco ^a			Cigarettes ^a			Smokeless tobacco ^a			Pipe tobacco ^a		
	AOR	95% CI		AOR	95% CI		AOR	95% CI		AOR	95% CI	
White	1.00			1.00			1.00			1.00		
Asian American	0.40	0.37–0.43		0.48	0.44–0.52		0.28	0.24–0.33		0.17	0.13–0.24	0.46
Native Hawaiian/Pacific Islander	0.71	0.56–0.91		0.74	0.59–0.93		0.80	0.50–1.30		0.61	0.41–0.89	0.77
Mixed-Race	1.05	0.97–1.15		1.08	0.98–1.18		1.20	1.05–1.38		0.80	0.64–1.01	0.94
Asian American	1.00			1.00			1.00			1.00		
Native Hawaiian/Pacific Islander	1.78	2.41–2.25		1.65	1.24–1.94		2.88	1.74–4.76		3.15	2.12–5.80	1.68
Mixed-Race	2.64	2.37–2.94		2.25	2.01–2.53		4.31	3.41–5.44		4.64	3.17–6.80	2.05
Mixed-Race	1.00			1.00			1.00			1.00		
Native Hawaiian/Pacific Islander	0.68	0.53–0.86		0.69	0.54–0.87		0.67	0.40–1.12		0.76	0.50–1.15	0.82

^aEach adjusted logistic regression model controlled for age, sex, family income, government assistance, county type, self-rated health, and survey year. Boldface indicates that the estimate was significant ($p < .05$). AOR, adjusted odds ratio.

Table 4

Adjusted logistic regression of cigarette smoking and cigar smoking among non-Hispanic whites, non-Hispanic Asian Americans, non-Hispanic Native Hawaiians/Pacific Islanders, and non-Hispanic mixed-race individuals aged 12 or older, adjusting for survey year.

Adjusted model ^a	Cigarette smoking						Cigar smoking					
	Asian American	Native Hawaiian/Pacific Islander	Mixed-race	Asian American	Native Hawaiian/Pacific Islander	Mixed-race	Asian American	Native Hawaiian/Pacific Islander	Mixed-race	Asian American	Native Hawaiian/Pacific Islander	Mixed-race
	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
Age (vs. 12–17 years)												
18–25	4.61	3.64–5.83	6.89	3.88–12.24	3.16	2.58–3.86	2.73	1.57–4.72	2.45	0.96–6.24	2.05	1.51–2.79
26–34	4.16	3.28–5.28	6.50	3.51–12.06	4.47	3.44–5.80	1.39	0.68–2.83	1.35	0.45–4.10	1.62	1.09–2.40
35–49	3.06	2.36–3.97	6.44	3.15–13.18	5.84	4.39–7.78	1.05	0.54–2.04	1.48	0.49–4.50	1.65	1.16–2.35
50–64	2.22	1.55–3.19	3.25	1.15–9.21	3.41	2.50–4.65	0.42	0.15–1.16	 ^b		0.91	0.46–1.82
65+	1.13	0.54–2.35	2.12	0.34–13.40	1.27	0.72–2.24	0.27	0.03–2.11	 ^b		0.52	0.17–1.54
Male vs. Female	2.48	2.06–2.98	0.90	0.57–1.41	1.18	0.98–1.42	4.88	3.35–7.10	4.64	1.96–11.00	3.00	2.27–3.96
Family income (vs. \$75,000)												
< \$20,000	1.44	1.08–1.91	1.70	0.79–3.64	2.47	1.77–3.44	1.20	0.78–1.84	1.10	0.42–2.85	1.30	0.89–1.90
\$20,000–\$49,999	1.54	1.21–1.96	3.00	1.42–6.36	1.96	1.51–2.54	0.82	0.52–1.31	0.50	0.22–1.14	0.89	0.65–1.23
\$50,000–\$74,999	1.66	1.27–2.16	1.37	0.66–2.84	1.42	1.03–1.96	0.96	0.55–1.68	0.80	0.28–2.23	0.93	0.61–1.42
Government assistance vs. no	1.10	0.86–1.40	1.84	1.05–3.23	1.36	1.03–1.79	0.88	0.53–1.48	2.26	1.00–5.10	1.00	0.75–1.33
County type (vs. large metro)												
Small metro	1.01	0.83–1.23	1.02	0.68–1.52	0.88	0.72–1.06	1.84	1.30–2.60	0.91	0.41–2.02	0.92	0.69–1.23
Non metro	2.52	1.28–4.99	2.57	1.24–5.34	1.14	0.82–1.59	1.61	0.77–3.39	0.82	0.14–4.76	1.03	0.64–1.64
Times moved (vs. none)												
1	1.03	0.83–1.27	0.80	0.49–1.31	0.99	0.77–1.27	0.76	0.50–1.17	0.38	0.16–0.89	0.97	0.69–1.35
2 or more	1.08	0.85–1.37	0.88	0.54–1.42	1.43	1.11–1.83	0.76	0.49–1.19	0.59	0.27–1.30	1.29	0.96–1.75
Fair/poor health vs. no	2.12	1.48–3.06	1.12	0.62–2.04	1.88	1.35–2.62	1.01	0.49–2.09	0.77	0.23–2.64	1.47	0.89–2.41
Alcohol use vs. no	3.69	2.89–4.71	4.03	2.33–6.97	1.93	1.52–2.44	4.33	2.31–8.12	5.91	2.39–14.58	2.86	1.85–4.41
Drug use vs. no	3.66	2.94–4.56	3.67	2.13–6.31	3.95	3.15–4.96	3.71	2.53–5.44	3.71	1.89–7.28	2.55	1.88–3.46

^aEach model included all covariates listed in the first column and survey year.

^bDue to small numbers of tobacco users aged 50 or over, they were combined with individuals aged 35–49 years. Boldface indicates that the estimate was significant ($p < .05$). AOR, adjusted odds ratio.

Table 5

Adjusted logistic regression of current smokeless tobacco use and pipe tobacco use among non-Hispanic whites, non-Hispanic Asian Americans, non-Hispanic Native Hawaiians/Pacific Islanders, and non-Hispanic mixed-race individuals aged 12 or older, adjusting for survey year.

Adjusted model ^a	Smokeless tobacco use						Pipe tobacco use					
	Asian American			Native Hawaiian/ Pacific Islander			Mixed-race			Asian American		
	AOR	95% CI		AOR	95% CI		AOR	95% CI		AOR	95% CI	
Age (vs. 12–17 years)												
18–25	13.92	5.17–7.51	1.03	0.31–3.40	1.94	1.14–3.29	1.91	0.63–5.77	2.05	0.55–7.67	0.89	0.32–2.48
26–34	18.95	6.52–55.07	2.25	0.51–10.00	1.86	1.01–3.42	1.08	0.26–4.51	2.44	0.39–5.45	0.35	0.11–1.14
35–49	10.38	3.63–29.67	0.76	0.18–3.18	2.56	1.36–4.79	0.82	0.18–3.72	0.60	0.15–2.37	1.27	0.40–4.05
50–64	 ^b		 ^b		1.49	0.63–3.55	1.71	0.24–11.97	 ^b		0.68	0.21–2.16
65+	 ^b		 ^b		3.01	1.09–8.35	1.43	0.23–8.73	 ^b		0.33	0.06–1.80
Male vs. Female	34.43	9.41–26.00	7.83	2.32–26.47	15.24	8.28–28.04	3.71	1.41–9.81	10.49	1.92–57.17	2.31	1.43–3.74
Family income (vs. \$75,000K)												
< \$20,000	0.60	0.22–1.66	1.68	0.47–5.98	0.91	0.42–1.96	1.26	0.42–3.76	46.73	4.68–466.42	3.65	1.15–11.56
\$20,000–\$49,999	1.37	0.60–3.13	0.81	0.25–2.62	1.36	0.68–2.72	0.68	0.27–1.71	9.38	0.99–89.04	1.78	0.65–4.85
\$50,000–\$74,999	0.77	0.28–2.16	0.42	0.12–1.41	0.69	0.32–1.47	1.91	0.49–7.36	8.46	0.89–80.03	3.20	1.15–8.95
Government assistance vs. no	0.65	0.20–2.13	0.93	0.32–2.74	1.09	0.62–1.94	0.36	0.11–1.21	3.45	1.16–10.25	0.51	0.24–1.06
County type (vs. large metro)												
Small metro	0.65	0.20–2.13	3.56	1.44–8.78	1.98	1.22–3.22	0.62	0.29–1.35	1.15	0.27–4.85	1.21	0.61–2.38
Non metro	2.23	0.70–7.18	1.39	0.16–12.48	2.61	1.35–5.03	3.65	0.67–19.75	0.03	0.001–0.89	1.76	0.62–5.05
Times moved (vs. none)												
1	0.22	0.13–0.37	2.34	0.88–6.22	1.89	0.88–4.05	1.00	0.40–2.04	0.43	0.06–3.33	0.55	0.26–1.16
2 or more	0.63	0.26–1.49	2.37	0.80–7.07	1.43	0.75–2.73	1.03	0.38–2.80	0.63	0.12–3.42	2.00	0.75–5.34
Fair/poor health vs. no	0.83	0.25–2.74	0.57	0.15–2.15	1.09	0.58–2.06	0.69	0.21–2.32	5.00	1.14–21.83	1.52	0.81–2.87
Alcohol use vs. no	0.60	0.26–1.40	3.30	0.97–11.20	3.27	1.55–6.90	1.61	0.42–6.13	0.84	0.24–2.97	1.84	0.61–5.53
Drug use vs. no	4.60	2.39–8.86	2.53	0.97–6.62	0.90	0.59–1.38	5.14	2.43–10.88	2.28	0.82–6.33	4.52	2.55–8.02

^aEach model included all covariates listed in the first column and survey year.

^bDue to small numbers of tobacco users aged 50 or over, they were combined with individuals aged 35–49 years. Boldface indicates that the estimate was significant ($p < .05$). AOR, adjusted odds ratio.