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Diabetes Prevalence and Associated Risk Factors Amongst Asian American Subgroups in California

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North Carolina State University
2019

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Abstract

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Asian Americans are among the fastest growing racial groups within the United States and are vastly diverse with respect to ethnicity, language, immigration patterns, cultural beliefs, and sociodemographic factors. Although there are known disparities in diabetes risk between certain ethnic groups, this population is often grouped in aggregate for purposes of health data collection and interpretation. There is limited availability of disaggregated health data on sociodemographic risk factors across individual subgroups regarding diabetes risk, and the extent to which factors contribute most to the disparities observed.

This was a cross-sectional study examining data from 108,983 non-Hispanic White and Asian American adults (Chinese, Japanese, Korean, Filipino, South Asian, and Vietnamese) using 2016-2020 California Health Interview (CHIS). Diabetes was identified based on reported use of insulin or glucose-lowering medications, or an established medical diagnosis. Sociodemographic factors most strongly associated with increased diabetes risk within each group were identified using adjusted multivariable logistic regression modeling.

Filipinos had the highest diabetes prevalence across groups (11.5%), followed by Vietnamese (9.6%), Japanese (7.9%), non-Hispanic Whites (7.7%), South Asians (7.3%), Koreans (6.9%), and Chinese (5.5%). Among the non-Hispanic White group, obesity and lower education were most strongly associated with increased risk, and higher education and uninsured status were associated with a decreased risk. For the Chinese group, male gender, uninsured status, and obesity were most strongly associated with increased risk. Within Japanese and Filipino groups, both obesity and Medicare or Medicaid enrollment were strongly associated with increased risk, and a limited English proficiency was strongly associated with a decreased risk. For the South Asian group, male gender and obesity were strongly associated with increased risk. For the Korean group, obesity was strongly associated with increased risk. Within the Vietnamese group, there were no factors strongly associated with increased risk, but underweight status and limited English proficiency were strongly associated with decreased risk.

These results emphasize the need to provide disaggregate health data on Asian Americans. Identification of the sociodemographic factors that were strongly associated with diabetes risk amongst each group offer insights toward culturally- appropriate diabetes prevention and management strategies amongst individual populations.

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Introduction:

Asian Americans are the fastest growing racial group in the United States. At an estimated 22 million individuals, this group currently represents 7% of the total United States population.[1] Over the past two decades (2000-2019), the Asian American population has grown by 81% within the United States, a rate which has far surpassed the growth rates of all other ethnic groups within this period.[2] The "Asian American" umbrella is comprised of individuals with roots from 22 different countries. Of those, Chinese, Indian, Filipino, Korean, Vietnamese, and Japanese Americans make up approximately 85% of all Asian Americans that currently reside in the United States.[3]

Asian Americans are a heterogeneous group, and present with vast differences in economic status, language proficiency, immigration patterns, cultural and religious practices, and educational attainment, all of which can influence health behaviors and outcomes.[1,3,4] In terms of religious observation, Catholicism is practiced by the majority of Filipino Americans, in contrast to Protestantism (Korean Americans), Hinduism (Indian Americans), Buddhism (Vietnamese Americans), Christianity (Japanese Americans) and majority unaffiliated (Chinese Americans).[5] Political affiliations and views on certain fundamental social issues (i.e. homosexuality and abortion) vary between religious groups. Asian American Protestants tend to be conservative, Hindus, Buddhists and the unaffiliated tend to be more liberal, while other religious groups tend to fall somewhere in between.[5] As religion and spirituality play a role in shaping identity and can influence behavior, they may be instrumental in shaping dietary and lifestyle preferences. Additionally, religious and spiritual beliefs can form the basis of important decisions regarding health status, such as the acceptance or disapproval of certain medical treatments.[6,7]

Educational attainment and income also vary by Asian American subgroup. While approximately half (54%) of Asian Americans 25 or older have at least a bachelor's degree or higher, 75% of Indians, 65% of Malaysians, and 60% of Mongolian and Sri Lankans have a bachelor's degree or higher, as compared to 18% of Laotians and 15% of Bhutanese.[3] Additionally, as of 2019, Asian Americans had an average annual income of $85,800, which is higher than the US average ($61,800), and are considered to fare well economically as compared to the rest of the nation.[3] However, there are stark disparities in income by subgroup. For example, Indians and Filipinos on average have a mean income that is higher than both the overall Asian American and national average at $110,000 and $90,400, respectively, whereas the majority of other Asian American groups, such as Nepalese and Burmese groups have median incomes that are lower than both the racial and national averages, at $44,400 and $55,000, respectively.[3] Understanding this distribution of wealth amongst Asian Americans can have important implications for health-related quality of life measures and the disparity seen in health outcomes across groups.[8] For example, individuals with higher incomes tend to have a larger capacity to afford medical treatments and services, nutritious foods, and stable housing.[9] Conversely, lower socio-economic status is associated with poorer health outcomes, limited healthcare access, a higher exposure to health related risk factors, and lower life expectancies.[8,10,11] In addition, higher education level can positively impact health literacy, allowing for an increased capability to follow care instructions, understand health needs, and effectively communicate with health providers.[9]

The pathways in which Asian Americans have immigrated into the US are also important to note, as they can have implications for healthcare utilization and access. For example, during 2011, roughly half of Korean and Indian Americans arrived on the basis of employee sponsorship, whereas only one third of Japanese Americans, one-fifth of Chinese Americans, and one in eight Filipinos arrived on a similar basis.[3] Vietnamese Americans arrived in large numbers as displaced political refugees, and only 1% of the Vietnamese population immigrated to US due to employee sponsorship during the same time period.[3] Instead, this group historically participated in larger-scale immigration into the United States due to a combination of educational, economic, and familial reasons following the Vietnam War in 1975.[3] Groups migrating to the United States on employer or student-based visas may have greater access to medical care, especially if receiving health insurance benefits offered by employers. Asian Americans migrating due to a job or educational sponsorship may also have higher levels of English proficiency and health literacy at baseline, which could have a positive influence on their ability to effectively access and utilize health services upon arrival to the US.[5,9]

There are also substantial variations in English proficiency amongst Asian Americans, with roughly half of Vietnamese and Korean Americans reporting limited English proficiency as compared to 22% of Japanese Americans and 20% of Indian Americans.[3] Evidence indicates that only about one third (34%) of Asian Americans report English as the primary language spoken within their homes. In fact, the Chinese (Mandarin and Cantonese) is spoken by 34% of Asian Americans as their primary language. followed by Hindi (13%), Tagalog and other Filipino languages (9%), and Vietnamese (7%).[4] These differential rates of English proficiency across Asian American subgroups can impact healthcare access and utilization. Those with limited English proficiency within the US are overall less likely to have a regular healthcare provider, have fewer average physician visits, have lower rates of health screenings (i.e., blood pressure), and report overall poorer patient-provider interactions when compared to English speakers.[12,13,14]

When measured as a composite group, the CDC estimates that the age-adjusted prevalence of diabetes in Asian American adults is 9%, a rate which is lower than that observed in Native Americans (15.9%), non-Hispanic Blacks (13.2%), and Hispanic Americans (12.8%), but higher than that of non-Hispanic White adults (7.6%).[15] However, aggregating Asian American subgroups masks important disparities in diabetes prevalence. For example, the Diabetes Study of Northern California (DISTANCE) assessed the prevalence of diabetes amongst 210,632 adults enrolled within the Kaiser Permanente Northern California (KPNC) integrated healthcare plan for a 12-month period in 2010.[15] The results of this study found substantial variation in diabetes prevalence amongst Asian and Pacific Islander subgroups with Pacific Islanders, South Asians, and Filipinos having the highest prevalence of diabetes at 18.3, 15.9, and 16.1%, respectively, compared to non-Hispanic Whites (7.7%), as well as that of Asians and Pacific Islanders as an aggregate group (12.3%).[16] Conversely, Chinese and Japanese subgroups had a relatively lower prevalence at 8.2% and 10.3%, respectively.[16] The patterns of diabetes incidence were similar with Pacific Islanders, South Asians, and Filipinos having the highest rate of diabetes incidence cases at 19.9, 17.2, and 14.7 cases per 1,000 person-years, respectively after standardizing for age and sex.[15] Comparatively, Chinese and Japanese groups had lower incidence rates of diabetes (6.5 and 7.5 cases per 1,000 person-years, respectively), suggesting that the elevated incidence rates found amongst some groups may be masked by lower rates of other groups when measuring Asian Americans in aggregate.[15]

Another cross-sectional analysis sought to assess differences in diabetes prevalence amongst Asian American subgroups (Chinese, Asian Indians, Filipinos, Japanese, and Koreans) using the 2013-2019 Behavioral Risk Factor Surveillance System (BRFSS) data.[16] The adjusted diabetes prevalence of diabetes amongst Asian Americas in total was 8.7% compared to 10% amongst non-Hispanic Whites.[17] However, there was considerable variability in diabetes prevalence amongst Asian American subgroups, with Filipino (14.4%), Japanese (13.4%), and Asian Indians (10.7%) having the highest adjusted prevalence and Chinese (5.1%) and Korean Americans (4.7%) having the lowest prevalence of diabetes.[17] Therefore, considering Asian Americans as a homogenous group for the purposes of health data collection and interpretation can conceal the disease burden in high-risk populations, while masking meaningful differences in health outcomes among certain ethnic groups.[15,16, 17] In addition, solely relying on aggregated data as a source of health information can hinder researchers and clinicians in developing and seeking treatment strategies and improving patient outcomes, and can ultimately have negative implications for achieving health equity within the US population.

Despite Asian Americans having an elevated diabetes risk, knowledge on the distribution of attributable risk factors such as age, BMI, socioeconomic status, education level, health literacy, cultural practices, and health behaviors across subgroups and the extent to which they contribute to this disparity remains limited.[18,19] A cross-sectional study using 2006-2018 National Health Interview Survey (NHIS) questionnaire data to understand the differences in diabetes risk factors amongst Asian American ethnic groups (Chinese, Indian and Filipino Americans) and the non-Hispanic White population[20] found that Asian Indians to had a significantly younger age of diabetes onset at 46 years compared to Non-Hispanic Whites at an average of 51 years.[20] Chinese Americans were diagnosed 2 years later on average than the non-Hispanic White population at 54 years.[20] Filipino Americans were the only group that lacked significant differences to the averages observed in the non-Hispanic White group, with an average age of onset of 50 years.[20] Family income, personal health status, and education served as the most significant predictors of diabetes among all sociodemographic factors included in the analysis. While Chinese Americans had a later age of diabetes onset at baseline, diabetes was most likely to have been left undiagnosed in those with lower education level and higher self-rated health status.[20] Additionally, the frequency and distribution of health insurance coverage varies substantially across subgroup.[21] For example, 77% of South Asian Americans report enrollment in an employer-based health plans, as compared to 72% of Japanese, Chinese, Filipino Americans, 56% of Vietnamese Americans, and 49% of Korean Americans.[21] Korean Americans (31%) and Vietnamese Americans (21%) have the highest uninsured rates across all Asian subgroups, while only 16% of Chinese Americans, 14% of Filipino Americans, and 12% of Japanese and South Asian Americans report being uninsured.[21] Understanding this discrepancy in health coverage across groups is important, as having stable health coverage allows for access to health services and preventative screening tools related to diabetes care, which in turn can have an impact on overall disease risk.[21]

Physical activity levels may also differ between Asian American subgroups. For example, a population-based survey conducted in 2010 compared physical activity levels in Chinese, South Asian, and Vietnamese subgroups to other ethnic groups suggesting that the composite Asian group had the lowest prevalence sufficient physical activity levels in the past

(39%), when compared to rates observed in non-Hispanic Whites (50%) and African Americans and Hispanics. (45%).[21] Amongst Asian subgroups, Vietnamese Americans were the most physically active and had the highest mean physical activity days per week (3.05) as compared to Chinese Americans (2.96) and South Asian Americans (2.77).[21]

In addition, the prevalence of tobacco use tends to significantly differ between Asian subgroups.[22,23] Korean Americans and Vietnamese American adults have the highest rates of tobacco usage across Asian American subgroups at 20% and 16.3%, respectively.[23] Conversely, Chinese Americans (7.6%) and South Asian Americans (7.6 have the lowest prevalence of tobacco usage.[23] Prevalence of alcohol use can also differ across subgroups, as illustrated in a cross-sectional study conducted using 2002-2013 National Survey on Drug Use and Health Data.[24] Within this study, Filipino Americans were found to have the highest prevalence of lifetime (29.3%) and past-month (10.3%) alcohol use.[24] Korean Americans had the highest prevalence of past-year alcohol use (22.7%).[24] South Asian Americans were found to have the lowest prevalence of all lifetime (14.9%), past-year (11.9%), and past-month (4.9%) alcohol use across all represented Asian subgroups.[24] Although these studies have sought to understand the variation in these health behaviors, there is limited coverage on their distribution within nationally representative Asian samples and an understanding of ethnic group differences in order to adequately inform screening recommendations for Asian Americans, necessitating the need for more research in both areas.

Although evidence indicates disparities in diabetes risk amongst Asian American subgroups, the primary driving factors behind this differential prevalence is not well-understood.[14,16,17] Despite this considerable variation in their cultural and religious practices, as well as educational backgrounds, economic status, and immigration patterns, the Asian American population is often grouped in aggregate for the purposes of health data collection and interpretation.[14,17]Considering this group as a homogenous entity is problematic, as it has historically masked meaningful differences in various health outcomes and health behaviors between individual groups.[14,16,17] Generating a more comprehensive understanding of the unique factors related to diabetes risk in each subgroup can offer additional insights toward more appropriate diabetes prevention and management strategies amongst Asian American populations.

The California Health Interview Survey (CHIS) is the largest state health survey in the nation. CHIS allows for the assessment of variation in health behaviors, outcomes, and risk factors between Asian American subgroups through its designation of separate variables for Chinese, Japanese, Korean, Filipino, South Asian, Vietnamese, and Southeast Asians. We therefore analyzed data from the CHIS to estimate the prevalence of diabetes amongst various Asian American subgroups as well as the associated risk factors and compared how these associations varied by ethnicity.

Despite Asian Americans having an elevated diabetes risk, knowledge on the distribution of attributable risk factors such as age, BMI, socioeconomic status, education level, health literacy, cultural practices, and health behaviors across subgroups and the extent to which they contribute to this disparity remains limited.[18,19] A cross-sectional study using 2006-2018 National Health Interview Survey (NHIS) questionnaire data to understand the differences in diabetes risk factors amongst Asian American ethnic groups (Chinese, Indian and Filipino Americans) and the non-Hispanic White population[20] found that Asian Indians to had a significantly younger age of diabetes onset at 46 years compared to Non-Hispanic Whites at an average of 51 years.[20] Chinese Americans were diagnosed 2 years later on average than the non-Hispanic White population at 54 years.[20] Filipino Americans were the only group that lacked significant differences to the averages observed in the non-Hispanic White group, with an average age of onset of 50 years.[20] Family income, personal health status, and education served as the most significant predictors of diabetes among all sociodemographic factors included in the analysis. While Chinese Americans had a later age of diabetes onset at baseline, diabetes was most likely to have been left undiagnosed in those with lower education level and higher self-rated health status.[20] Additionally, the frequency and distribution of health insurance coverage varies substantially across subgroup.[21] For example, 77% of South Asian Americans report enrollment in an employer-based health plans, as compared to 72% of Japanese, Chinese, Filipino Americans, 56% of Vietnamese Americans, and 49% of Korean Americans.[21]Korean Americans (31%) and Vietnamese Americans (21%) have the highest uninsured rates across all Asian subgroups, while only 16% of Chinese Americans, 14% of Filipino Americans, and 12% of Japanese and South Asian Americans report being uninsured.[21] Understanding this discrepancy in health coverage across groups is important, as having stable health coverage allows for access to health services and preventative screening tools related to diabetes care, which in turn can have an impact on overall disease risk.[21]

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Methods:

Data Source and Study Design

We utilized cross-sectional data from the 2016-2020 California Health Interview Survey (CHIS). CHIS is a statewide program conducted by the University of California Los Angeles Center for Health Policy and Research. CHIS is a telephone-based survey administered to adults (18 or older) within the residential, non-institutionalized California state population every 2 years.[26] CHIS includes questions regarding current and pre-existing health conditions, health behaviors, insurance coverage, and access to and use of health services. This survey employs a geographically stratified, multi-stage random-digit-dial (RDD) sampling design to provide stable county-level estimates for this health data.[26] It seeks to obtain representative coverage of its diverse population through the designation of separate variables for most key ethnic groups and subgroups, and is administered in the English, Spanish, Chinese (Cantonese and Mandarin), Korean, and Vietnamese languages.[26] A cross-sectional study design was chosen to allow for various demographic, social, and health variables to be analyzed at one point in time and to better examine prevailing characteristics related to diabetes risk.

Study Measures and Participants

For the purposes of this analysis, the study population was limited to the non-Hispanic White population and the following Asian American subgroups: Chinese, Japanese, Korean, Filipino, South Asian and Vietnamese. The sample consisted of 108,983 non-Hispanic White and Asian American adults. Analysis was further stratified by ethnicity into non-Hispanic White (n=95,922), Chinese (n=4,558), Japanese (n=1,631), Korean (n=1,498), Filipino (n=2,380), South Asian (n=1,331), and Vietnamese (n=1,646) groups.

For the non-Hispanic White group, body mass index (BMI) levels were predefined according to World Health Organization (WHO) classifications [27]: underweight <18.5, normal weight 18.5-24.9, overweight 25.0-29.9, and obese => 30. For all Asian American groups, BMI levels predefined according to Asia-Pacific classifications[28]: underweight <18.5, normal weight 18.5-22.9, overweight 23.0-29.9, and obese => 30.

Baseline socioeconomic status (SES) indicators related to race (non-Hispanic White, Chinese, Japanese, Korean, Filipino, South Asian and Vietnamese) income as a percentage of the federal poverty level ("<100% FPL", "100-199% FPL", "200-299%" FPL, and "=> 300% FPL") baseline English proficiency ("Only English as Primary Language", "Very Well/Well", "Not Well/Not at All") insurance type ("Uninsured", "Medicare/Medicaid, or Medicare and Other Insurance Type", and "Employment-Based or Private Insurance") and educational background ("Less than High School", "High School Diploma or Equivalent", "Some College or Vocational School", "Bachelor's or Associate's Degree Completed", and "Masters' Degree or Above") were grouped into categorical variables for each group and subgroup. Data on self-reported smoking behaviors were designated into "Current Smoker", "Former Smoker", and "Never Smoker" categories. The outcome of diabetes was measured through the creation of a composite variable, "DM", which combined data regarding the active use of insulin or any glucose-lowering medications or an established medical diagnosis.

Statistical Analysis

Multivariate logistic regression models were used to examine the relationship between each risk factor and outcome of diabetes using SAS V. 9.4 software using an alpha level of 0.05. Discrete variables of race, gender, educational level, English proficiency, body mass index (BMI) group, familial income level and smoking status were compared by group a percentages and standard deviations. Continuous variables corresponding to age, body mass index (BMI), height, and weight were compared between groups as mean (average) and standard deviation (SD). Separate multivariate logistic regression models were performed for each ethnic group to assess the relationship between BMI, sociodemographic factors, and health behaviors in shaping overall diabetes risk. Diabetes risk was presented as an odds ratio (OR) with 95% confidence intervals (CIs). The first model calculated the separate risk of each risk factor without any adjustment for any covariates. Model 1 depicted the odds of diabetes after adjustment for age, sex, and BMI. Model 2 described diabetes risk after adjustment for age, sex, BMI, English proficiency, insurance status, educational level, federal poverty level, and smoking status. When running each model, women, high school education level, employment-based or private insurance, => 300% FPL, non-smokers, and only English speakers were used as the reference groups. The weight variable was applied to all sample data to produce weighted population estimates and account for the complex survey sampling design employed by CHIS.

Results:

Table 1 details the demographic characteristics of the sample by ethnic group. The mean age of all study participants was 53.8 years, and (55.8%) of participants in the composite sample were women. South Asians had the youngest mean age (42.4 years), while non-Hispanic Whites had the oldest (55.5 years). Distribution of gender was approximately equally divided in all ethnic groups aside from the South Asian group (60.6% females and 39.3% males). Of all ethnic groups, Vietnamese Americans, reported the highest proportion of individuals with less than a high school education level (17.3%) and the lowest proportions at a master's degree or above (9.7%). Conversely, South Asian (43.5%) and Chinese Americans (32.0%) had the highest proportion of respondents reporting a master's degree or above. Non-Hispanic Whites had the highest proportion of obese individuals at 16.3%, and the lowest proportion of underweight individuals (23.3%). Within the Asian groups, South Asians had the highest proportion of overweight individuals (38.0%) and Vietnamese had the lowest proportion (23.6). Obesity was highest in the Filipino group (12.7%), and lowest in the Chinese group (4.9%). With regards to insurance type, half of Vietnamese Americans (58.7%) and non-Hispanic Whites (53.1%) reported active Medicare and/or Medicaid enrollment as compared to 26.2% of South Asian Americans. The majority (63.2%) of South Asian Americans reported enrollment in employment-based insurance and had the highest proportion of this insurance type across all groups. Korean Americans were found to have the highest proportion of uninsured respondents (7.4%). Regarding English proficiency, 74.9% of Japanese Americans reported English as their primary and only language. The majority of South Asians (74.2%) and over half of Filipinos (53.2%) and Chinese (51.3%) reported highest proportions of well to advanced English proficiency in this language, and Vietnamese Americans (44.9%) and Korean Americans (39.9%) had the lowest levels of English proficiency across all groups.

Table 1: Weighted Characteristics of Participants 18 Years or Older by Race/Ethnicity. CHIS 2016-2020

Mean or % (95% CI)	Total (n=108,983)	Non-Hispanic White (n=95,922	Chinese (n=4,558)	Japanese (n=1,631)	Korean (n=1,498)	Filipino (n=2,380)	South Asian (n=1,331)	Vietnamese (n=1,464)
Age (mean, y)	53.8 (53.7-53.9)	55.5 (55.4-55.6)	49.6 (49.0-50.1)	57.4 (56.5-58.2)	53.2 (52.2-54.1)	47.6 (46.9-48.4)	42.4 (41.5-43.3)	52.2 (51.2-53.2)
Gender, (%)								
Women	55.8 (55.5-56.1)	43.5 (43.2-43.8)	47.5 (46.1-49.8)	42.4 (40.0-44.8)	44.3 (41.7-46.8)	42.8 (40.8-44.8)	60.6 (57.9-63.2)	49.8 (47.2-52.3)
Men	44.1 (43.9-44.4)	56.4 (56.1-56.7)	52.4 (50.9-53.8)	57.5 (55.1-59.9)	55.6 (53.1-58.2)	57.1 (55.1-59.1)	39.3 (36.7-42.0)	50.2 (47.6-52.8)
Education (%)								

< High School	7.6 (-)	5.4 (-)	5.7 (5.0-6.4)	0.9 (-)	6.3 (5.1-7.5)	3.0 (2.3-3.7)	1.6 (0.9-2.3)	17.3 (-)
High School Diploma or Equivalent	18.4 (18.2-18.6)	17.5 (17.2-17.7)	11.4 (10.5-12.4)	9.7 (8.3-11.1)	17.0 (15.1-19.0)	12.1 (10.8-13.5)	9.0 (7.4-10.5)	27.8 (25.5-30.1)
Some College or Vocational School	19.9 (19.7-20.1)	20.7 (20.5-21.0)	9.2 (8.4-10.1)	16.0 (14.2-17.7)	9.6 (8.1-11.1)	18.1 (17.2-20.4)	11.0 (9.3-12.7)	13.2 (11.5-15.1)
Bachelor's or Associates Degree Completed	34.8 (34.5-35.0)	35.8 (35.5-36.1)	41.4 (40.0-42.9)	48.7 (46.3-51.1)	43.7 (41.2-46.4)	51.1 (49.1-53.2)	34.7 (32.1-37.2)	31.8 (29.4-34.2)
Masters Degree and Above	19.2 (18.9-19.4)	20.4 (20.1-20.6)	32.0 (30.7-33.4)	24.6 (22.5-26.7)	23.3 (21.1-25.4)	14.7 (13.3-16.1)	43.5 (40.9-46.2)	9.7 (8.2-11.2)
English Proficiency, (%)								
Speak English as Only Primary Language	70.7 (70.5-70.9)	80.7 (80.5-81.0)	27.6 (26.3-28.9)	74.9 (72.8-77.0)	18.8 (16.9-20.9)	42.9 (40.9-44.9)	23.4 (21.1-25.7)	10.3 (8.8-11.9)
Very Well/Well	21.8 (21.6-22.0)	15.5 (15.2-15.7)	51.3 (49.8-52.8)	21.5 (19.9-22.2)	41.2 (38.7-43.7)	53.2 (51.2-55.3)	74.2 (71.9-76.6)	44.7 (42.2-47.3)
Not Well or Not at All	7.5 (7.3-7.6)	3.8 (3.7-3.9)	21.1 (19.9-22.3)	3.6 (2.8-4.6)	39.9 (37.5-42.5)	3.9 (3.2-4.8)	2.4 (1.7-3.4)	44.9 (42.4-47.5)
Weight, mean, kg	77.4 (77.3-77.5)	78.4 (78.3-78.5)	65.3 (64.9-65.8)	66.3 (65.5-67.1)	65.0 (64.2-65.7)	69.5 (68.8-70.2)	72.0 (71.1-72.8)	61.3 (60.7-62.0)
Height, mean, cm	166.3 (166.0-166.6)	167.4 (167.1-167.7)	161.5 (159.7-163.3)	160.2 (157.6-162.8)	162.5 (160.0-164.9)	159.5 (157.0-162.0)	164.6 (161.1-168.2)	158.6 (156.1-161.1)
BMI, mean*	27.2 (27.2-27.3)	27.3 (27.2-27.3)	23.8 (23.7-24.0)	24.9 (24.6-25.1)	23.9 (23.6-24.1)	26.0 (25.8-26.2)	25.2 (24.9-25.5)	23.7 (23.5-23.9)
BMI Group								
Underweight	23.8 (23.5-23.9)	23.3 (23.1-23.6)	45.7 (44.2-47.2)	37.7 (35.4-40.2)	44.1 (41.6-46.7)	26.5 (24.8-28.4)	29.2 (26.7-31.2)	49.2 (46.7-51.8)
Normal	15.3 (15.1-15.6)	15.3 (15.1-15.6)	20.1 (18.9-21.2)	19.1 (17.1-20.9)	22.1 (20.0-24.3)	19.7 (18.1-21.3)	20.8 (18.6-22.9)	19.8 (17.8-21.9)
Overweight	34.5 (34.2-34.8)	34.8 (34.5-35.2)	26.8 (25.5-28.1)	29.9 (27.8-32.2)	26.9 (24.7-29.2)	35.4 (33.5-37.4)	38.0 (35.4-40.8)	23.6 (21.4-25.8)
Obese	16.1 (15.9-16.3)	16.3 (16.1-16.5)	4.9 (4.3-5.6)	9.4 (7.9-10.8)	5.2 (4.0-6.3)	12.7 (11.4-14.1)	9.3 (7.8-11.0)	5.2 (4.0-6.3)
>= 35	10.3 (10.1-10.5)	10.2 (10.0-10.4)	2.4 (1.9-2.9)	3.8 (2.8-4.8)	1.6 (1.0-2.4)	5.7 (4.7-6.6)	2.7 (1.9-3.7)	2.2 (1.5-3.1)
Insurance Status								

Uninsured	5.4 (5.4-5.6)	4.5 (4.3-4.6)	4.3 (3.7-5.0)	2.4 (1.8-3.2)	7.4 (6.1-8.9)	5.7 (4.8-6.7)	4.1 (3.1-5.3)	4.3 (3.2-5.3)
Medicare/Medicaid, Medicare and Medicaid, or Medicare and Other Insurance Type	51.9 (51.6-52.1)	53.1 (52.8-53.5)	38.2 (36.8-39.7)	47.6 (45.1-50.0)	47.8 (45.2-50.4)	39.1 (37.2-41.1)	26.2 (23.8-28.6)	58.7 (56.1-61.2)
Employment-Based or Privately Purchased Insurance	42.7 (42.2-42.9)	42.4 (42.0-42.7)	57.5 (57.0-57.8)	50.0 (48.2-54.3)	44.8 (42.2-49.0)	44.8 (40.2-46.8)	30.3 (27.2-33.4)	37.0 (35.2-41.3)
Familial Income								
<100% FPL	12.6 (12.4-12.8)	10.2 (9.9-10.4)	12.0 (11.1-12.9)	5.2 (4.1-6.2)	16.4 (14.6-18.3)	10.8 (9.5-12.0)	8.7 (7.2-10.2)	27.9 (25.6-30.2)
100-199% FPL	15.6 (15.4-15.8)	13.9 (13.3-14.2)	12.7 (11.8-13.4)	7.5 (6.3-8.9)	19.4 (17.4-21.4)	14.8 (13.3-16.2)	9.9 (8.3-11.5)	24.9 (22.7-27.2)
200-299% FPL	12.9 (12.7-13.1)	12.8 (12.6-12.9)	10.4 (9.4-11.2)	10.6 (9.2-12.3)	12.5 (10.9-14.3)	11.6 (10.5-13.1)	10.4 (8.7-12.0)	10.4 (8.9-12.1)
=>300% FPL	58.9 (58.6-59.1)	63.1 (62.8-63.4)	64.9 (63.6-66.4)	76.7 (74.6-78.7)	51.7 (49.2-54.3)	62.8 (60.8-64.7)	71.0 (68.9-73.4)	36.8 (34.3-39.3)
Smoking Status								
Current Smoker	9.5 (9.3-9.6)	9.4 (9.2-9.6)	3.7 (3.1-4.3)	5.2 (4.1-6.3)	8.8 (7.4-10.4)	7.9 (6.9-9.1)	5.7 (4.5-7.1)	7.0 (5.8-8.5)
Former Smoker	27.4 (27.1-27.5)	30.3 (29.9-30.6)	11.9 (10.9-12.8)	26.3 (24.2-28.5)	23.0 (20.9-25.3)	19.5 (17.9-21.2)	11.5 (9.8-13.3)	10.5 (8.9-12.2)
Never Smoker	63.2 (62.9-63.5)	60.3 (60.0-60.7)	84.5 (83.3-85.5)	68.5 (66.2-70.7)	68.2 (65.7-70.5)	72.6 (70.8-74.4)	82.8 (80.1-84.8)	82.5 (80.5-84.4)
Abbreviations: BMI: Body Mass Index; CHIS: California Health Interview Survey; FPL: Federal Poverty Level								
**Calculated as weight in kilograms divided by height in meters squared.* ***Includes adults with a reported diabetes diagnosis or report current usage of insulin, diabetic pills, or insulin and diabetic pills.* ****Unweighted total number of participants with a reported diabetes diagnosis or current usage of insulin, diabetic pills, or insulin and diabetic pills.*								

Table 2 details the measured crude, age-sex adjusted, and age-sex-BMI-adjusted prevalence of diabetes. Filipino Americans had the highest prevalence of diabetes across ethnic groups (11.5%), followed by Vietnamese Americans (9.6%), Japanese Americans (7.9%), non-Hispanic Whites (7.7%), South Asian Americans (7.3%), Koreans (6.9%), and Chinese Americans (5.5%) after adjustment for age, sex, and BMI.

Table 2: Weighted Crude and Adjusted Prevalence of Total Diabetes[a] by Race/Ethnicity Among US Adults Aged 18 and Older, CHIS 2016-2020 (n=108,983)							
Race/Ethnicity	**No. of Cases[b]**	**Crude Prevalence, % (95% CI)**	**Overall *P* Value[c]**	**Age-Sex-Adjusted Prevalence, % (95% CI)**	**Overall *P* Value[c]**	**Age-Sex-BMI-Adjusted Prevalence, % (95% CI)**	**Overall *P* Value[c]**
Total Diabetes[b]							
All Adults	12,382	9.6 (9.5-9.8)	<.0001	8.3 (7.9-8.5)	<.0001	8.3 (7.9-8.5)	<.0001
Non-Hispanic White	8,424	8.8 (8.7-9.0)	<.0001	7.7 (7.4-7.9)	<.0001	7.7 (7.4-7.9)	<.0001
Chinese	344	7.6 (6.8-8.3)	<.0001	5.6 (4.5-6.7)	<.0001	5.5 (4.4-6.6)	<.0001
Japanese	177	10.9 (9.3-12.4)	<.0001	7.9 (5.7-10.1)	<.0001	7.9 (5.7-10.1)	<.0001
Korean	166	11.1 (9.5-12.7)	<.0001	6.9 (5.0-8.9)	<.0001	6.9 (5.0-8.8)	<.0001
Filipino	312	13.1 (11.8-14.5)	<.0001	11.5 (9.7-13.4)	<.0001	11.5 (9.6-13.4)	<.0001
South Asian	136	10.2 (8.9-11.9)	<.0001	7.3 (5.4-9.2)	<.0001	7.3 (5.4-9.2)	<.0001
Vietnamese	165	11.3 (9.6-12.9)	<.0001	9.6 (6.9-12.3)	<.0001	9.6 (6.9-12.3)	<.0001
[a]*-Includes adults with a reported diabetes diagnosis or report current usage of insulin, diabetic pills, or insulin and diabetic pills.*							
[b]*- Unweighted total number of participants with a reported diabetes diagnosis or current usage of insulin, diabetic pills, or insulin and diabetic pills.*							
[c]- The P value in the line for all adults is the variation across all major race/ethnicity groups within the dataset, the P value for each group is the variation across all groups included within the table (non-Hispanic White and all Asian American subgroups).							
Abbreviations: CHIS: California Health Interview Survey; BMI= Body Mass Index							

Tables 3-9 describe the model output of the unadjusted and age-sex-BMI adjusted odds of diabetes, as well as the odds of diabetes after adjustment for all variables. Table 3 details the factors associated with elevated diabetes risk for the non-Hispanic White group. Of those, obesity and lower education (less than a high school level) were most strongly associated with increased diabetes risk. Having a master's degree or above and an uninsured status were associated with decreased diabetes risk.

Table 3: Risk Factors Associated with Diabetes Amongst non-Hispanic White US Adults Aged 18 and Older, CHIS 2016-2020			
	Unadjusted[a]	**Model 1[b]**	**Model 2[c]**
	OR [95% CL] (n=95,922)	**OR [95% CL] (n=95,922)**	**OR [95% CL] (n=93,055)**
Age (mean, y)	1.31 (0.85-2.03)	1.05 (1.05-1.06)	1.26 (1.06-1.51)
Gender			
Women	*ref*	*ref*	*ref*
Men	1.29 (1.14-1.48)	1.46 (1.39-1.53)	1.54 (1.46-1.62)
Education Level			
< High School	2.31 (2.07-2.58)	2.16 (1.92-2.44)	1.78 (1.57-2.01)
High School Diploma or Equivalent	*ref*	*ref*	*ref*
Some College or Vocational School	1.08 (1.00-1.15)	0.92 (0.81-1.04)	1.00 (0.93-1.08)
Bachelor's or Associates Degree Completed	0.96 (0.87-1.05)	0.66 (0.61-0.71)	0.91 (0.82-1.00)
Masters Degree and Above	0.60 (0.54-0.68)	0.59 (0.47-0.60)	0.69 (0.63-0.76)
English Proficiency, (%)			
Speak English as Only Primary Language	*ref*	*ref*	*ref*
Very Well/Well	1.12 (0.67-1.87)	1.40 (1.24-1.59)	1.33 (1.24-1.42)
Not Well or Not at All	2.96 (1.76-2.99)	2.68 (2.54-3.11)	1.71 (1.50-1.95)
BMI Group*			
Underweight	1.09 (0.88-1.37)	1.15 (0.91-1.44)	1.07 (1.46-1.62)
Normal	*ref*	*ref*	*ref*
Overweight	2.22 (2.07-2.37)	1.97 (1.84-2.12)	1.86 (1.73-1.99)

Obese	5.39 (5.05-5.75)	5.45 (5.10-5.83)	4.79 (4.47-5.12)
Insurance Status			
Uninsured	0.95 (0.82-1.11)	0.93 (0.79-1.09)	0.85 (0.72-0.99)
Medicare/Medicaid, Medicare and Medicaid, or Medicare and Other Insurance Type	2.85 (2.70-3.01)	1.91 (1.76-2.07)	1.64 (1.51-1.78)
Employment-Based or Privately Purchased Insurance	*ref*	*ref*	*ref*
Familial Income			
<100% FPL	1.96 (1.62-2.37)	2.16 (2.01-2.33)	1.47 (1.34-1.59)
100-199% FPL	2.00 (1.65-2.44)	1.69 (1.58-1.81)	1.29 (1.19-1.38)
200-299% FPL	1.51 (1.27-1.79)	1.46 (1.36-1.57)	1.26 (1.17-1.35)
=>300% FPL	*ref*	*ref*	*ref*
Smoking Status			
Current Smoker	1.05 (0.83-1.33)	1.09 (0.93-1.78)	0.88 (0.74-1.04)
Former Smoker	1.65 (1.49-1.82)	1.01 (0.91-1.11)	1.00 (0.91-1.11)
Never Smoker	*ref*	*ref*	*ref*
Abbreviations: BMI: Body Mass Index; CHIS: California Health Interview Survey; CI: Confidence Interval, FPL: Federal Poverty Level			
*Calculated as weight in kilograms divided by height in meters squared.			
a- Separate models were estimated for each independent variable; β[95% CL] reflects bivariate association between variable and outcome. b- Model is adjusted for age, sex, and BMI. c- Model is adjusted for all variables in the table: age, sex, BMI, familial income, educational level, and insurance status, and smoking status.			

Table 4 details the factors associated with increased diabetes risk for the Chinese group. Of those, male gender, uninsured status, and obesity were most strongly associated with increased diabetes risk. Underweight status was associated with decreased diabetes risk.

Table 4: Risk Factors Associated with Diabetes Amongst Chinese American Adults Aged 18 and Older, CHIS 2016-2020			
	Unadjusted[a]	**Model 1[b]**	**Model 2[c]**

	OR [95% CL] (n=4,558)	OR [95% CL] (n=4468)	OR [95% CL] (n=4,446)
Age (mean, y)	1.82 (0.85-2.03)	1.07 (1.05-1.09)	1.67 (1.28-2.13)
Gender			
Women	*ref*	*ref*	*ref*
Men	1.75 (1.40-2.20)	1.89 (1.49-2.41)	1.71 (1.31-2.23)
Education Level			
< High School	2.81 (1.70-4.67)	1.31 (0.75-2.29)	1.33 (0.76-2.34)
High School Diploma or Equivalent	*ref*	*ref*	*ref*
Some College or Vocational School	1.21 (0.74-0.99)	1.33 (0.75-2.35)	1.34 (0.76-2.38)
Bachelor's or Associates Degree Completed	1.01 (0.69-1.46)	0.94 (0.62-1.43)	1.04 (0.66-1.57)
Masters Degree and Above	0.74 (0.49-1.14)	0.71 (0.44-1.15)	0.81 (0.49-1.34)
English Proficiency, (%)			
Speak English as Only Primary Language	*ref*	*ref*	*ref*
Very Well/Well	1.11 (0.67-1.87)	1.45 (0.84-2.49)	1.36 (0.99-1.86)
Not Well or Not at All	2.69 (1.76-4.99)	1.91 (1.08-3.36)	1.51 (1.00-2.27)
BMI Group*			
Underweight	0.49 (0.36-0.69)	0.61 (0.43-0.88)	0.62 (0.44-0.89)
Normal	*ref*	*ref*	*ref*
Overweight	1.48 (1.09-2.01)	1.57 (1.13-2.18)	1.59 (1.14-2.22)
Obese	2.52 (1.73-3.68)	3.77 (2.47-5.77)	3.81 (2.47-5.89)
Insurance Status			
Uninsured	1.46 (0.79-2.69)	2.47 (1.27-4.79)	2.21 (1.11-4.41)

Medicare/Medicaid, Medicare and Medicaid, or Medicare and Other Insurance Type	3.31 (2.61-4.19)	0.91 (0.57-1.45)	0.79 (0.49-1.29)
Employment-Based or Privately Purchased Insurance	*ref*	*ref*	*ref*
Familial Income			
<100% FPL	1.58 (1.15-2.16)	1.32 (0.92-1.89)	1.10 (0.69-1.74)
100-199% FPL	1.54 (1.13-2.11)	1.24 (0.87-1.75)	0.97 (0.65-1.45)
200-299% FPL	1.42 (1.00-2.01)	1.33 (0.89-1.98)	1.12 (0.74-1.69)
=>300% FPL	*ref*	*ref*	*ref*
Smoking Status			
Current Smoker	1.77 (0.69-4.52)	1.39 (0.53-3.68)	1.21 (0.48-3.06)
Former Smoker	2.33 (1.32-4.12)	1.96 (1.22-2.01)	0.93 (0.52-1.68)
Never Smoker	*ref*	*ref*	*ref*
Abbreviations: BMI: Body Mass Index; CHIS: California Health Interview Survey; CI: Confidence Interval, FPL: Federal Poverty Level			
*Calculated as weight in kilograms divided by height in meters squared.			
a- Separate models were estimated for each independent variable; β[95% CL] reflects bivariate association between variable and outcome. b- Model is adjusted for age, sex, and BMI. c- Model is adjusted for all variables in the table: age, sex, BMI, familial income, educational level, and insurance status, and smoking status.			

Table 5 details the factors associated with increased diabetes risk for the Japanese group. Of those, obesity and Medicare or Medicaid enrollment were most strongly associated with increased diabetes risk. A limited to intermediate English proficiency was associated with decreased diabetes risk.

Table 5: Risk Factors Associated with Diabetes Amongst Japanese American Adults Aged 18 and Older, CHIS 2016-2020			
	Unadjusted[a]	**Model 1[b]**	**Model 2[c]**
	OR [95% CL] (n=1,631)	**OR [95% CL] (n=1,595)**	**OR [95% CL] (n=1,498)**

Age (mean, y)	1.32 (0.85-2.03)	1.08 (1.04-1.13)	1.07 (0.37-2.46)
Gender			
Women	*ref*	*ref*	*ref*
Men	1.46 (0.55-3.91)	1.59 (1.11-2.29)	1.59 (1.08-2.35)
Education Level			
< High School	1.47 (0.16-13.40)	0.94 (0.11-8.02)	1.17 (0.15-9.12)
High School Diploma or Equivalent	*ref*	*ref*	*ref*
Some College or Vocational School	0.61 (0.22-1.73)	1.17 (0.54-2.55)	1.21 (0.55-2.68)
Bachelor's or Associates Degree Completed	0.79 (0.46-1.36)	1.10 (0.46-2.62)	1.06 (0.52-2.16)
Masters Degree and Above	0.88 (0.42-1.47)	0.85 (0.39-1.88)	1.03 (0.45-2.33)
English Proficiency, (%)			
Speak English as Only Primary Language	*ref*	*ref*	*ref*
Very Well/Well	0.19 (0.08-0.45)	0.19 (0.08-0.49)	0.19 (0.08-0.50)
Not Well or Not at All	0.06 (0.02-0.42)	0.07 (0.08-0.44)	0.04 (0.01-0.45)
BMI Group*			
Underweight	0.62 (0.36-1.06)	0.68 (0.38-1.22)	0.68 (0.37-1.24)
Normal	*ref*	*ref*	*ref*
Overweight	1.77 (1.10-2.86)	1.78 (1.06-3.01)	1.87 (1.09-3.19)
Obese	2.98 (1.77-5.01)	4.48 (2.42-8.29)	4.71 (2.41-9.24)
Insurance Status			
Uninsured	0.45 (0.06-3.36)	0.44 (0.06-3.08)	0.43 (0.05-3.58)
Medicare/Medicaid, Medicare and Medicaid, or Medicare and Other Insurance Type	3.62 (2.53-5.17)	3.18 (1.63-6.22)	2.65 (1.32-5.32)

Employment-Based or Privately Purchased Insurance	*ref*	*ref*	*ref*
Familial Income			
<100% FPL	1.19 (0.59-2.36)	1.96 (0.88-4.36)	1.56 (0.67-3.61)
100-199% FPL	1.72 (1.03-2.88)	1.73 (0.91-3.29)	1.47 (0.75-2.89)
200-299% FPL	1.08 (0.66-1.79)	1.07 (0.59-1.94)	1.03 (0.56-1.91)
=>300% FPL	*ref*	*ref*	*ref*
Smoking Status			
Current Smoker	0.61 (0.12-3.03)	0.53 (0.06-4.43)	0.34 (0.04-2.56)
Former Smoker	1.57 (0.79-3.15)	0.81 (0.37-1.76)	0.56 (0.27-1.18)
Never Smoker	*ref*	*ref*	*ref*
Abbreviations: BMI: Body Mass Index; CHIS: California Health Interview Survey; CI: Confidence Interval, FPL: Federal Poverty Level			
*Calculated as weight in kilograms divided by height in meters squared.			
a- Separate models were estimated for each independent variable; β[95% CL] reflects bivariate association between variable and outcome. b- Model is adjusted for age, sex, and BMI. c- Model is adjusted for all variables in the table: age, sex, BMI, familial income, educational level, and insurance status, and smoking status.			

Table 6 details the factors associated with increased diabetes risk for the Korean group. Of those, obesity was most strongly associated with increased diabetes risk. There were no factors associated with decreased diabetes risk in this group.

Table 6: Risk Factors Associated with Diabetes Amongst Korean American Adults Aged 18 and Older, CHIS 2016-2020			
	Unadjusted[a]	**Model 1[b]**	**Model 2[c]**
	OR [95% CL] (n=1,498)	**OR [95% CL] (n=1,470)**	**OR [95% CL] (n=1,456)**
Age (mean, y)	1.07 (1.03-1.11)	1.08 (1.05-1.11)	1.18 (0.21-1.72)
Gender			
Women	*ref*	*ref*	*ref*
Men	1.40 (1.02-1.94)	1.39 (0.94-2.07)	1.29 (0.74-2.28)
Education Level			
< High School	1.86	1.07	1.09

	(0.99-3.51)	(0.49-2.29)	(0.49-2.37)
High School Diploma or Equivalent	*ref*	*ref*	*ref*
Some College or Vocational School	0.78 (0.42-1.46)	1.23 (0.57-2.64)	1.36 (0.62-2.97)
Bachelor's or Associates Degree Completed	0.56 (0.36-0.87)	0.75 (0.45-1.26)	0.87 (0.51-1.49)
Masters Degree and Above	0.45 (0.24-0.81)	0.89 (0.38-2.07)	1.18 (0.47-2.94)
English Proficiency, (%)			
Speak English as Only Primary Language	*ref*	*ref*	*ref*
Very Well/Well	1.41 (1.46-4.31)	1.12 (0.73-1.71)	1.47 (0.67-3.21)
Not Well or Not at All	4.03 (1.40-11.56)	1.97 (0.79-4.85)	1.54 (0.69-3.45)
BMI Group*			
Underweight	1.00 (0.62-1.62)	1.22 (0.69-2.13)	1.29 (0.74-2.28)
Normal	*ref*	*ref*	*ref*
Overweight	1.78 (1.09-2.89)	1.81 (1.04-3.12)	1.91 (1.09-3.33)
Obese	4.08 (2.26-7.39)	7.93 (3.71-16.96)	8.57 (3.80-19.32)
Insurance Status			
Uninsured	0.75 (0.26-2.16)	0.52 (0.13-2.09)	0.38 (0.09-1.66)
Medicare/Medicaid, Medicare and Medicaid, or Medicare and Other Insurance Type	4.49 (3.00-6.73)	1.22 (0.56-2.65)	0.83 (0.37-1.89)
Employment-Based or Privately Purchased Insurance	*ref*	*ref*	*ref*
Familial Income			
<100% FPL	3.56 (2.30-5.51)	1.79 (1.06-3.04)	1.83 (0.98-3.42)
100-199% FPL	2.99 (1.95-4.61)	1.48 (0.88-2.47)	1.48 (0.83-2.62)

200-299% FPL	2.50 (1.50-4.16)	1.75 (0.95-3.29)	1.74 (0.89-3.39)
=>300% FPL	*ref*	*ref*	*ref*
Smoking Status			
Current Smoker	0.97 (0.35-2.65)	1.05 (0.25-4.54)	1.46 (0.62-3.44)
Former Smoker	2.37 (1.22-4.62)	1.47 (0.63-3.46)	1.39 (0.85-2.26)
Never Smoker	*ref*	*ref*	*ref*
Abbreviations: BMI: Body Mass Index; CHIS: California Health Interview Survey; CI: Confidence Interval, FPL: Federal Poverty Level			
*Calculated as weight in kilograms divided by height in meters squared.			
a- Separate models were estimated for each independent variable; β[95% CL] reflects bivariate association between variable and outcome. b- Model is adjusted for age, sex, and BMI. c- Model is adjusted for all variables in the table: age, sex, BMI, familial income, educational level, and insurance status, and smoking status.			

Table 7 details the factors associated with increased diabetes risk for the Filipino group. Of those, obesity and Medicaid or Medicare enrollment were associated with increased diabetes risk. Being underweight was associated with decreased diabetes risk.

Table 7: Risk Factors Associated with Diabetes Amongst Filipino American Adults Aged 18 and Older, CHIS 2016-2020			
	Unadjusted[a]	**Model 1[b]**	**Model 2[c]**
	OR [95% CL] (n=2,340)	**OR [95% CL] (n=2,333)**	**OR [95% CL] (n=2,282)**
Age (mean, y)	1.05 (1.04-1.06)	1.06 (1.04-1.07)	1.09 (1.06-1.11)
Gender			
Women	*ref*	*ref*	*ref*
Men	1.18 (0.72-1.92)	1.57 (1.19-2.05)	1.66 (1.25-2.23)
Education Level			
< High School	2.81 (1.16-6.81)	2.80 (1.00-7.83)	2.56 (0.86-7.61)
High School Diploma or Equivalent	*ref*	*ref*	*ref*
Some College or Vocational School	1.38 (0.86-2.21)	1.12 (0.65-1.93)	1.14 (0.64-2.00)

Bachelor's or Associates Degree Completed	1.25 (0.83-1.89)	1.03 (0.64-1.68)	1.10 (0.67-1.82)
Masters Degree and Above	0.93 (0.53-1.63)	0.82 (0.39-1.70)	0.85 (0.39-1.83)
English Proficiency, (%)			
Speak English as Only Primary Language	*ref*	*ref*	*ref*
Very Well/Well	1.40 (0.93-2.13)	1.12 (0.73-1.71)	1.05 (0.67-1.65)
Not Well or Not at All	4.33 (2.05-9.15)	1.97 (0.79-4.85)	1.86 (0.69-4.99)
BMI Group*			
Underweight	0.49 (0.32-0.75)	0.59 (0.38-0.94)	0.56 (0.35-0.89)
Normal	*ref*	*ref*	*ref*
Overweight	1.23 (0.88-1.72)	1.29 (0.91-1.85)	1.32 (0.91-1.89)
Obese	1.61 (1.11-2.32)	2.12 (1.42-3.18)	2.19 (1.44-3.33)
Insurance Status			
Uninsured	0.99 (0.53-1.84)	1.12 (0.56-2.24)	1.15 (0.57-2.35)
Medicare/Medicaid, Medicare and Medicaid, or Medicare and Other Insurance Type	2.61 (2.03-3.36)	2.09 (1.40-3.14)	2.12 (1.34-3.35)
Employment-Based or Privately Purchased Insurance	*ref*	*ref*	*ref*
Familial Income			
<100% FPL	1.60 (1.13-2.27)	1.46 (0.97-2.20)	1.02 (0.63-1.64)
100-199% FPL	1.07 (0.76-1.51)	0.99 (0.67-1.46)	0.72 (0.47-1.11)
200-299% FPL	0.81 (0.53-1.22)	0.86 (0.54-1.37)	0.73 (0.47-1.18)
=>300% FPL	*ref*	*ref*	*ref*
Smoking Status			
Current Smoker	1.25 (0.70-2.22)	1.45 (0.71-2.96)	1.55 (0.69-3.46)

Former Smoker	1.72 (1.09-2.71)	0.95 (0.58-1.55)	1.03 (0.61-1.74)
Never Smoker	*ref*	*ref*	*ref*
Abbreviations: BMI: Body Mass Index; CHIS: California Health Interview Survey; CI: Confidence Interval, FPL: Federal Poverty Level			
*Calculated as weight in kilograms divided by height in meters squared.			
a- Separate models were estimated for each independent variable; β[95% CL] reflects bivariate association between variable and outcome. b- Model is adjusted for age, sex, and BMI. c- Model is adjusted for all variables in the table: age, sex, BMI, familial income, educational level, and insurance status, and smoking status.			

Table 8 details the factors associated with increased diabetes risk for the South Asian group. Of those, male gender and obesity were most strongly associated with increased diabetes risk. There were no factors associated with decreased diabetes risk in this group.

Table 8: Risk Factors Associated with Diabetes Amongst South Asian American Adults Aged 18 and Older, CHIS 2016-2020

	Unadjusted[a]	**Model 1[b]**	**Model 2[c]**
	OR [95% CL] (n=1,331)	**OR [95% CL] (n=1,296)**	**OR [95% CL] (n=1,288)**
Age (mean, y)	1.08 (1.06-1.11)	1.09 (1.06-1.11)	1.07 (0.09-7.55)
Gender			
Women	*ref*	*ref*	*ref*
Men	1.31 (0.36-4.72)	1.61 (1.00-2.58)	1.66 (1.01-2.72)
Education Level			
< High School	0.63 (0.08-5.29)	0.41 (0.03-5.83)	0.29 (0.02-3.77)
High School Diploma or Equivalent	*ref*	*ref*	*ref*
Some College or Vocational School	0.91 (0.39-2.08)	0.65 (0.21-1.97)	0.69 (0.22-2.12)
Bachelor's or Associates Degree Completed	1.12 (0.58-2.14)	0.88 (0.36-2.17)	1.07 (0.42-2.74)
Masters Degree and Above	0.72 (0.36-1.44)	0.43 (0.16-1.14)	0.58 (0.21-1.42)

English Proficiency, (%)			
Speak English as Only Primary Language	*ref*	*ref*	*ref*
Very Well/Well	1.06 (0.49-2.03)	1.10 (0.45-2.71)	1.26 (0.73-2.19)
Not Well or Not at All	2.73 (0.66-11.21)	1.48 (0.31-7.05)	0.75 (0.18-3.12)
BMI Group*			
Underweight	1.19 (0.63-2.22)	1.48 (0.73-2.99)	1.61 (0.77-3.34)
Normal	*ref*	*ref*	*ref*
Overweight	1.86 (1.06-3.28)	1.75 (0.93-3.28)	1.62 (0.85-3.09)
Obese	3.82 (2.04-7.17)	5.45 (2.64-11.26)	5.37 (2.50-11.51)
Insurance Status			
Uninsured	0.77 (0.23-2.53)	0.90 (0.19-4.27)	0.77 (0.15-4.03)
Medicare/Medicaid, Medicare and Medicaid, or Medicare and Other Insurance Type	3.32 (2.30-4.79)	1.79 (0.89-3.59)	1.26 (0.57-2.75)
Employment-Based or Privately Purchased Insurance	*ref*	*ref*	*ref*
Familial Income			
<100% FPL	1.86 (1.07-3.23)	2.34 (1.13-4.87)	2.44 (0.99-5.97)
100-199% FPL	1.70 (0.99-2.91)	1.86 (0.87-3.94)	1.69 (0.72-4.00)
200-299% FPL	1.14 (0.62-2.08)	1.29 (0.63-2.61)	1.28 (0.59-2.57)
=>300% FPL	*ref*	*ref*	*ref*
Smoking Status			
Current Smoker	1.54 (0.61-3.85)	3.81 (1.42-10.26)	2.59 (0.76-8.88)
Former Smoker	1.62 (0.78-3.36)	1.22 (0.51-2.87)	1.32 (0.54-3.22)
Never Smoker	*ref*	*ref*	*ref*

Abbreviations: BMI: Body Mass Index; CHIS: California Health Interview Survey; CI: Confidence Interval, FPL: Federal Poverty Level
*Calculated as weight in kilograms divided by height in meters squared.
a- Separate models were estimated for each independent variable; β[95% CL] reflects bivariate association between variable and outcome. b- Model is adjusted for age, sex, and BMI. c- Model is adjusted for all variables in the table: age, sex, BMI, familial income, educational level, and insurance status, and smoking status.

Table 9 details the factors associated with increased diabetes risk for the Vietnamese group. Of those, male gender and lower education (less than a high school level) were associated with increased diabetes risk. Being underweight and at a limited English proficiency level was strongly associated with decreased diabetes risk.

Table 9: Risk Factors Associated with Diabetes Amongst Vietnamese American Adults Aged 18 and Older, CHIS 2016-2020

	Unadjusted[a]	**Model 1[b]**	**Model 2[c]**
	OR [95% CL] (n=1,464)	**OR [95% CL] (n=1,447)**	**OR [95% CL] (n=1,444)**
Age (mean, y)	1.07 (1.05-1.09)	1.09 (1.05-1.09)	1.08 (1.05-1.09)
Gender			
Women	*ref*	*ref*	*ref*
Men	0.93 (0.41-2.12)	1.09 (0.75-1.59)	1.23 (0.76-1.97)
Education Level			
< High School	1.65 (1.01-2.69)	1.49 (0.85-2.65)	1.59 (0.89-2.85)
High School Diploma or Equivalent	*ref*	*ref*	*ref*
Some College or Vocational School	0.63 (0.34-1.15)	0.78 (0.40-1.53)	0.76 (0.39-1.49)
Bachelor's or Associates Degree Completed	0.55 (0.34-0.87)	0.89 (0.50-1.54)	0.84 (0.19-3.74)
Masters Degree and Above	0.33 (0.12-0.95)	0.75 (0.23-2.21)	0.59 (0.19-1.87)
English Proficiency, (%)			
Speak English as Only Primary Language	*ref*	*ref*	*ref*
Very Well/Well	0.24	0.47	0.27

	(0.03-1.66)	(0.10-2.19)	(0.04-1.81)
Not Well or Not at All	0.04 (0.01-0.27)	0.25 (0.05-1.14)	0.04 (0.01-0.29)
BMI Group*			
Underweight	0.54 (0.35-0.83)	0.51 (0.31-0.82)	0.51 (0.31-0.83)
Normal	*ref*	*ref*	*ref*
Overweight	1.27 (0.82-1.96)	1.32 (0.81-2.15)	1.33 (0.81-2.19)
Obese	0.64 (0.31-1.33)	0.92 (0.41-2.09)	0.90 (0.38-2.11)
Insurance Status			
Uninsured	1.19 (0.41-3.54)	1.74 (0.55-5.55)	1.86 (0.56-6.17)
Medicare/Medicaid, Medicare and Medicaid, or Medicare and Other Insurance Type	3.23 (2.12-4.89)	1.29 (0.73-2.29)	1.33 (0.67-2.65)
Employment-Based or Privately Purchased Insurance	*ref*	*ref*	*ref*
Familial Income			
<100% FPL	1.98 (1.29-3.04)	1.01 (0.61-1.68)	0.74 (0.38-1.44)
100-199% FPL	2.12 (1.37-3.27)	1.12 (0.67-1.86)	0.99 (0.54-1.84)
200-299% FPL	1.45 (0.79-2.68)	1.01 (0.47-2.16)	0.84 (0.38-1.86)
=>300% FPL	*ref*	*ref*	*ref*
Smoking Status			
Current Smoker	0.77 (0.19-3.02)	0.92 (0.18-4.62)	0.79 (0.14-4.47)
Former Smoker	1.84 (0.79-4.23)	2.11 (0.74-6.04)	2.67 (0.95-7.47)
Never Smoker	*ref*	*ref*	*ref*

Abbreviations: BMI: Body Mass Index; CHIS: California Health Interview Survey; CI: Confidence Interval, FPL: Federal Poverty Level

*Calculated as weight in kilograms divided by height in meters squared.

a- Separate models were estimated for each independent variable; β[95% CL] reflects bivariate association between variable and outcome.
b- Model is adjusted for age, sex, and BMI.
c- Model is adjusted for all variables in the table: age, sex, BMI, familial income, educational level, and insurance status, and smoking status.

Male gender was associated with an elevated diabetes risk across all ethnic groups included in the sample. However, this finding was only statistically significant within the non-Hispanic White, Chinese, Japanese, Filipino, and South Asian groups. This association was most pronounced in the Chinese group, where the risk was almost twice as high in males as in females. In all ethnic groups, there was a positive association between obesity and diabetes, though this association was not statistically significant within the Vietnamese group after adjustment for all sociodemographic factors. This association was most pronounced within the Korean group, where obesity was associated with almost nine-fold the risk of diabetes when using the normal weight group as a reference.

Limited English proficiency levels were associated with an elevated diabetes risk across the non-Hispanic Whites, Chinese, and Korean groups. However, within the Japanese, Vietnamese, Vietnamese, and South Asian groups, limited English proficiency was associated with a decreased diabetes risk. The most pronounced association was found within the Japanese and Vietnamese groups, where individuals with limited English proficiency were 0.04 times as likely to have diabetes compared to Japanese Americans that reported to be English-only speakers.

With regards to insurance type, enrollment in Medicaid, Medicare, or a combination of Medicare and another insurance type was associated with a moderately increased diabetes risk in all ethnic groups except for Korean Americans and Chinese Americans, where Medicaid enrollment was associated a decreased odds of diabetes risk. Although being uninsured was associated with an increased diabetes risk in in Chinese and Filipinos, and Vietnamese groups, uninsured individuals were less likely to have diabetes across the non-Hispanic White, Japanese, Koreans, South Asian groups.

Lower education was associated with a higher diabetes risk in all groups, except for within the South Asian group, where there was a moderately decreased risk of diabetes attributed to this risk factor. This association was most pronounced within the Filipino group, where individuals with less than a high school education were almost three times as likely to have diabetes after adjusting for all sociodemographic factors. Higher education was associated with a decreased risk of diabetes across all groups, except for a moderate increased risk within the Korean and Japanese groups.

An active smoking status was associated with an increased odds of diabetes within the Filipino, Chinese, South Asian, and Korean groups. However, a previous smoking history was associated with a moderately increased diabetes risk within the Korean, South Asian, Vietnamese, and Chinese groups. A moderately negative association between smoking status (past or active) and diabetes risk was found amongst the non-Hispanic White and Japanese groups.

Discussion and Implications:

This cross-sectional study utilized disaggregated data on Asian Americans and non-Hispanic Whites to analyze the heterogeneity of pertinent sociodemographic risk factors across individual groups, and to understand the extent to which they may contribute to elevated diabetes risk. The overall prevalence of diabetes within the full sample was 8.6% after adjustment for age, sex, and BMI. Filipinos had the highest prevalence of diabetes (11.5%), followed by Vietnamese Americans (9.6%), Japanese Americans (7.9%), non-Hispanic Whites (7.7%), South Asian Americans (7.3%), Korean Americans -(6.9%), and Chinese Americans (5.5%). These findings align with the results of previous studies that have used nationally representative data from the National Health Interview Survey (NHIS) and Behavioral Risk Factor Surveillance System (BRFSS), in which Filipino and Chinese Americans were also found to have the highest and lowest self-reported, fully adjusted prevalence of diabetes across all Asian groups, respectively.[29,30] Furthermore, both studies also found that South Asian Americans had the second highest -diabetes prevalence amongst Asian American subgroups.[29,30]

The results of our study also noted differences in the strength of association between sociodemographic factors and diabetes risk by ethnic group. Obesity was strongly associated with diabetes risk amongst all groups aside from Vietnamese Americans. Lower levels of education were strongly associated with diabetes risk among non-Hispanic Whites, while being uninsured was strongly associated with diabetes risk amongst Chinese Americans, and having Medicare or Medicaid was a strong factor for diabetes risk amongst Japanese Americans and Filipino Americans Male gender was significantly associated with diabetes risk within the non-Hispanic White, Chinese, Japanese, Filipino, and South Asian groups. This variation in gender risk has been observed in previous cohort studies diabetes was more prevalent in Asian men than in Asian women at baseline and after adjustments for age and sex.[15,31] Limited to intermediate levels of English proficiency were significantly associated with increased diabetes risk within the non-Hispanic White and Chinese groups. This association could be explained some of the disparities these groups may face in successfully adopting diabetes prevention strategies, as groups with lower English proficiency are less likely to obtain satisfactory medical care and experience communication barriers with their providers regarding their health status.[32,33] However, this level of English proficiency was significantly associated with a decreased risk in both the Japanese and Vietnamese groups. As English language acquisition is an important predictor of social and cultural assimilation, it is possible that individuals in these groups may be more inclined to preserve their cultural dietary patterns.[34,35] Evidence from clinical randomized controlled trials suggest the potential benefits of adhering to a traditional Asian diet on lowering diabetes risk, they are higher in fiber and lower in fat content than the typical Westernized diet, which could explain the decreased diabetes risk observed in these groups.[36]

The role of a higher education (master's degree or above) was significantly associated with a decreased risk of diabetes within non-Hispanic White group. This association could perhaps be explained by the association of a higher educational attainment with increased health literacy outcomes and likelihood of participation in preventative screening measures.[7, 9, 37] Additionally, individuals with a higher education plan are more likely to obtain enrollment in health insurance plans, resulting in an increased access to health facilities and provider networks.[8,38] Although a low-income level (<100% FPL) was moderately associated with increased diabetes risk amongst all groups (apart from the Vietnamese), this association was only statistically significant within the non-Hispanic White group. Previous or current smoking status yielded mixed associations amongst the overall sample but did not serve as statistically significant predictors in any of the individual groups regarding diabetes risk.

Our study has several strengths. CHIS is a multi-lingual survey that is administered in the Chinese (Cantonese and Mandarin), Korean, and Vietnamese languages, which offered the opportunity for study participants to be interviewed in their preferred languages.[26] This may allow for more comprehensive, reliable data on these subgroups, especially those with limited to intermediate English proficiency. Additionally, the CHIS includes structured questions and standardized variables within its protocol.[26] Incorporating this health data within a cross-sectional study design allowed for multiple sociodemographic characteristics of interest to be analyzed across ethnic groups and making it possible to simultaneously analyze any differential relationships between these variables and diabetes risk. Additionally, this study made use of disaggregated data to better characterize disease risk in individual Asian subgroups, which is not commonly done in many larger US-based health studies. Using the data from the designated multi-level variable for Asian Americans allowed for visibility of the sociodemographic differences present between individual Chinese, Japanese, Korean, Filipino, South Asian, and Vietnamese subgroups. The use of separate models (unadjusted, age-sex-adjusted, and age-sex-BMI adjusted) for each ethnicity allowed for an understanding of which factors were most significantly associated with diabetes risk in each group, as well as the strength and magnitude of these associations.

The findings of this study are subject to several limitations. Utilizing a cross-sectional study design does not allow for the determination of a direct cause-and-effect relationship between the risk factors and the primary outcome of diabetes. Ascertainment of diabetes status was reliant on self-report of active glucose-lowering medication use or a self-report of a previous diagnosis, making our effect estimates susceptible to recall and reporting biases. It is also important to consider the probability of undiagnosed cases within the sample, as Asian Americans have historically presented with some of the highest rates of undiagnosed diabetes across all demographic groups.[39] Our results also do not consider the prevalence of undiagnosed cases that may have existed within our sample, as laboratory results are not collected by CHIS and any information regarding hemoglobin A1c is through self-report. Individuals without health insurance coverage or an active provider network could also be contributing to these undiagnosed cases and can further underestimate the true burden of this condition within our sample. Lastly, though the weighting variables ensure that CHIS data is representative of the Californian population at the state and county levels, these results may not be generalizable to Asian American populations across other areas within the United States. However, they could enable the understanding of the trends taking place in states that also have large populations of similar Asian American groups, particularly within the Western region of the United States.

This study sought to understand diabetes burden amongst Asian Americans through examination of the individual risk factors that are persistent amongst Chinese, Japanese, Korean, Filipino, South Asian, and Vietnamese groups at a statewide level. It allowed for the determination of individual risk factors that have shown to be influential in shaping overall diabetes risk, offering insight on some areas of consideration when tailoring diabetes prevention and management strategies amongst these ethnic groups. However, there is a critical need for the expansion of individual Asian subgroup data at the national level to fully understand the extent to which social determinants such as linguistic factors, education levels, socioeconomic status, and health behaviors contribute to any subgroup differences observed in diabetes risk. As much of this individual subgroup data on diabetes available within in this population is based on self-report, it is also important to expand the availability of this subgroup data on a clinically recognized basis, which has been a limitation noted in other population-based studies.[15]

These findings have several important implications. Adjusted diabetes prevalence varied significantly amongst Asian American subgroups, with the largest disparity occurring amongst the Filipino and Chinese groups. Incorporating these diverse groups within a single Asian category for the purposes of health risk interpretation is problematic, as reporting an aggregate figure has the potential to underscore the true disease burden present amongst the higher risk groups. Individual Filipino, Japanese, and Vietnamese groups were found to have a higher adjusted prevalence than non-Hispanic Whites even after applying lower Asian-specific BMI threshold weight categories, suggesting the potential benefit incorporating screening measures within these groups, even in the absence of an elevated BMI. It is interesting to note that Vietnamese Americans were found to be a high-risk group despite having the largest proportion of individuals categorized as underweight in this group, suggesting that increased screening measures at all weight categories could be especially important to consider within this ethnic group. Males were found to present with a higher diabetes risk across all groups, necessitating the need to examine the socio-cultural habits, behaviors, and lifestyle factors that might be contributing to this disparity. The presence of Medicare or Medicare enrollment was significantly associated with diabetes risk amongst four of the seven groups (non-Hispanic Whites, Japanese, Filipinos, and Vietnamese). However, national survey data suggests that insured adults with diabetes have higher rates of care utilization as compared to uninsured adults, making them more likely to be frequently engaging in blood glucose checks and eye exams.[39] Certain Medicare and Medicaid programs provide coverage of certain injectable or oral glucose-lowering medications, diabetic supplies, and nutritional services, making long-term management both an affordable and feasible option for those that are enrolled.[40,41] If left untreated or poorly-managed, diabetes is known to cause a host of long-term complications, such as cardiovascular disease, kidney damage, stroke, and retinopathy.[41] These complications could be of utmost concern for Korean and Filipino populations, as they were had the highest rates of uninsured status across all groups.

These results emphasize the need to provide disaggregate health data on Asian Americans. Identification of the sociodemographic factors that were strongly associated with diabetes risk amongst each group offer insights toward culturally appropriate diabetes prevention and management strategies amongst individual populations.

References:

1. Jin, C. H. (2021, May 25). *6 charts that dismantle the trope of Asian Americans as a model minority*. NPR. https://www.npr.org/2021/05/25/999874296/6-charts-that-dismantle-the-trope-of-asian-americans-as-a-model-minority
2. Budiman A, Ruiz NG. Key facts about Asian origin groups in the U.S. Pew Research Center. Accessed November 8, 2023. https://www.pewresearch.org/short-reads/2021/04/29/key-facts-about-asian-origin-groups-in-the-u-s/#:~:text=Chinese-origin%20Asians%20are%20the
3. Greenwood S. Diverse Cultures and Shared Experiences Shape Asian American Identities. Pew Research Center Race & Ethnicity. Published May 8, 2023. https://www.pewresearch.org/race-ethnicity/2023/05/08/diverse-cultures-and-shared-experiences-shape-asian-american-identities/
4. Pew Research Center. Asian americans: A mosaic of faiths. Pew Research Center's Religion & Public Life Project. Published July 19, 2012. https://www.pewresearch.org/religion/2012/07/19/asian-americans-a-mosaic-of-faiths-overview/
5. Paulk ME. Understanding the Role of Religion in Medical Decision Making. *Journal of Oncology Practice*. 2017;13(4):219-220. doi:https://doi.org/10.1200/jop.2016.020693
6. Geros-Willfond KN, Ivy SS, Montz K, Bohan SE, Torke AM. Religion and Spirituality in Surrogate Decision Making for Hospitalized Older Adults. *J Relig Health*. 2016;55(3):765-777. doi:10.1007/s10943-015-0111-9
7. Zhang S, Xiang W. Income gradient in health-related quality of life - the role of social networking time - International Journal for Equity in health. BioMed Central. March 15, 2019. Accessed December 14, 2023. https://equityhealthj.biomedcentral.com/articles/10.1186/s12939-019-0942-1.
8. Why education matters to health: Exploring the causes. Center on Society and Health. Accessed December 14, 2023. https://societyhealth.vcu.edu/work/the-projects/why-education-matters-to-health-exploring-the-causes.html#gsc.tab=0.
9. Eikemo TA, Huisman M, Bambra C, Kunst AE. Health inequalities according to educational level in different welfare regimes: a comparison of 23 European countries. Sociol Health Illn. 2008;30(4):565–82.
10. Bor J, Cohen GH, Galea S. Population health in an era of rising income inequality: USA, 1980–2015. Lancet. 2017;389(10077):1475–90.
11. Foiles Sifuentes AM, Robledo Cornejo M, Li NC, Castaneda-Avila MA, Tjia J, Lapane KL. The Role of Limited English Proficiency and Access to Health Insurance and Health Care in the Affordable Care Act Era. *Health Equity*. 2020;4(1):509-517. doi:https://doi.org/10.1089/heq.2020.0057
12. Berdahl TA, Kirby JB. Patient-provider communication disparities by limited English proficiency (LEP): trends from the US Medical Expenditure Panel Survey, 2006–2015. *J Gen Intern Med*. 2019;34:1434–1440
13. Ponce NA, Hays RD, Cunningham WE. Linguistic disparities in health care access and health status among older adults. *J Gen Intern Med*. 2006;21:786–791
14. Gartley CE. Type 2 diabetes in Asian Americans. American Nurse. Published March 1,

2023. https://www.myamericannurse.com/type-2-diabetes-in-asian-americans/#:~:text=According%20to%20the%20Centers%20for
15. Karter AJ, Schillinger D, Adams AS, et al. Elevated rates of diabetes in Pacific Islanders and Asian subgroups: The Diabetes Study of Northern California (DISTANCE). *Diabetes Care*. 2013;36(3):574-579. doi:10.2337/dc12-0722
16. Shah NS, Luncheon C, Kandula NR, Cho P, Loustalot F, Fang J. Self-Reported Diabetes Prevalence in Asian American Subgroups: Behavioral Risk Factor Surveillance System, 2013-2019. *J Gen Intern Med*. 2022;37(8):1902-1909. doi:10.1007/s11606-021-06909-z
17. Diabetes Among Asians and Native Hawaiians or other Pacific Islanders — United States, 2011–2014. www.cdc.gov. https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6445a2.htm
18. Yoshida Y, Fonseca VA. Diabetes control in Asian Americans — Disparities and the role of acculturation. *Primary Care Diabetes*. Published online February 2020. doi:https://doi.org/10.1016/j.pcd.2020.01.010
19. Bhatt R, Ingle S, Sackpraseuth A, et al. Differences in the Age of Diagnosis of Diabetes in Asian Subgroups: Analysis of Data from the National Health Interview Survey (NHIS) 2006-2018. *Journal of Asian Health*. 2021;1(1). doi:https://doi.org/10.59448/jah.v1i1.4
20. Kff.org. Published 2023. https://www.kff.org/wp-content/uploads/2013/01/7745.pdf
21. Kao D, Carvalho Gulati A, Lee RE. Physical Activity Among Asian American Adults in Houston, Texas: Data from the Health of Houston Survey 2010. *Journal of Immigrant and Minority Health*. 2015;18(6):1470-1481. doi:https://doi.org/10.1007/s10903-015-0274-1
22. Alcohol and Drug Abuse Among Asian Americans. American Addiction Centers. https://americanaddictioncenters.org/addiction-statistics/asian-americans
23. Tobacco use in the Asian American community. Truth Initiative. https://truthinitiative.org/research-resources/targeted-communities/tobacco-use-asian-american-community
24. Kane JC, Damian AJ, Fairman B, Bass JK, Iwamoto DK, Johnson RM. Differences in alcohol use patterns between adolescent Asian American ethnic groups: Representative estimates from the National Survey on Drug Use and Health 2002–2013. *Addictive Behaviors*. 2017;64:154-158. doi:https://doi.org/10.1016/j.addbeh.2016.08.045
25. Nguyen TH, Nguyen TN, Fischer T, Ha W, Tran TV. Type 2 diabetes among Asian Americans: Prevalence and prevention. *World J Diabetes.* 2015;6(4):543-547.
26. California Health Interview Survey. Accessed April 3, 2024. https://healthpolicy.ucla.edu/our-work/california-health-interview-survey-chis/about-chis
27. World Health Organization. A healthy lifestyle - WHO recommendations. World Health Organisation. Published May 6, 2010. https://www.who.int/europe/news-room/fact-sheets/item/a-healthy-lifestyle---who-recommendations

28. Lim JU, Lee JH, Kim JS, et al. Comparison of World Health Organization and Asia-Pacific body mass index classifications in COPD patients. *International Journal of Chronic Obstructive Pulmonary Disease*. 2017;12:2465-2475. doi:https://doi.org/10.2147/copd.s141295

29. Shah NS, Luncheon C, Kandula NR, Cho P, Loustalot F, Fang J. Self-reported diabetes prevalence in Asian American subgroups: Behavioral Risk Factor Surveillance System,

2013-2019. Journal of general internal medicine. June 2022. Accessed March 28, 2024. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9198162/.

30. Lee JW, Brancati FL, Yeh HC. Trends in the prevalence of type 2 diabetes in Asians versus whites: results from the United States National Health Interview Survey, 1997-2008. *Diabetes Care*. 2011;34(2):353-357. doi:10.2337/dc10-0746

31. Gordon NP, Lin TY, Rau J, Lo JC. Aggregation of Asian-American subgroups masks meaningful differences in health and health risks among Asian ethnicities: An electronic health record based Cohort Study - BMC Public Health. BioMed Central. November 25, 2019. Accessed March 28, 2024. https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7683-3.

32. Holman H, Müller F, Bhangu N, Kottutt J, Alshaarawy O. Impact of Limited English Proficiency on the Diagnosis and Awareness of Diabetes: The National Health and Nutrition Examination Survey, 2003–2018. *Diabetes Care*. 2022;45(8):e124-e125. doi:https://doi.org/10.2337/dc22-0594

33. Green AR, Chijioke Nze. Language-Based Inequity in Health Care: Who Is the "Poor Historian"?. *AMA Journal of Ethics*. 2017;19(3):263-271. doi:https://doi.org/10.1001/journalofethics.2017.19.3.medu1-1703.

34. Bleakley H, Chin A. Age at Arrival, English Proficiency, and Social Assimilation Among US Immigrants. *American Economic Journal: Applied Economics*. 2010;2(1):165-192. doi:https://doi.org/10.1257/app.2.1.165

35. Akresh IR, Massey DS, Frank R. Beyond English proficiency: rethinking immigrant integration. *Soc Sci Res*. 2014;45:200-210. doi:10.1016/j.ssresearch.2014.01.005

36. Lower Diabetes Risk on Asian Diet. hms.harvard.edu. https://hms.harvard.edu/news/lower-diabetes-risk-asian-diet

37. Yu Kuang Liao, Tsai W, Chiu LT, Kung P. Educational attainment affects the diagnostic time in type 2 diabetes mellitus and the mortality risk of those enrolled in the diabetes pay-for-performance program. Health Policy. 2023;138:104917-104917. doi:https://doi.org/10.1016/j.healthpol.2023.104917

38. Casagrande SS, Park J, Herman WH, Bullard KM. Health Insurance and Diabetes. PubMed. Published 2023. https://www.ncbi.nlm.nih.gov/books/NBK597725

39. Vieira G. Medicare Benefits for People with Type 1 + Type 2 Diabetes. Beyond Type 1. Published October 3, 2022. Accessed April 17, 2024. https://beyondtype1.org/medicare-benefits-diabetes/

40. Kff.org. Published 2011. https://www.kff.org/wp-content/uploads/2013/01/8383_d.pdf

41. Deshpande AD, Harris-Hayes M, Schootman M. Epidemiology of diabetes and diabetes-related complications. *Phys Ther*. 2008;88(11):1254-1264. doi:10.2522/ptj.20080020