Title
Gender and ethnic differences in the prevalence of type 2 diabetes among Asian subgroups in California

Journal
Journal of diabetes and its complications, 27(5)

ISSN
1873-460X

Authors
Choi, Sarah E.
Liu, Michael
Palaniappan, Latha P.
et al.

Publication Date
2013-06-04

Peer reviewed

Published in final edited form as:
J Diabetes Complications. 2013 ; 27(5): 429–435. doi:10.1016/j.jdiacomp.2013.01.002.

Gender and ethnic differences in the prevalence of type 2 diabetes among Asian subgroups in California

Sarah E. Choi, PhD, RN[1], **Michael Liu**[2], **Latha P. Palaniappan, MD, MS**[3], **Elsie J. Wang, MS**[3], and **Nathan D. Wong, PhD**[2]

[1]Program in Nursing Science, College of Health Sciences, University of California, Irvine, CA

[2]Heart Disease Prevention Program, Division of Cardiology, Department of Medicine, University of California, Irvine, CA

[3]Palo Alto Medical Foundation Research Institute, Palo Alto, CA

Abstract

Aims—To investigate gender and ethnic type 2 diabetes (DM) prevalences among California Asian subgroups versus other ethnic groups and if risk factors explain these differences.

Methods—We identified the prevalence of DM and associated risk factors, stratified by gender, among Chinese, Filipino, South Asian, Japanese, Korean, Vietnamese, Mexican, Other Hispanic, African American, Caucasian, and Native American adults in a large survey conducted in 2009 (n=46,091, projected n= 26.6 mil).

Results—The highest age-adjusted DM prevalence was seen in Native Americans (32.4%), Filipinos (15.8%), and Japanese (11.8%) among men and in Native Americans (16.0%) and African Americans (13.3%) among women. Caucasian and Mexican men had higher DM prevalences than women. Age and risk factor-adjusted logistic regression showed DM more likely (relative to Caucasians) among women in Koreans (OR=4.6, $p<0.01$), Native Americans (OR=3.0, $p<0.01$), and Other Hispanics (OR 2.9, $p<0.01$) and among men in Filipinos (OR=7.0, $p<0.01$), South Asians (OR=4.7, $p<0.01$), and Native Americans (OR=4.7, $p<0.01$). No specific risk factors accounted for the gender differences.

Conclusions—Ethnic and gender differences in DM prevalence persist, even after adjusting for lifestyle and other risk factors; prevalence is high among certain Asian American subgroups. Different diabetes prevention approaches may be needed across ethnic/gender groups.

Keywords

type 2 diabetes prevalence; risk factors; gender difference; ethnicity

Introduction

The prevalence of type 2 diabetes (DM) is higher in racial/ethnic minorities than in Caucasians (Centers for Disease Control and Prevention, 2011). However, to date, Asian

Corresponding Author: Sarah E. Choi, PhD, RN, Program in Nursing Science, College of Health Sciences, University of California, Irvine, 100B Berk Hall, Irvine, CA 92697-3959, Phone: (949) 824-2043, Fax: (949) 824-0470, sechoi@uci.edu.

Americans remain underrepresented in most population-based epidemiological studies, either being excluded due to small sample sizes or included only in aggregate as an Asian American Pacific Islander “AAPI” or “others” group. As a result, despite the rapid population growth and rising incidence of DM among Asian American subgroups (Caballero, 2005; Lee, Brancati and Yeh, 2011; U.S. Census Bureau, 2009), data on the prevalence and risk factors of DM among Asian subgroups, compared with that of other racial/ethnic groups (e.g., African Americans or Hispanics), lag behind, and the scarcity of Asian subgroup-specific data makes it difficult to identify potentially critical subgroup differences in this most diverse racial group in the United States (Terrance and Bennett, 2003).

In addition, while gender differences in DM risk factors and prevalence have been shown among African Americans, Hispanics, and Caucasians in previous studies using national datasets (Cowie, Rust, Byrd-Holt, Gregg, Ford, Geiss, et al., 2010; Hertz, Unger and Ferrario, 2006; Signorello, Schlundt, Cohen, Steinwandel, Buchowski, McLaughlin, et al., 2007), gender differences have not been adequately investigated among Asian American subgroups using a population-based representative sample. Previous studies included only one major Asian subgroup (e.g., Filipinos, Chinese) (Araneta and Barrett-Connor, 2005; Lakoski, Cushman, Criqui, Rundek, Blumenthal, D’Agostino, et al., 2006), limiting the ability to compare gender differences in risks and prevalence of DM with other Asian subgroups and other racial/ethnic groups, or used Asian subgroups within a specific healthcare care setting (Palaniappan, Wong, Shin, Fortmann and Lauderdale, 2011; Wang, Wong, Dixit, Fortmann, Linde and Palaniappan, 2011).

Asian Americans are racial/ethnically diverse and each subgroup has distinct culture, lifestyle habits, and health behaviors and practices (Islam, Trinh-Shevrin and Rey, 2009). Evidence suggests that health behaviors and practices, such as diet and exercise, are directly linked to risk factors and prevalence of DM (Mann, 2002; Perez-Escamilla and Putnik, 2007; Schenk and Horowitz, 2007; Uusitupa, 2002). Thus, treating diverse Asian Americans as a single group may mask important heterogeneity in DM risk factor profiles and prevalence among Asians and obstruct the identification of high risk subgroups that may require different prevention and intervention approaches (e.g., screening at younger age, gender-specific prevention protocols).

Data comparing multiple subgroups within a single data source/dataset simultaneously remains scarce, and gender stratification may reveal further differences in DM prevalence. Therefore, we examined the prevalence of DM within a sample of California adults for six Asian subgroups along with three other racial/ethnic minority groups relative to Caucasians and stratified the results by gender. Our specific aims were (1) to investigate the gender difference in the prevalence of DM among California Asian subgroups in comparison with Caucasians and other racial/ethnic groups; (2) to describe gender differences in the prevalence of lifestyle and clinical DM risk factors among the same groups; and (3) to examine whether gender differences in risk factors explain the gender differences in the prevalence of DM in certain Asian subgroups compared to Caucasians and other racial/ethnic groups.

Methods

Study population

Using the California Health Interview Survey (CHIS) 2009, 2011), we examined California adults aged 18 and older (n=46,091 projected to 26.6 million) to determine DM likelihood among different racial/ethnic groups relative to Caucasians, African Americans, and Hispanics, stratified by gender. These racial/ethnic groups include: Chinese, Filipino, South

Asian, Japanese, Korean, Vietnamese, Mexican, Other Hispanic, and African American. Due to the insufficient number of the Cambodian/ Other Asian subgroup with prevalent diabetes (n=13), we omitted this group from the study.

Data Source and Definitions

The CHIS is a biennial population-based telephone interview health survey of individuals residing in households in California. The survey collects a variety of health information including diseases, lifestyle and health behaviors, health status, socioeconomic status, and access to healthcare. The CHIS sample was drawn from all of California's 58 counties and was designed to be representative of the diversity of the California population. The sample was weighted to represent the non-institutionalized population statewide. The weighting procedure used for CHIS 2009 compensates for differential probabilities of selection for households and persons, reduces biases occurring from the differing characteristics of respondents and non-respondents, adjusts for under-coverage in the sampling frames, and reduces the variance of the estimates by using auxiliary information.

One randomly selected adult was interviewed per household. Interviews were conducted in multiple languages (English, Spanish, Mandarin, Cantonese, Vietnamese, and Korean). Questions covered included health conditions, health behaviors (e.g., smoking, daily fruit and vegetable consumption, and vigorous exercise), poverty level, and health insurance coverage. Body Mass Index (BMI) was calculated in kg/m^2 based on self-reported height and weight without shoes. Race/ethnicity was determined by participants' self-report. DM was defined by the respondents' self-reported answer choice to the question, "Were you told that you had type 1 or type 2 diabetes?" The respondent was provided with a description of type 1 and type 2 diabetes if needed. Those who responded with type 1 diabetes were excluded from the study. Additionally, high blood pressure, coronary heart disease (CHD), and heart failure (HF) were defined by either self-report or indication of the doctor's saying they had the condition.

Risk factors for DM by the American Diabetes Association include age, BMI, exercise habits, history of hypertension, and dyslipidemia (American Diabetes Association, 2012). Past research has also focused extensively on the documentation of demographic risk factors for racial/ethnic minority populations, identifying socioeconomic and cultural factors such as health insurance, poverty level, and acculturation as correlates to DM prevalence (Centers for Disease Control and Prevention, 2007; Perez-Escamilla and Putnik, 2007; Signorello, Schlundt, Cohen, Steinwandel, Buchowski, McLaughlin, et al., 2007). Poverty level in the United States is determined by the Department of Health and Human Services and refers to federal poverty level (FPL), which is the set minimum amount of gross income that a family needs for food, clothing, transportation, shelter, and other necessities. FPL varies according to family size and public assistance programs define eligibility income limits as some percentage of FPL (U.S. Department of Health and Human Services, 2012). Therefore, we selected risk factors available from CHIS for this analysis to include: gender, age, whether or not the subject was US-born, time living in US, health insurance status, FPL (0–99%, 100–299%, and 300%), current smoker, high blood pressure, vegetable consumption, level of vigorous physical activity, BMI, and use of cholesterol medication. The presence of comorbidities of HF and CHD were also included.

Statistical analysis

The Chi-squared test of proportions was used to compare the prevalence of DM and risk factors across the different racial/ethnic groups for both genders. For continuous variables, the Student's t-test was used for comparisons between genders and analysis of variance (ANOVA) between racial/ethnic groups. Multivariable logistic regressions were used to determine which risk factors and racial/ethnic subgroups (relative to Caucasian), stratified by gender, remained independently associated with an increased likelihood of having DM. Additionally, using individual multivariable logistic regression models, we sequentially added clinical and lifestyle covariates to a base model with only gender and race/ethnicity to determine if they explained gender differences within racial/ethnic groups regarding the odds of DM. SAS version 9.1.3 (SAS institute, Cary, NC) and SUDAAN software (RTI International, Research Triangle Park, North Carolina) were used for analysis and computation of weighted estimates for projection to the California population.

Results

An analysis of the prevalence of DM in Californian adults (Figure 1) demonstrates that among men, the age-adjusted prevalence of DM was highest in Native Americans (32.4%), Filipinos (15.8%), Japanese (11.8%), and Mexicans (10.0%). Among women, Native Americans (16.0%), African Americans (13.3%) and Other Hispanic (10.7%) had the highest DM prevalence. In all racial/ethnic groups, except African Americans and Other Hispanics, men had higher DM prevalence than women. Among men, Vietnamese (2.5%) and Chinese (5.0%) had lower prevalence than Caucasians (6.1%). Among women, Vietnamese (2.1%), South Asian (2.7%), and Chinese (3.6%) had lower prevalence than Caucasians (4.9%). Significant gender differences were observed only in Caucasians (p<0.01) and Mexicans (p<0.05), where men had a higher DM prevalence than women. The differences across ethnic groups among all males and females are significant (p<.0001).

In our sample of male adults with DM (Table 1A, B), the independent variables US-born, duration of US residence, insurance, poverty level, smoking, high blood pressure, BMI (overweight/obesity), HF, and CHD were significantly different across the different racial/ethnic groups ($p < 0.01$); among female adults with DM (Table 1C, D), the most significant risk factors were the same except for blood pressure ($p < 0.05$). Other significant risk factors included cholesterol medication in males ($p < 0.05$) and vigorous activity in females ($p <$ 0.05).

In multiple logistic regression adjusting for age and other clinical and lifestyle risk factors (Table 2), Filipinos had the greatest overall likelihood of DM [OR 4.0, p<.01], followed by Native Americans [OR 3.8, p<.01] and Koreans [OR 3.5, p<.01]. Other high risk groups overall included South Asian [OR 3.3, p<.01], Mexican [OR 2.4, p<.01], African American [OR 2.2, p<.01] and Other Hispanic [OR 2.2, p<.01]. Among men, compared to Caucasians, DM was more likely in Filipinos (OR 7.0, p<0.01), South Asians (OR 4.7, p<0.01), Native Americans (OR 4.7, p<0.01), and Mexicans (OR 2.8, p<0.01). Among women, compared to Caucasians, an increased likelihood of DM was seen in Koreans (OR 4.6, p<0.01), Native Americans (OR 3.0, p<0.01), and Other Hispanic (OR 2.9, p<0.01).

The likelihood of DM differed across racial/ethnic groups when examined as an overall group compared to men and women separately within the group (Table 2). When gender stratified, the odds of DM among Other Hispanics were only significant for females [OR 2.9, p<.05], among South Asian, only significant for males [OR 4.7, p<.01], and among Japanese, no longer significant for either with the smaller sample sizes. Furthermore, the following variables were associated with an increased likelihood of DM: gender (male), increased age, insurance, below federal poverty level (male), high blood pressure, eating vegetables (male), lack of vigorous physical activity, high BMI – overweight or obese, heart failure (female), and heart disease (female).

Racial/ethnic specific logistic regression was performed to assess the effects of risk factor adjustments on male and female gender differences (Table 3). Using a base model of factors ethnicity and gender, with each risk factor added incrementally, no significant change in significance of male vs. female differences for any racial/ethnic group was seen; in fact, the male vs. female greater odds of DM remained both in Caucasians and in Mexicans. Therefore, the analysis suggests that no specific risk factors we studied account for the observed gender differences.

Discussion

To our knowledge, our analysis of CHIS is the first that simultaneously examined DM prevalence stratified by gender in six Asian racial/ethnic subgroups along with other frequently studied racial/ethnic groups using a single source dataset. We found various levels of gender and racial/ethnic differences in age-adjusted DM prevalence among these groups. The gender difference was wide in some groups (e.g., Native Americans) and narrow in others (e.g., Vietnamese). In all racial/ethnic groups, except African Americans and Other Hispanics, men had higher DM prevalence than women. Our prevalence finding is consistent with studies with a national dataset (e.g., NHANES) that showed in African American and Hispanics, women had higher prevalence of DM than men (Harris, Flegal, Cowie, Eberhardt, Goldstein, Little, et al., 1998; Hertz, Unger and Ferrario, 2006). Our findings with Asian subgroups are also consistent with recent studies that showed men had higher prevalence of DM than women across all 6 Asian subgroups included in our study (Wang, Wong, Dixit, Fortmann, Linde and Palaniappan, 2011). While a previous study based on national data found the prevalence of DM was similar across both sexes in Caucasians (Cowie, Rust, Byrd-Holt, Gregg, Ford, Geiss, et al., 2010), our study among California Caucasian adults showed higher prevalence in men than women.

Contrary to reports indicating that Asian Americans (as an aggregate) have higher prevalence of DM than Caucasians (Centers for Disease Control and Prevention, 2011), we found that the prevalence rate varies widely among Asian subgroups. Whereas the highest age-adjusted prevalence of DM among Filipinos in this study was consistent with a recent study that examined DM prevalence among Asian subgroups (Choi, Chow, Chung and Wong, 2010) and high prevalence of DM among South Asians also was consistent with a recent report (Gujral, Echouffo-Tcheugui and Narayan, 2011), some subgroups showed lower prevalence of DM than Caucasians. For example, Chinese Americans and Vietnamese Americans have been often cited as having a higher DM prevalence than Caucasians, yet in our study, both genders in these subgroups had lower DM prevalence than Caucasians, similar to findings from previous studies with an Asian sample (Choi, Chow, Chung and Wong, 2010; Wang, Wong, Dixit, Fortmann, Linde and Palaniappan, 2011). A recent study that used a national telephone survey dataset also showed significant differences in age-adjusted diabetes prevalence estimates among the same 6 Asian subgroups we studied compared to other racial/ethnic groups, with Asian Indian and Filipino having higher prevalence than other Asian subgroups (Barnes, Adams and Powell-Griner, 2008). Our study provides racial/ethnic-specific DM prevalence information that can be used for research and practice to focus prevention efforts on high prevalence Asian subgroups and to address their unmet DM prevention care needs. Our findings emphasize the importance of considering disease risk and approaches to treatment among individual Asian subgroups rather than the traditional approach of treating Asians in aggregate.

Our study also showed gender and racial/ethnic difference in likelihood of DM in our sample. Contrary to previous studies reporting that the likelihood of DM in Asians is lower than other racial/ethnic minorities (e.g., African Americans or Hispanics) when compared to Caucasians, certain Asian groups in our study (Filipinos, Koreans, South Asians) showed higher likelihood of DM than Hispanic and African Americans compare to Caucasians. Furthermore, the likelihood of DM in Filipinos for overall and men were higher than even

Native American, the group known to have the highest DM prevalence (American Diabetes Association, 2012; Burrows, Geiss, Engelgau and Acton, 2000). Particularly noteworthy was the strikingly high likelihood of DM among Korean women compared to Caucasian women, nearly 5 times higher likelihood of DM compared to Caucasian women and higher than any other racial/ethnic group women including Native Americans. These differences in DM likelihood among Asian subgroups are an important finding in our study and contribute to new knowledge: not all Asians are the same when it comes to DM risk and certain Asian subgroups that have not been traditionally recognized as at risk are at remarkably high risk for DM. While high prevalence of DM among Filipinos and South Asians in the U.S. is recognized in research and practice, high prevalence of DM in Koreans in the U.S., particularly in Korean women, has not been recognized. To our knowledge, this or similar findings have not been reported for Korean American women. This group's high risk for DM warrants further research to investigate different contributing factors that may be involved in this increased risk.

Although men have higher risk factor adjusted likelihood of DM than women in most racial/ethnic groups, in some groups, women have higher DM likelihood than men (Koreans, African Americans) compared to their Caucasian counterparts. Gender differences in DM likelihood within each individual racial/ethnic group (particularly for Asians) should be taken into account in research and practice for DM. At the same time, prevention strategies should be tailored to risk factors and DM likelihood (e.g., heart disease) specific to each gender.

We also found gender differences in risk factors in our sample with DM. While high blood pressure, lack of vigorous physical activity, and increased BMI were associated with higher likelihood of DM for overall, men, and women, certain risk factors were only associated with increased likelihood for men (poverty and frequency of vegetable eating) or only for women (HF and CHD). While DM is associated with both HF and CHD in both genders (Kanaya, Grady and Barrett-Connor, 2002), previous investigations do show a stronger relation in women than in men (Lee, Cheung, Cape and Zinman, 2000; Orchard, 1996). Poverty and less vegetable consumption may be risk factors in men considering DM is more prevalent in low SES individuals (Connolly, Unwin, Sherriff, Bilous and Kelly, 2000), yet gender differences on this relationship are unclear in literature. Nevertheless, our study suggests that gender differences should be considered in risk factor assessment for DM.

We examined gender differences in lifestyle and clinical risk factor adjusted likelihood of DM, but did not find evidence that the risk factor differences we observed explained gender differences in the prevalence of DM in any of the racial/ethnic groups we studied. While findings from previous studies regarding DM risk factors and gender differences are inconclusive and vary by race/ethnicity and risk factors, it may be that certain risk factors that we were unable to examine, such as novel biomarkers, genetic markers, environmental exposures, may play a significant role in explaining gender differences in DM prevalence in Asian subgroups. Future studies should consider including these factors as well as traditional risk factors.

Our study has a few limitations. First, the recall bias inherent in self-reported data and no objective data to verify (e.g., diagnosis code for DM) may have influenced the accuracy of both exposure and outcome variables. However, recent large scale validation studies of diabetes self-report compared with reference definitions including biochemical measurement concluded that self-reported diabetes was >92% reliable over time (Schneider, Pankow, Heiss and Selvin, 2012), self-reports of "treated diabetes" are sufficiently accurate to allow use in epidemiologic studies (Margolis, Lihong, Brzyski, Bonds, Howard, Kempainen, et al., 2008), and health surveys are a good instrument to use to evaluate the prevalence of diabetes

(Espelt, Goday, Franch and Borrell, 2012). Given the support from these studies we believe the influence of self-repot in our current study is minimal. Unfortunately, participants in these studies were predominantly White and none examined ethnic differences in the diabetes self-report accuracy. Second, the CHIS phone interview survey excluded individuals using cell phones, or those hospitalized and institutionalized from participating. Third, due to the cross-sectional design of the survey, we are unable to establish causation. Lastly, while we made our best efforts to be comprehensive in including covariates/ confounding factors in the model, this study utilized an existing public dataset of a large telephone survey, which is limited to variables amenable to self-report. Thus, measured clinical risk factors such as blood pressure, lipid, or other biomarker data (e.g., C-reactive protein) or genetic or other environmental factors that were not available may have accounted for observed gender and racial/ethnic differences in our study. Also, it is important to note that certain racial/ethnic groups had substantially larger sample sizes than others, allowing for detection of smaller differences in prevalence of DM between genders. Strengths of our study include using a state-wide, representative, population based sample and a dataset that has Asian subgroup specific information obtained in individuals' native languages, which enables us to generalize our findings to Asian subgroup populations in California.

In summary, age-adjusted DM and associated risk factor prevalence varies by gender and race/ethnicity among Asian subgroups as compared with Caucasian and other racial/ethnic minorities in California. Overall, Filipinos had the greatest likelihood of DM, followed by Koreans, and South Asians. Among men, Filipino men had the greatest DM likelihood, followed by, South Asian, and Korean men. Among women, Korean women had the greatest DM likelihood, followed by Filipinas. Koreans, particularly Korean women, are newly identified high-risk group for DM and require urgent prevention effort. The excess odds of DM in these subgroups and gender differences were not explained by traditional lifestyle or clinical risk factors in the current study. Nevertheless, our findings are unique in documenting California Asian subgroup adults' DM prevalence and risk factors by gender in comparison with Caucasian and other racial/ethnic groups simultaneously, and in this regard, contribute to addressing health disparities in DM research and practice for Asian racial/ethnic minorities. Our findings also highlight the need to study Asian subgroups individually and not in aggregate and stratified by gender in future research, to consider contextual factors (e.g., socio-economic, cultural, environmental factors) and novel risk factors (e.g., genetics, biomarkers) as well as traditional risk factors when assessing DM risk and prevalence among Asian subgroups.

Acknowledgments

Grant support: National Center for Research Resources and the National Center for Advancing Translational Sciences, National Institute of Health, through Grant UL1 TR000153 and KL2 TR000147 [Dr. Choi].

References

American Diabetes Association. [Accessed July 30, 2012] My Community - Native American Complications. 2012. http://www.diabetes.org/in-my-community/programs/native-american-programs/

American Diabetes Association. Standards of medical care in diabetes--2012. Diabetes Care. 2012; 35(Suppl 1):S11–63. [PubMed: 22187469]

Araneta MR, Barrett-Connor E. Ethnic differences in visceral adipose tissue and type 2 diabetes: Filipino, African-American, and white women. Obesity Research. 2005; 13:1458–65. [PubMed: 16129729]

Barnes PM, Adams PF, Powell-Griner E. Health characteristics of the Asian adult population: United States, 2004–2006. Advance Data. 2008:1–22. [PubMed: 18271366]

Burrows NR, Geiss LS, Engelgau MM, Acton KJ. Prevalence of diabetes among Native Americans and Alaska Natives, 1990–1997: an increasing burden. Diabetes Care. 2000; 23:1786–90. [PubMed: 11128353]

Caballero, AE. Diabetes in Minority Populations. In: Khan, CR.; Weir, GC.; King, GL.; Jacobson, AM.; Moses, AC.; Smith, RJ., editors. Joslin's Diabetes Mellitus. 14. Philadelphia: Lippincott, Williams & Eilkins; 2005. p. 505-524.

California Health Interview Survey. CHIS 2009 Methodology Series: Report 1 - Sample Design. Los Angeles, CA: UCLA Center for Health Policy Research; 2011.

Centers for Disease Control and Prevention. Diabetes Among Hispanics - Los Angeles County, California, 2002–2003. Morbidity and Mortality Weekly Report (MMWR). 2007; 52:1152–1155.

Centers for Disease Control and Prevention. National Diabetes Fact Sheet: National Estimates and General Information on Diabetes and Prediabetes in the United States. 2011.

Choi SE, Chow VH, Chung SJ, Wong ND. Do Risk Factors Explain the Increased Prevalence of Type 2 Diabetes Among California Asian Adults? Journal of Immigrant and Minority Health. 2010; 13(5):803–808. [PubMed: 20936431]

Connolly V, Unwin N, Sherriff P, Bilous R, Kelly W. Diabetes prevalence and socioeconomic status: a population based study showing increased prevalence of type 2 diabetes mellitus in deprived areas. Journal of Epidemiology & Community Health. 2000; 54:173–7. [PubMed: 10746110]

Cowie CC, Rust KF, Byrd-Holt DD, Gregg EW, Ford ES, Geiss LS, et al. Prevalence of diabetes and high risk for diabetes using A1C criteria in the U.S. population in 1988–2006. Diabetes Care. 2010; 33:562–8. [PubMed: 20067953]

Espelt A, Goday A, Franch J, Borrell C. Validity of self-reported diabetes in health interview surveys for measuring social inequalities in the prevalence of diabetes. Journal of Epidemiology & Community Health. 2012; 66:e15. [PubMed: 21502089]

Gujral UP, Echouffo-Tcheugui JB, Narayan K. Commentary: Trends in prevalence of type 2 diabetes and prediabetes in South Asians--does it tell a story? International Journal of Epidemiology. 2011; 40:1554–5. [PubMed: 22158666]

Harris MI, Flegal KM, Cowie CC, Eberhardt MS, Goldstein DE, Little RR, et al. Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S. adults. The Third National Health and Nutrition Examination Survey, 1988–1994. Diabetes Care. 1998; 21:518–24. [PubMed: 9571335]

Hertz RP, Unger AN, Ferrario CM. Diabetes, hypertension, and dyslipidemia in Mexican Americans and non-Hispanic whites. American Journal of Preventive Medicine. 2006; 30:103–10. [PubMed: 16459207]

Islam, NS.; Trinh-Shevrin, C.; Rey, MJ. Asian American Communities and Health: Context, Research, Policy and Action. San Francisco, CA: John Wiley & Sons, Inc; 2009. Chapter 1: Toward a Contextual Understanding of Asian American Health; p. 3-22.

Kanaya AM, Grady D, Barrett-Connor E. Explaining the sex difference in coronary heart disease mortality among patients with type 2 diabetes mellitus: a meta-analysis. Archives of Internal Medicine. 2002; 162:1737–45. [PubMed: 12153377]

Lakoski SG, Cushman M, Criqui M, Rundek T, Blumenthal RS, D'Agostino RB Jr, et al. Gender and C-reactive protein: data from the Multiethnic Study of Atherosclerosis (MESA) cohort. American Heart Journal. 2006; 152:593–8. [PubMed: 16923436]

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; 34:353–7. [PubMed: 21216863]

Lee WL, Cheung AM, Cape D, Zinman B. Impact of diabetes on coronary artery disease in women and men: a meta-analysis of prospective studies. Diabetes Care. 2000; 23:962–8. [PubMed: 10895847]

Mann JI. Diet and risk of coronary heart disease and type 2 diabetes. Lancet. 2002; 360:783–9. [PubMed: 12241840]

Margolis KL, Lihong Q, Brzyski R, Bonds DE, Howard BV, Kempainen S, et al. Validity of diabetes self-reports in the Women's Health Initiative: comparison with medication inventories and fasting glucose measurements. Clinical Trials. 2008; 5:240–7. [PubMed: 18559413]

Orchard TJ. The impact of gender and general risk factors on the occurrence of atherosclerotic vascular disease in non-insulin-dependent diabetes mellitus. Annals of Medicine. 1996; 28:323–33. [PubMed: 8862687]

Palaniappan LP, Wong EC, Shin JJ, Fortmann SP, Lauderdale DS. Asian Americans have greater prevalence of metabolic syndrome despite lower body mass index. International Journal of Obesity (Lond). 2011; 35:393–400.

Perez-Escamilla R, Putnik P. The role of acculturation in nutrition, lifestyle, and incidence of type 2 diabetes among Latinos. Journal of Nutrition. 2007; 137:860–70. [PubMed: 17374645]

Schenk S, Horowitz JF. Acute exercise increases triglyceride synthesis in skeletal muscle and prevents fatty acid-induced insulin resistance. Journal of Clinical Investigation. 2007; 117:1690–8. [PubMed: 17510709]

Schneider AL, Pankow JS, Heiss G, Selvin E. Validity and Reliability of Self-reported Diabetes in the Atherosclerosis Risk in Communities Study. American Journal of Epidemiology. 2012; 176:738–43. [PubMed: 23013620]

Signorello LB, Schlundt DG, Cohen SS, Steinwandel MD, Buchowski MS, McLaughlin JK, et al. Comparing diabetes prevalence between African Americans and Whites of similar socioeconomic status. American Journal of Public Health. 2007; 97:2260–7. [PubMed: 17971557]

Terrance, R.; Bennett, C. [Accessed July 30, 2012] The Asian and Pacific Islander Population in the United States: March 2002; Current Population Reports. 2003. p. 20-540.http://www.census.gov/prod/2003pubs/p20-540.pdf

U.S. Census Bureau. [Accessed July 30, 2012] United States Population Projections: 2010 to 2050. 2009. http://www.census.gov/population/www/projections/2009projections.html

U.S. Department of Health and Human Services. [Accessed December 4, 2012] HHS Poverty Guidelines. 2012. http://aspe.hhs.gov/poverty/12poverty.shtml

Uusitupa M. Lifestyles matter in the prevention of type 2 diabetes. Diabetes Care. 2002; 25:1650–1. [PubMed: 12196442]

Wang EJ, Wong EC, Dixit AA, Fortmann SP, Linde RB, Palaniappan LP. Type 2 diabetes: Identifying high risk Asian American subgroups in a clinical population. Diabetes Research and Clinical Practice Journal. 2011; 93:248–254.

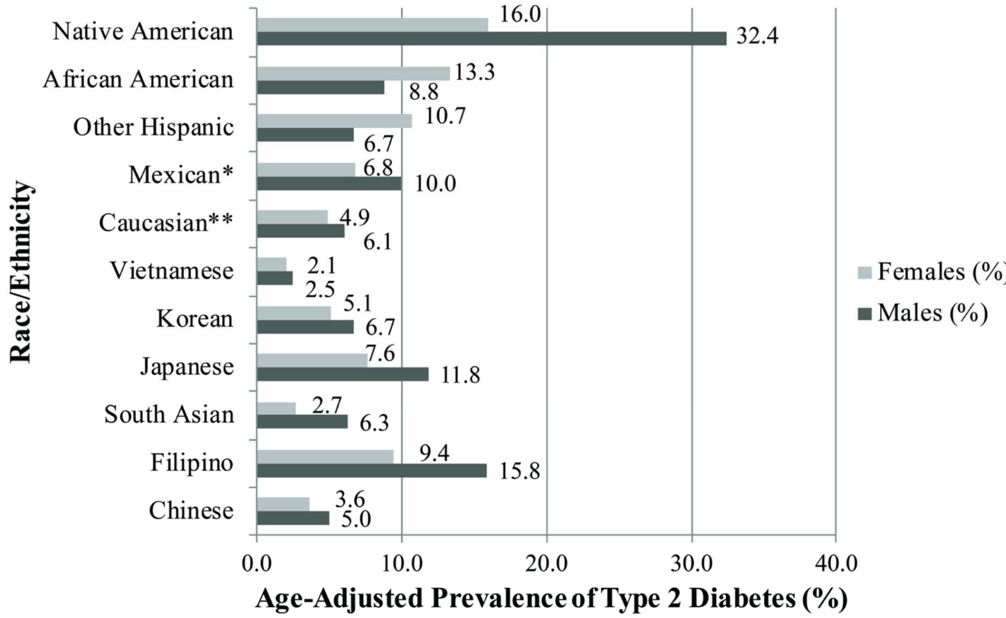

Figure 1.

Age-adjusted prevalence (in percent) of DM among adults ≥ 18 years old in California, CHIS (California Health Interview Survey) 2009 by ethnicity and gender, $p < 0.001$ across all ethnic groups among males and females. * $p<.05$, ** $p<.01$ differences between genders

Table 1

A–D. Distribution of risk factors among Californian adults ≥ 18 years with type 2 diabetes (DM) by Asian and non-Asian race/ethnicity for males and females (CHIS 2009)

1A. Males (Asian)

Covariates	Chinese		Filipino		South Asian		Japanese		Korean		Vietnamese	
	DM (31)	**No DM (402)**	**DM (22)**	**No DM (140)**	**DM (28)**	**No DM (184)**	**DM (24)**	**No DM (127)**	**DM (35)**	**No DM (285)**	**DM (63)**	**No DM (649)**
Mean Age (years)	62.3	48.0	56.4	44.9	59.0	43.1	72.1	57.6	67.0	52.7	64.7	48.2
Mean BMI (kg/m²)	25.4	24.6	28.6	26.1	24.1	24.4	26.9	25.3	25.9	24.4	25.5	25.0
US-Born (%)	29.7**	17.0††	#57.5	35.1	#0	16.2	94.1	80.3	#0.20	19.7	#0	21.3
Lived in US (>15 years)	69.1**	51.4††	38.7	37.7	76.4	31.1	#5.9	16.4	50.9	41.4	94.1	63.4
Health Insurance (%)	92.7**	87.9††	44.1	86.3	100	90.8	100	91.3	96.4	59.8	88.8	88.4
Below FPL (0–99%)	#17.4**	12.2††	#46.7	#5.5	0	#3.9	#19.9	#4.5	#2.8	6.9	18.6	23.7
≥3× FPL (≥300%)	62.6**	61.5††	17.9	58.4	74.5	84.3	63.1	73.8	72.5	49.7	36.4	33.9
Current Smoker (%)	#11.5	8.5††	#12.3	19.8	#7.8	16.2	#0	11.5	#4.2	22.9	#7.0	31.6
High Blood Pressure Medication (%)	66.8**	20.6††	96.6	15.6	#28.9	9.2	67.9	32.1	68.0	19.9	64.3	27.1
Vegetables (>7 times/week)	#26.3	27.5††	#19.5	4.4	#5.9	18.8	#18.3	15.4	#2.9	19.0	17.6	16.9
Vigorous Activity (last 7 days)	#19.9	26.6††	#3.2	39.9	#18.4	55.9	#14.7	36.7	#13.7	28.6	#14.6	38.6
Overweight (BMI 25–29.9 kg/m²)	#35.1**	28.5 ††	61.9	37.5	44.3	29.7	60.0	36.4	21.3	44.1	39.4	18.8
Obese (BMI ≥ 30 kg/m²)	#15.5**	3.7††	#24.6	11.9	#4.8	4.4	#22.5	12.7	#9.2	5.0	#10.6	7.7
Cholesterol Med (%)	63.8*	#0	97.7	#0	71.0	#0	87.5	#0	40.0	#0	78.8	#0
Heart Failure (%)	#0.7**	#0††	#10.1	#0.5	#0	#0.4	#18.5	#0.6	#2.8	#1.1	15.0	0.4
Coronary Heart Disease (%)	#19.4**	2.5††	#14.7	#2.4	#4.4	2.7	#23.6	10.5	#4.2	1.7	18.5	0.8

1B. Males (Non-Asians)

Covariates	Caucasian		Mexican		Other Hispanic		African American		Native American	
	DM (1,239)	**No DM (11,429)**	**DM (292)**	**No DM (2,228)**	**DM (80)**	**No DM (605)**	**DM (96)**	**No DM (585)**	**DM (35)**	**No DM (152)**
Mean Age (years)	68.1	57.1	58.6	41.9	60.3	44.6	64.2	51.0	62.9	51.7

Covariates	Caucasian		Mexican		Other Hispanic		African American		Native American	
1B. Males (Non-Asians)	DM (1,239)	No DM (11,429)	DM (292)	No DM (2,228)	DM (80)	No DM (605)	DM (96)	No DM (585)	DM (35)	No DM (152)
Mean BMI (kg/m^2)	30.2	27.0	30.9	28.4	30.3	27.9	30.2	27.9	31.0	28.8
US-Born (%)	91.1**	91.5††	32.0	41.2	22.3	43.7	90.5	90.4	100	96.5
Lived in US (>15 years)	8.7**	6.7††	65.1	40.8	68.6	39.1	#8.4	5.3	#0	#1.3
Health Insurance (%)	96.7**	86.4††	86.8	65.1	68.4	68.6	96.5	72.5	67.2	67.5
Below FPL (0–99%)	3.9**	6.1††	33.9	27.2	36.8	17.2	32.6	24.7	#56.1	16.6
≥3× FPL (≥300%)	68.0**	72.6††	16.8	27.4	23.1	43.3	41.1	41.8	27.0	54.8
Current Smoker (%)	9.8	16.1††	12.3	19.6	#5.9	19.5	29.6	15.6	#19.1	31.2
High Blood Pressure Medication (%)	68.0**	24.7††	62.6	19.1	68.6	22.9	78.2	23.7	78.0	47.5
Vegetables (>7 times/week)	14.2	17.8††	8.1	8.3	16.6	8.8	8.2	7.0	#3.8	11.1
Vigorous Activity (last 7 days)	14.6	42.1††	27.9	45.6	10.3	45.8	15.6	41.8	#4.1	34.5
Overweight (BMI 25–29.9 kg/m^2)	36.3**	41.6††	45.2	43.5	32.5	38.2	49.7	35.8	#11.7	47.3
Obese (BMI ≥ 30 kg/m^2)	48.3**	21.7††	45.6	28.3	42.6	29.6	38.3	22.9	85.2	41.4
Cholesterol Med (%)	74.9*	#0	64.0	#0	66.7	#0	72.9	#0	61.9	#0
Heart Failure (%)	11.1**	1.7††	2.9	0.9	#14.8	0.8	#4.0	0.9	#35.3	3.7
Coronary Heart Disease (%)	30.3**	7.3††	10.3	2.7	20.2	6.8	29.3	3.8	39.9	9.5

Covariates	Chinese		Filipino		South Asian		Japanese		Korean		Vietnamese	
1C. Females (Asian)	DM (23)	No DM (566)	DM (23)	No DM (253)	DM (8)	No DM (183)	DM (18)	No DM (203)	DM (62)	No DM (539)	DM (35)	No DM (652)
Mean Age (years)	67.6	49.6	59.3	52.8	55.0	41.8	69.1	60.3	66.6	50.8	63.7	47.1
Mean BMI (kg/m^2)	25.0	22.3	27.7	24.5	26.9	23.7	26.4	23.5	24.0	22.3	24.5	23.1
US-Born (%)	#16.3**	26.0††	#23.2	24.7	#0	14.4	70.9	74.1	#0	43.9	#0	22.5
Lived in US (>15 years)	41.5**	50.5††	69.5	59.7	#81.7	39.5	#28.9	19.3	93.9	27.5	98.8	55.1
Health Insurance (%)	94.6**	88.8††	95.8	96.5	#100	89.2	100	98.8	80.0	74.9	95.2	78.5
Below FPL (0–99%)	#17.0**	16.7††	#2.4	6.4	#2.3	7.9	#0.0	2.9	31.0	15.4	45.3	18.6
≥3× FPL (≥300%)	#17.5**	55.8††	51.7	59.5	#97.7	71.8	80.6	74.5	42.4	62.3	#35.0	30.3

1C. Females (Asian)												
Covariates	Chinese		Filipino		South Asian		Japanese		Korean		Vietnamese	
	DM (23)	No DM (566)	DM (23)	No DM (253)	DM (8)	No DM (183)	DM (18)	No DM (203)	DM (62)	No DM (539)	DM (35)	No DM (652)
Current Smoker (%)	#2.9	1.7††	#21.7	3.4	#0	#0.1	#0	14.1	#12.5	21.2	#0	#0.9
High Blood Pressure Medication (%)	47.9*	14.4††	81.1	34.2	#26.4	9.3	76.9	27.4	52.9	6.5	86.9	10.5
Vegetables (>7 times/week)	65.5**	46.8††	#10.4	20.9	#37.0	27.3	#22.0	29.7	41.7	13.6	66.9	20.2
Vigorous Activity (last 7 days)	#9.3*	19.7††	#8.4	25.2	#24.2	27.9	#14.4	18.3	#43.7	30.2	#16.4	11.1
Overweight (BMI 25–29.9 kg/m^2)	#31.1**	12.0††	#35.7	27.1	#42.5	27.1	#9.0	14.7	26.8	11.1	#23.0	6.6
Obese (BMI ≥ 30 kg/m^2)	#5.2**	1.4††	#36.7	10.4	#35.7	#2.8	#43.8	9.6	#3.38	#3.2	#17.0	3.4
Cholesterol Med (%)	44.8	#0	75.8	#0	#75.9	#0	77.9	#0	52.0	#0	58.5	#0
Heart Failure (%)	#4.3**	#0.7††	#0	#0.1	#2.3	#0	#0	#0.2	#0.1	#0	#2.0	1.0
Coronary Heart Disease (%)	#13.2**	4.4††	#1.3	4.6	#2.3	3.1	#19.2	#1.9	#8.8	5.68	#2.3	1.9

1D. Females (Non-Asians)										
Covariates	Caucasian		Mexican		Other Hispanic		African American		Native American	
	DM (1,289)	No DM (17,108)	DM (388)	No DM (3,415)	DM (106)	No DM (970)	DM (183)	No DM (1,042)	DM (46)	No DM (248)
Mean Age (years)	68.6	59.6	57.9	43.1	61.8	48.5	64.8	53.6	63.1	53.0
Mean BMI (kg/m^2)	31.0	25.7	32.2	28.0	32.0	26.8	32.2	28.4	31.8	28.0
US-Born (%)	93.5**	90.6††	39.4	43.3	45.7	49.6	70.6	90.5	99.7	98.6
Lived in US (>15 years)	6.3**	6.8††	49.4	32.7	39.0	33.7	29.4	3.6	#0.3	#1.4
Health Insurance (%)	96.4**	91.9††	78.9	70.7	90.6	74.1	87.3	84.8	97.6	81.9
Below FPL (0–99%)	8.7**	7.0††	38.1	35.6	29.1	27.4	15.3	16.0	13.7	33.4
≥3× FPL (≥300%)	49.8**	67.4††	17.7	23.3	41.0	33.7	39.7	44.8	51.0	36.5
Current Smoker (%)	9.6	12.7††	7.9	6.3	#6.1	6.1	12.4	16.7	#9.5	27.7
High Blood Pressure Medication (%)	70.4*	25.0††	57.8	17.4	77.2	23.2	84.2	34.6	68.7	28.4
Vegetables (>7 times/week)	30.5	32.9††	15.2	15.4	12.2	16.9	23.3	21.8	23.0	29.6
Vigorous Activity (last 7 days)	10.8*	29.0††	6.6	24.5	#3.0	27.4	6.3	26.2	#28.4	17.1
Overweight (BMI 25–29.9 kg/m^2)	30.9**	27.1††	23.2	31.3	25.7	27.9	47.9	34.6	42.8	32.7

Covariates	1D. Females (Non-Asians)									
	Caucasian		Mexican		Other Hispanic		African American		Native American	
	DM (1,289)	No DM (17,108)	DM (388)	No DM (3,415)	DM (106)	No DM (970)	DM (183)	No DM (1,042)	DM (46)	No DM (248)
Obese (BMI ≥30 kg/m^2)	52.3**	17.1††	58.0	26.8	61.5	27.6	40.5	29.0	46.5	32.9
Cholesterol Med (%)	65.2	#0	56.2	#0	55.8	#0	71.7	#0	62.5	#0
Heart Failure (%)	7.8**	1.2††	5.5	1.0	#5.9	#0.4	5.4	1.7	#4.9	#5.3
Coronary Heart Disease (%)	20.5**	5.4††	11.6	3.8	13.2	2.9	12.9	4.1	#10.8	9.9

Males (all ethnicities):

* *P*<0.05,

** *P*<0.01 across Type 2 DM ethnicity groups,

† *P*<0.05,

†† *P*<0.01 across no DM ethnicity groups; mean age and mean body mass index (BMI) significant P<0.01 with type 2 DM/ No DM, n = 18,731, weighted n = 13.0M,

Sample size <10, *FPL* federal poverty level, *CHF* congestive heart failure

Females (all ethnicities):

* *P*<0.05,

** *P*<0.01 across Type 2 DM ethnicity groups,

† *P*<0.05,

†† *P*<0.01 across no DM racial/ethnic groups; mean age and mean body mass index (BMI) significant P<0.01 with type 2 DM/ No DM, n = 27,360, weighted n = 13.6M,

Sample size <10, *FPL* federal poverty level

Table 2

Gender stratified logistic regression comparing ethnicity and other factors to the likelihood of prevalent Type 2 diabetes (CHIS 2009)

Variables	**All, OR (95% CI) n=46,091**	**Male, OR (95% CI) n=18,731**	**Female, OR (95% CI) n=27,360**
	Demographics		
Gender (Male vs. Female)	1.5** (1.2–1.8)	-	-
Age (10 year increments)	1.6** (1.5–1.7)	1.8** (1.7–1.9)	1.5** (1.3–1.6)
Caucasian	1.0 (-)	1.0 (-)	1.0 (-)
Chinese	1.3 (0.8–2.2)	1.2 (0.6–2.3)	1.5 (0.7–3.5)
Filipino	4.0** (2.2–7.1)	7.0** (3.6–13.7)	2.4* (1.0–5.8)
South Asian	3.3** (1.9–5.7)	4.7** (2.3–9.3)	1.9 (0.7–4.8)
Japanese	1.8* (1.1–3.00)	1.7 (0.9–3.3)	1.8 (0.9–3.6)
Korean	3.5** (2.0–6.0)	2.4** (1.3–4.4)	4.6** (2.3–9.5)
Vietnamese	0.8 (0.4–1.5)	0.5 (0.2–1.40)	1.3 (0.6–2.5)
Mexican	2.4** (1.9–2.9)	2.8** (2.0–3.7)	2.1** (1.7–2.6)
Other Hispanic	2.2** (1.5–3.3)	1.6 (0.9–2.8)	2.9** (1.7–5.1)
African American	2.2** (1.4–3.2)	1.6** (1.1–2.4)	2.5** (1.3–4.6)
Native American	3.8** (2.0–7.4)	4.7** (1.7–13.0)	3.0** (1.2–7.4)
	Risk Factors		
Insured vs. Uninsured	1.4* (1.0–1.9)	1.0 (0.9–2.3)	1.4 (1.0–1.9)
Below fed. Poverty level (0–99% vs. 100–199%)	1.4* (1.0–2.0)	2.2* (1.2–4.0)	0.9 (0.7–1.2)
Current smoker vs. non smoker	0.9 (0.7–1.2)	0.8 (0.6–1.1)	1.2 (0.8–1.8)
High Blood Pressure (yes vs. no)	3.1** (2.5–3.7)	3.2** (2.5–4.2)	3.0** (2.3–4.0)
Times eating vegetables (per week)	1.01* (1.00–1.03)	1.03* (1.00–1.05)	1.01 (1.00–1.02)
Vigorous physical activity (last 7 days yes vs. no)	0.6** (0.5–0.8)	0.7* (0.5–1.0)	0.6** (0.4–0.7)
BMI (Overweight vs. Normal)	2.2** (1.7–2.8)	2.2** (1.5–3.1)	2.3** (1.7–3.0)
BMI (Obese vs. Normal)	4.5** (3.7–5.4)	4.1** (3.1–5.4)	5.2** (4.0–6.7)
Heart Failure (yes vs. no)	1.6* (1.1–2.3)	1.5 (0.9–2.5)	1.7** (1.1–2.5)
Heart Disease (yes vs. no)	1.3* (1.1–1.7)	1.3 (1.0–1.9)	1.3* (1.1–1.7)

* $P < 0.05$,

** $P < 0.01$

Table 3

Odds Ratios for Likelihood of Type 2 Diabetes Males vs. Females, by Racial/Ethnic Group, Sequential Adjustment for Risk Factors

	Gender (Males vs. Females) Only	+ Age (years)	+ Current Smoker (yes vs. no)	+ High Blood Pressure medicati on (yes vs. no)	+BMI (kg/m^2)	+Health Insurance (%)	+ Poverty Level (%)	+ Heart Failure (%)	+ Coronary Heart Disease (%)	+ Vigorous Activity (last 7 days, yes vs. no)	+ Times Eating Vegetable s. (>7 times a week)
Chinese (1,022)	1.4 (0.5–3.9)	1.4 (0.5–4.1)	1.4 (0.5–3.9)	1.5 (0.5–4.7)	1.3 (0.4–3.5)	1.3 (0.4–3.6)	1.4 (0.5–3.6)	1.4 (0.5–4.1)	1.4 (0.5–4.1)	1.3 (0.5–3.9)	1.3 (0.5–3.8)
Filipino (438)	1.8 (0.7–5.0)	2.5 (0.8–8.3)	2.4 (0.5–10.8)	3.0 (0.6–14.2)	3.2 (0.6–15.5)	2.1 (0.4–11.3)	1.8 (0.3–11.0)	1.4 (0.2–8.4)	1.4 (0.2–8.4)	1.6 (0.3–9.9)	1.7 (0.3–10.5)
South Asian (403)	2.4 (0.8–6.9)	2.1 (0.7–6.4)	2.1 (0.7–6.4)	2.1 (0.7–6.4)	2.1 (0.7–6.3)	2.3 (0.8–6.8)	2.8 (0.9–8.9)	2.8 (1.0–8.0)	2.9 (1.0–8.2)	3.2* (1.1–9.6)	3.5 (0.9–12.9)
Japanese (372)	1.6 (0.7–3.6)	1.8 (0.8–4.4)	1.9 (0.8–4.7)	1.9 (0.8–4.9)	1.5 (0.6–3.7)	1.6 (0.7–3.9)	1.6 (0.7–3.8)	1.4 (0.6–3.3)	1.4 (0.6–3.3)	1.4 (0.5–3.5)	1.2 (0.5–3.3)
Korean (921)	1.3 (0.5–3.3)	0.7 (0.3–1.8)	0.7 (0.3–1.9)	0.7 (0.3–1.8)	0.7 (0.3–1.9)	0.7 (0.3–1.9)	0.6 (0.2–1.7)	0.6 (0.2–1.8)	0.6 (0.2–1.9)	0.6 (0.2–1.9)	0.7 (0.2–1.9)
Vietnamese (1,399)	1.2 (0.5–2.9)	0.9 (0.3–2.9)	1.6 (0.6–4.3)	1.2 (0.4–3.5)	1.1 (0.4–3.4)	1.1 (0.4–3.5)	1.1 (0.4–3.2)	1.1 (0.4–3.2)	1.1 (0.4–3.2)	1.1 (0.4–3.2)	1.2 (0.5–3.1)
Caucasian (31,065)	1.3** (1.1–1.5)	1.5** (1.3–1.7)	1.5** (1.3–1.7)	1.5** (1.3–1.7)	1.3** (1.1–1.5)	1.3** (1.1–1.5)	1.4** (1.2–1.6)	1.4** (1.2–1.6)	1.3** (1.1–1.5)	1.4** (1.2–1.6)	1.4** (1.2–1.6)
Mexican (6,323)	1.5** (1.1–2.1)	1.7** (1.2–2.5)	1.8** (1.2–2.6)	1.8** (1.2–2.5)	1.7** (1.2–2.4)	1.7** (1.2–2.3)	1.8** (1.3–2.7)	1.8** (1.3–2.7)	1.8** (1.3–2.7)	1.8** (1.3–2.5)	1.9** (1.4–2.7)
Other Hispanic (1,761)	0.6 (0.3–1.2)	0.7 (0.3–1.6)	0.7 (0.3–1.6)	0.7 (0.3–1.6)	0.7 (0.3–1.7)	0.7 (0.3–1.6)	0.8 (0.3–1.9)	0.7 (0.3–1.7)	0.7 (0.3–1.7)	0.8 (0.3–1.8)	0.8 (0.3–2.0)
African American (1,906)	0.6 (0.3–1.2)	0.7 (0.4–1.5)	0.7 (0.4–1.5)	0.9 (0.5–1.7)	0.9 (0.4–1.7)	0.9 (0.4–1.7)	0.8 (0.4–1.7)	0.8 (0.4–1.7)	0.8 (0.4–1.5)	0.8 (0.4–1.6)	0.9 (0.4–1.7)
Native American (481)	2.5 (0.7–9.8)	2.8 (0.7–10.7)	2.9 (0.8–10.9)	2.3 (0.6–8.8)	1.8 (0.4–7.8)	2.0 (0.5–8.7)	2.2 (0.4–12.9)	2.1 (0.4–11.8)	2.1 (0.4–11.7)	2.2 (0.4–12.2)	2.3 (0.4–13.5)

**P*<.05,

***P*<.01;

BMI body mass index, *FPL* federal poverty level