Sociodemographic Correlates of Dietary Practices among Asian-Americans: Results from the California Health Interview Survey

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Abstract

Objective Studies show that Asian-American subgroups do not always meet dietary recommendations and are at high risk of cardiovascular diseases. The purpose of our research is to illustrate the various sociodemographic correlates of dietary habits for six subgroups of Asian-Americans in California.

Design The 2005 California Health Interview Survey (CHIS) was utilized. A total of 3772 Asian-Americans were included in this study, with the largest subgroup being Chinese ($n=1280$; $N=913,798$). The outcome variable for this study was dietary behavior defined as consuming five or more fruits and vegetables per day (5-a-day), provided by CHIS. Univariate and multivariable regression analyses were conducted accounting for complex survey design.

Results Being a female (Chinese, Filipina, Korean, and Vietnamese), not being married (Chinese), not being a college graduate (Chinese), living in poverty (South Asian), and speaking only English language at home (Chinese and Japanese) were associated with higher odds of not meeting a 5-a-day requirement.

Conclusion Results highlighted several sociodemographic correlates to not meeting 5-a-day requirement among six Asian-American subgroups. Targeted health promotion measures for such at-risk groups should be implemented to improve dietary practices.

Keywords Acculturation · California Health Interview Survey · Asian Americans · Recommended dietary allowances · Health promotion

Background

Asian-Americans are one of the fastest growing minority populations in the US and are expected to comprise at least 9 % of the total US population by 2050 [1–4]. Historically, studies assessing the health of Americans [5–7] have aggregated Asian populations as one group, leading to masking of heterogeneous risk factors and thus limited clinical, preventive, and policy implementations for subgroups [2]. Recent researchers, however, have highlighted specific Asian-American subgroups at high risk of cardiovascular diseases [8–13].

In order to mitigate the burden of cardiovascular diseases, both national and international agencies [14, 15] have promoted the importance of healthy diet. Prior studies [16–19], however, have demonstrated that Asian-Americans may not always meet the required dietary recommendations. For example, a population-based study in California noted diverse health behaviors among Asian-American subgroups. Of the five subgroups evaluated (Chinese, Filipino, Japanese, Vietnamese, and Korean), all reported lower levels of five servings of fruits and vegetables per day (5-a-day), as compared to non-Hispanic Whites. Among the Asian subgroups, Koreans and Vietnamese men had the highest prevalence, while Korean, Filipino, and Vietnamese women reported the

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lowest [19]. Though South Asians were excluded from the analysis, results from such a study highlight the need for addressing health behaviors among Asian-American subgroups and elucidating the determinants of such behaviors in order to create targeted health promotion measures. As such, the goal of this study was to utilize the 2005 California Health Interview Survey (CHIS), a population-based survey, in order to illustrate the key correlates of dietary practices of Asian-Americans, by independent subgroup analyses.

Recent literature has highlighted several putative factors that may attenuate dietary practices among ethnic minorities. For example, increasing neighborhood socioeconomic status (SES) has been positively associated with increasing intake of fruits and vegetables [20], while neighborhood poverty has been shown to impact availability of healthy food choices [21, 22]. Studies have further highlighted the role of acculturation, the process by which immigrants adopt the norms of the host nation [23–25], as a significant factor in determining health behaviors of minorities [26–29]. To date, however, studies assessing the role of such factors among Asian-American subgroups, especially one utilizing a population-based survey, are limited. As such, we further evaluated if acculturation and/or body weight would attenuate dietary practices among Asian-American subgroups.

Methods

Data Source

Data from the 2005 CHIS adult portion was included in the study. The CHIS is a biennial population-based random digital telephone survey that assesses health and health behaviors of Californians and is representative of noninstitutionalized Californians living in households. The 2005 overall response rate for the CHIS adult portion of the survey was 26.9 %, comparable to that of California Behavioral Risk Factor Surveillance System. The CHIS further employs iterative raking to make estimates consistent with population control totals [30]. Further methodological details of the CHIS can be obtained elsewhere [30–34].

Measures

All measures in CHIS are self-reported. The outcome variable for this study was dietary practice defined as consuming five or more fruits and vegetables per day (5-a-day), provided by CHIS. The independent variables included age (included as a continuous covariate after checking assumption of linearity), gender, marital status (currently married, not currently married), education level (college graduate, not college graduate), employment status (currently employed, not currently employed), poverty level (living below 200 % federal poverty level [FPL], living at or above 200 % FPL), body mass index (BMI) based on

Asian standards, and acculturation. BMI (kg/m^2) was based on WHO-recommended Asian-American categories created from height and weight of CHIS participants as follows: less than 18.5 for underweight, 18.5–22.9 for normal weight (acceptable risk), 23.0–27.5 for overweight (increased risk), and 27.5 or more for obese (high risk) [35, 36]. In our study, BMI was dichotomized as 23 or higher versus less than 23 to represent overweight/obese versus not overweight/obese. Acculturation was assessed through two proxy measures: language spoken at home (English, English and another language, another language only) and time in USA (born in USA, immigrated more than 15 years ago, immigrated less than 15 years ago).

Data Analysis

Pearson's test with design-based *F* values was utilized to determine significant differences between sociodemographic and other characteristics among each Asian-American subgroup who met the 5-a-day requirement, compared to those who did not. Next, multivariable logistic regression was conducted independently for each Asian-American subgroup. Due to the survey's complex design, a jackknife approach was used to compute standard errors in addition to assessing potential interaction between acculturation and gender, as previously noted in the literature [37]. SAS 9.3 (SAS Institute, Inc., Cary, NC) was utilized for all statistical analyses. The study was approved by California State University, San Bernardino Institutional Review Board.

Results

Table 1 presents the differences in sociodemographic characteristics between Asian-Americans who met the 5-a-day requirement as compared to those who did not meet this dietary requirement. Across subgroups, women, more than men, were less likely to report meeting the 5-a-day requirement; these gender differences were especially pronounced among individuals of Filipino, Korean, and Vietnamese origin. Individuals of Chinese origin more likely to meet the 5-a-day requirement for fruits and vegetables were currently married and college graduates. Furthermore, South Asians less likely to meet the 5-a-day dietary requirement were those currently married, college graduates, of lower FPL, currently employed, and immigrants. Currently employed Filipino individuals were also less likely to meet dietary requirements compared to their nonemployed counterparts. Furthermore, individuals of Japanese origin were less likely to meet the 5-a-day fruit and vegetables requirement if they reported being born in the USA and speaking English at home. Similarly, American immigrants of Vietnamese origin were less likely to meet dietary recommendations compared to their counterparts who reported being born in the USA. In addition,

Table 1 Sociodemographic and other characteristics of Asian-American who met 5-a-day requirement versus those who did not, by subgroup

	Chinese		Filipino		South Asian	
	Met	Not met	Met	Not met	Met	Not met
<i>n</i>	578	699	238	365	208	190
<i>N</i>	387,399	524,637	319,413	517,929	215,386	206,543
Weighted %	42.5	57.5	38.1	61.9	51.0	49.0
Mean age (95 % CI)	46.4 (44.8, 48.0)	44.0 (42.6, 45.5)	44.0 (41.4, 46.5)	42.2 (40.5, 43.9)	38.6 (35.9, 41.3)	39.0 (36.8, 41.1)
Gender ^{ab}						
Male	46.7	53.3	47.2	52.8	53.1	46.9
Female	39.1	60.9	30.3	69.7	48.3	51.7
Marital status ^a						
Not currently married	34.0	66.0	36.2	63.8	60.0	40.0
Currently married	46.7	53.3	39.7	60.3	48.4	51.6
Education level ^a						
Not a college graduate	37.3	62.7	40.2	59.8	63.4	36.6
College graduate	46.5	53.5	36.8	63.2	48.2	51.8
Poverty status						
<200 % FPL	39.9	60.1	40.8	59.2	43.7	56.3
≥200 % FPL	43.6	56.4	37.3	62.7	52.5	47.5
Employment status ^{bc}						
Not currently employed	40.9	59.1	48.3	51.7	61.5	38.5
Currently employed	43.2	56.8	34.9	65.1	47.4	52.6
Language spoken at home						
Non-English only	42.1	57.9	45.2	54.8	52.7	47.3
English and another	46.0	54.0	36.8	63.2	51.1	48.9
English only	34.6	65.4	36.9	63.1	48.2	51.8
Time in USA						
Born in USA	42.1	57.9	44.1	55.9	65.8	34.2
Immigrated >15 years	41.7	58.3	34.6	65.4	47.2	52.8
Immigrated <15 years ago	43.7	56.3	39.7	60.3	51.8	48.2
Body mass index						
23 BMI or more	40.9	59.1	37.8	62.2	51.7	48.3
Less than 23 BMI	43.8	56.2	38.7	61.3	50.1	49.9
	Japanese		Korean		Vietnamese	
	Met	Not met	Met	Not met	Met	Not met
<i>n</i>	174	197	275	337	212	279
<i>N</i>	114,753	132,051	139,243	178,560	170,379	223,237
Weighted %	46.5	53.5	43.8	56.2	43.3	56.7
Mean age (95 % CI)	55.9 (51.5, 60.2)	53.9 (50.2, 57.7)	43.7 (41.0, 46.3)	42.5 (40.6, 44.3)	42.8 (40.6, 44.9)	44.5 (42.0, 47.0)
Gender ^{ef}						
Male	48.9	51.1	58.0	42.0	55.8	44.2
Female	44.9	55.1	33.2	66.8	31.7	68.3
Marital status						
Not currently married	49.5	50.5	43.5	56.5	46.6	53.4
Currently married	44.2	55.8	44.0	56.0	41.2	58.8
Education level						
Not a college graduate	47.0	53.0	42.8	57.2	44.2	55.8
College graduate	46.1	53.9	44.6	55.4	41.3	58.7
Poverty status						
<200 % FPL	52.5	47.5	46.2	53.8	44.7	55.3
≥200 % or more FPL	45.2	54.8	42.6	57.4	41.7	58.3

Table 1 (continued)

Employment status						
Not currently employed	46.9	53.1	45.0	55.0	44.8	55.2
Currently employed	46.2	53.8	43.1	56.9	42.2	57.8
Language spoken at home ^d						
Non-English only	74.9	25.1	46.0	54.0	42.3	57.7
English and another	57.2	42.8	43.2	56.8	45.9	54.1
English only	39.6	60.4	37.1	62.9	41.2	58.8
Time in USA ^d						
Born in USA	41.3	58.7	45.3	54.7	57.7	42.3
Immigrated >15years	59.9	40.1	42.3	57.7	37.9	62.1
Immigrated <15years ago	59.9	40.1	45.5	54.5	49.0	51.0
Body mass index ^e						
23 BMI or more	44.2	55.8	50.5	49.5	49.4	50.6
Less than 23 BMI	49.2	50.8	37.8	62.2	38.8	61.2

^a Statistically significant at $p < 0.05$ for Chinese^b Statistically significant at $p < 0.05$ for Filipino^c Statistically significant at $p < 0.05$ for South Asian^d Statistically significant at $p < 0.05$ for Japanese^e Statistically significant at $p < 0.05$ for Korean^f Statistically significant at $p < 0.05$ for Vietnamese

Americans of Korean and Vietnamese origin whose BMI was 23 or less were less likely to meet dietary recommendations for fruit and vegetables.

Table 2 shows the results of multivariable logistic regression analyses. Among Chinese adults, higher odds of not meeting the 5-a-day requirement were associated with being female, not being currently married, not a college graduate, and only speaking English at home. Filipinas were also more likely to not meet the 5-a-day recommendation as compared to

Filipino males. Similarly, both Korean and Vietnamese females had higher odds of not meeting 5-a-day recommendation as compared to their male counterparts. Odds of not meeting the 5-a-day requirement were 3.5 times higher among Japanese adults speaking only English language at home compared to their counterparts who reported not speaking English at home. South Asians living in poverty were further noted with increased likelihood of not meeting the 5-a-day recommendation. On the other hand, lower odds of not meeting such

Table 2 Multivariable logistic regression results of not meeting 5-a-day requirement among Asian-Americans, by subgroup

	Chinese	Filipino	South Asian	Japanese	Korean	Vietnamese
Age (10-year increment)	0.9 (0.8, 1.0)*	0.9 (0.8, 1.1)	0.9 (0.7, 1.1)	0.9 (0.7, 1.1)	0.9 (0.8, 1.1)	1.1 (0.9, 1.3)
Female vs. male	1.3 (1.0, 1.8)*	2.1 (1.4, 3.2)**	1.5 (0.9, 2.7)	1.4 (0.8, 2.5)	2.9 (1.9, 4.4)***	3.2 (2.0, 5.2)***
Currently not married vs. currently married	1.5 (1.1, 2.1)*	1.4 (0.9, 2.2)	0.6 (0.3, 1.3)	0.8 (0.4, 1.4)	1.0 (0.6, 1.7)	1.0 (0.6, 1.7)
Not a college graduate vs. College graduate	1.5 (1.1, 2.2)*	0.9 (0.6, 1.4)	0.5 (0.2, 1.2)	1.1 (0.5, 2.2)	1.2 (0.7, 1.8)	0.8 (0.5, 1.4)
<200 % FPL vs. ≥200 % FPL	1.0 (0.7, 1.5)	1.1 (0.6, 1.9)	2.9 (1.1, 7.4)*	1.0 (0.4, 2.2)	1.0 (0.6, 1.8)	0.9 (0.5, 1.7)
Not currently employed vs. currently employed	1.1 (0.8, 1.6)	0.6 (0.3, 1.1)	0.5 (0.2, 1.0)*	1.3 (0.7, 2.2)	0.7 (0.4, 1.2)	0.7 (0.4, 1.1)
Language spoken at home						
Bilingual vs. another only	0.9 (0.7, 1.3)	1.4 (0.7, 2.7)	1.1 (0.5, 2.4)	2.1 (0.7, 6.3)	1.0 (0.6, 1.5)	0.7 (0.4, 1.4)
English only vs. another only	1.8 (1.0, 3.3)*	1.7 (0.7, 4.2)	1.2 (0.4, 3.6)	3.5 (1.1, 11.5)*	1.3 (0.4, 3.9)	0.8 (0.2, 2.9)
Time in USA						
Born in USA vs. immigrated <15 years ago	0.8 (0.4, 1.3)	0.6 (0.2, 1.4)	0.9 (0.3, 3.0)	1.8 (0.5, 6.3)	0.9 (0.4, 2.1)	0.8 (0.2, 3.4)
Immigrated >15 years ago vs. <15 years ago	1.2 (0.8, 1.7)	1.2 (0.6, 2.2)	1.6 (0.9, 2.7)	1.1 (0.3, 3.7)	1.2 (0.7, 2.0)	1.6 (0.9, 2.8)
BMI ≥23 vs. BMI <23	1.2 (0.9, 1.6)	1.3 (0.8, 2.1)	0.9 (0.6, 1.5)	1.3 (0.7, 2.2)	0.8 (0.5, 1.2)	0.7 (0.4, 1.3)

FPL federal poverty level, BMI body mass index

* $p < .05$; ** $p < .005$; *** $p < .0001$

a requirement were noted among Chinese adults and South Asians who reported not being currently married (distinct from that of Chinese). In addition, lower odds of not meeting the 5-a-day recommendations were observed among unemployed South Asians compared to their currently employed counterparts ($p=0.046$).

In the Korean subgroup, there was a significant interaction between gender and language spoken at home. Results demonstrated that male Koreans who spoke only English at home, compared to those who only spoke another language at home, were approximately four times more likely to not meet 5-a-day recommendation (adjusted OR=3.99 and 95 % CI=[1.20, 13.23]).

Discussion

Addressing the determinants of health behaviors, particularly dietary practices, is critical in aiding public health programs that create culturally targeted nutrition education messages. By utilizing a population-based survey in California, this study was able to provide Asian-American subgroup-specific analyses of the sociodemographic correlates of fruit and vegetable intake.

Our study has several implications. Results showed that several specific Asian-American subgroups did not meet the 5-a-day recommendation, demonstrating a significant public health concern as several Asian-American subgroups have been noted to have heightened risk of cardiovascular diseases [8, 10, 11, 13, 38–40]. Such results are also consistent with Maxwell et al. [19] who noted that Asian-Americans were less likely to meet such recommendation as compared to non-Hispanic Whites. Though the authors did not evaluate South Asians, our results further noted that an annual population estimate of 206,543 did not meet the 5-a-day recommendation. Given the increased risk of cardiovascular disease in the population, public health efforts to improve such dietary outcomes are of need.

Our study also demonstrated that females among several Asian-American subgroups were less likely to meet the 5-a-day recommendation, a similar trend noted in the previous literature among Asian-Americans [19] and other immigrant populations, in turn demonstrating the need for further public health efforts to improve such dietary behaviors among Asian-American females, particularly those of Chinese, Filipino, Korean, and Vietnamese ethnicities. Results further showed that being older was associated with increased odds of consuming 5-a-day among Chinese adults. Previous literature has noted unhealthy diet to be associated with younger age [41], and thus, the results of this study highlight that younger Chinese populations should be further targeted with health promotion measures.

In addition, low socioeconomic status, such as living below the 200 % FPL for South Asians and not being a college graduate for Chinese, was significantly associated with not meeting the 5-a-day consumption. Though most Chinese and South Asians in the study met the 5-a-day requirement, such results highlight potentially at-risk and overlooked groups. These results have significant implications to public health, as South Asians not only are the fastest growing population in the USA [42] but also have one of the highest rates of cardiovascular diseases [8, 43–49]. Such results are also consistent with previous literature [50] demonstrating that socioeconomic advantage was associated with better cardiovascular health among South Asians in other nations. Similar trends have also been noted among Chinese-Americans where increased socioeconomic status was associated with increased healthy dietary practices [51]. As such, improving dietary habits of such an at-risk population in addition to policy efforts to improve food security must become a public health priority.

Speaking only English at home was also associated with increased odds of not meeting the 5-a-day requirement among some Asian-American subgroups, demonstrating the negative impact of acculturation. Such trends have been noticed in several other studies where acculturation was negatively associated with healthy dietary practices [52–54]. As such, targeting health promotion measures to acculturated populations would be of value to public health to ensure positive dietary outcomes.

The results of this study should be interpreted with caution due to some limitations. For example, the self-reported data is prone to recall bias. The CHIS is also cross-sectional data and thus does not provide casual or temporal relationships. The CHIS questionnaire on dietary habits is also short and does not include a 24-h recall or food-frequency questionnaire and thus may be limited in capturing the true dietary practices of Asian-Americans. Given that the CHIS is a state sample, results from this study cannot be generalized to Asian-Americans outside California.

Despite such limitations, this study provides an assessment of the association between acculturation and dietary habits among Asian-Americans disaggregated by subgroups utilizing a population-based survey, in turn providing for better variance estimations. A significant advantage of utilizing the CHIS database is its inclusion of the rich diversity of California and thus range of Asian-American subgroups. Since the majority of Asian-Americans reside in California [4] and the CHIS is considered to be the largest state health survey [55], this study can provide the health education arena the necessary tools to understand the correlates of dietary behaviors and potential for interventions among Asian-American subgroups.

The results of this study also provide the foundation for several future studies. CHIS does not ask culture-specific food items, and as such, given the results noted related to acculturation among some subgroups in this study, future studies addressing changes in cultural dietary practices upon acculturation among Asian-American subgroups are warranted. Gender was also shown to be a significant moderator of the association between linguistic acculturation (language spoken at home) and dietary habit among Koreans, with acculturated Korean males reporting lower odds of 5-a-day. Furthermore, the lower 5-a-day requirement met among females is of public health concern. Exploratory qualitative studies could further be conducted to elucidate the potential cultural factors associated with such outcomes among females. Moreover, such results imply that high-risk populations are in need for targeted health education measures where traditional dietary practices are promoted to maintain positive cardiovascular health. Finally, given the diversity among the Asian-American population, culture-specific acculturation measures are of necessity instead of the use of proxies.

Conclusion

Consuming five or more fruits and vegetables has been associated with lower risk of cardiovascular diseases and cancer. Consistent with previous literature, our study showed that most Asian-American subgroups reported not meeting the 5-a-day fruits and vegetables requirement. Specific groups, such as South Asians residing in poverty, were identified as a significantly at-risk group. Such results highlight the importance of further public health messages for Asian-Americans to improve dietary habits and in turn lower chronic disease morbidity and mortality. Future research including longitudinal studies and those asking detailed food questionnaires are necessary.

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Conflict of Interest The authors (ES, DA, BJB, and MBB) declare no conflict of interest.

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