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Nianshuo Wang
Hunan University

Ifeoma Ozodiegwu
East Tennessee State University

Shaoqing Gong
Xi'an Jiaotong University

Kesheng Wang
West Virginia University

Xin XIe
East Tennessee State University

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Research article

Multivariate analyses of social-behavioral factors with health insurance coverage among Asian Americans in California

Nianshuo Wang[1], Ifeoma Ozodiegwu[2], Shaoqing Gong[3], Kesheng Wang[4] and Xin Xie[5,*]

[1] College of Finance and Statistics, Hunan University, Changsha, Hunan Province, China
[2] Department of Biostatistics and Epidemiology, College of Public Health, East Tennessee State University, Johnson City, TN 37614, USA
[3] School of Public Policy and Administration, Xi'an Jiaotong University, Xi'an, China
[4] Department of Family and Community Health, School of Nursing, Health Sciences Center, West Virginia University, Morgantown, WV 26506, USA
[5] Department of Economics and Finance, College of Business and Technology, East Tennessee State University, Johnson City, TN 37614, USA

* **Correspondence:** Email: xiex01@etsu.edu; Tel: +14234395365.

Abstract: This study aimed to estimate the prevalence of uninsurance among California adults and Asian Americans, and to examine the associations of social-behavioral variables with uninsurance. A total of 24,136 adults (aged 18–64) including 2,060 Asian Americans were selected from the combined 2013–2014 California Health Interview Survey. Weighted univariate and multivariate logistic regression analyses were used to estimate the associations of potential factors with uninsurance. To evaluate the relationship of independent variables, the oblique principal component cluster analysis (OPCCA) was used to classify 9 variables into disjoint clusters. For Whites, African Americans, Latinos, and Asians, the prevalence of uninsurance was 8.5%, 10.3%, 24.7%, and 12.6%, respectively. Among Asians, the prevalence of uninsurance was 15.5%, 9.2%, 6.2%, 20.8% and 12.1% for Chinese, Filipinos, Japanese, Koreans, and Vietnamese, respectively. In the whole sample, multivariate logistic regression analysis revealed that being male, non-citizen, lower education, higher poverty, and current smoking were associated with uninsurance. Among Asians, compared to Koreans, being Filipinos and Vietnamese were associated with lower odds of being uninsured; meanwhile being male, non-citizen, lower education, and higher poverty were significantly associated with increased odds of uninsurance. Elder age groups and current smoking were significantly associated with increased odds of uninsurance in bivariate analysis; however, such associations disappeared after adjusting for other factors. Nine independent variables were

divided into 2 clusters, where the variables in the same cluster were strongly correlated but had weak correlations with the variables in the other cluster. In conclusion, there are differences in the prevalence of uninsurance between Asians and Whites, and among Asian subgroups. Being male, non-citizen, lower education, higher poverty and current smoking were positively significantly associated with uninsurance.

Keywords: uninsurance; ethnicity; citizenship; socioeconomic factors; smoking; Asian; weighted logistic regression; variable cluster analysis

JEL Codes: C12, C30, C38, G22, I12, I13, I14, I18

1. Introduction

Racial differences in uninsurance rate were observed among adults in the United States (U.S.) (Huang and Carrasqullo, 2008; Denavas-Walt et al., 2012; Barnett and Vornovitsky, 2016; Budhwani and De, 2016; Ward et al., 2016; Young et al., 2017; Kim et al., 2019). For example, Asians have higher rates than Whites (Huang and Carrasqullo, 2008; Denavas-Walt et al., 2012; Barnett and Vornovitsky, 2016) but lower rates than African Americans (AAs) and Hispanics (Denavas-Walt et al., 2012). Furthermore, Asian Americans are highly diverse (Zhou and Xiong, 2005; Cook et al., 2011; Park et al., 2018; Kim et al., 2019). Among Asians, there are also racial differences in uninsurance. For example, Koreans have the highest rate of uninsurance than Chinese, Vietnamese and Filipino (Nguyen et al., 2015). Moreover, a few studies have focused on social-behavioral factors with uninsurance rate among Asian Americans (Huang and Carrasqullo, 2008; Wilper et al., 2009; Kao, 2010; Nguyen et al., 2015; Wang and Xie, 2017; Tan et al., 2018). Additionally, some social-behavioral factors may be correlated.

The present study aims to estimate the weighted prevalence of uninsurance among Asian Americans of Chinese, Filipinos, Japanese, Koreans, and Vietnamese ancestry, and compare it with Whites, AAs and Latinos. A second objective of the study is to evaluate the associations of smoking, citizenship, and socioeconomic status with uninsurance. The California Health Interview Survey (CHIS), a random-digit-dial telephone survey of households designed to be representative of California's noninstitutionalized population, is the largest state-level health survey data in the U.S. The large CHIS sample includes people from many ethnic groups to provide health-related information for most large and small racial and ethnic populations that are all a part of California. We used the pooled 2013–2014 weighted CHIS data which is representative of Asian ethnic groups: Chinese, Filipinos, Japanese, Koreans, and Vietnamese (Hoeffel et al., 2010; CHIS, 2016); whereas most national surveys on health sample a small number of Asian Americans. Further, we considered sampling weights, so that the results represent California's residential population, and performed weighted univariate and multivariate logistic regression analyses to estimate the associations of potential factors with uninsurance. Additionally, we applied the oblique principal component cluster analysis (OPCCA), as implemented using PROC VARCLUS in SAS to classify independent variables into disjoint clusters; where the variables in the same cluster are as strongly correlated as possible with each other and as uncorrelated as possible with the variables in the other cluster (Aggarwal and Kosian, 2011; Nelson, 2001; Sanche and Lonergan, 2006; Wang et al., 2019).

The remaining part of the paper has following sections: section 2 has extensive literature review; section 3 includes data source and statistical methods; section 4 provides results; section 5 discusses the research findings; and section 6 draws conclusion with practical implications.

2. Literature review

2.1. Studies on racial differences in uninsurance rate

According to the National Health Interview Survey (NHIS), for adults aged 18–64 in the United States (U.S.), the percentage uninsured declined from 22.3% in 2010 to 16.3% in 2014 (Ward et al., 2016). However, this figure masks important racial differences (Huang and Carrasqullo, 2008; Denavas-Walt et al., 2012; Barnett and Vornovitsky, 2016; Budhwani and De, 2016; Ward et al., 2016; Young et al., 2017; Kim et al., 2019). For example, Latinos have higher uninsurance rates compared with Whites and African Americans (AAs) (Ward et al., 2016), while Asians have higher rates than Whites (Huang and Carrasqullo, 2008; Denavas-Walt et al., 2012; Barnett and Vornovitsky, 2016) but lower rates than AAs and Hispanics (Denavas-Walt et al., 2012). Despite these differences, majority of previous studies have only compared Asian Americans to other minorities, and there is very limited research examining insurance coverage among Asian Americans (Huang and Carrasqullo, 2008; Kao, 2010; Nguyen et al., 2015; Tan et al., 2018). Insurance is conducive to the protection of citizens and the safe development of society; while improving insurance coverage is of great significance to both individuals and society. Therefore, studying the insurance differences among different groups of people with different characteristics will help us to understand the social security situation of different groups and find out the reasons from it.

2.2. Heterogeneities among Asian Americans

Asian Americans are one of the fastest growing populations in the U.S. Between 2000 and 2010, the Asian population in the U.S. increased by 46% (Pew Research Center, 2013), with estimates indicating a doubling in population size leading to a projected increase to more than 43 million by 2050 (Yi et al., 2015). In 2014, Asian Americans accounted for 42.4% of the 42.4 million immigrants in the U.S. (Mossaad, 2016). In the overall immigrant population, Asian Americans were the second largest immigrant group, accounting for 28% of all foreign-born populations (Grieco et al., 2012).

Notwithstanding the common racial categorization, Asian Americans should not simply be treated as one group because they are highly diverse (Zhou and Xiong, 2005; Cook et al., 2011; Park et al., 2018; Kim et al., 2019). For example, they represent over 20 national origins in the U.S. alone (Zhou and Xiong, 2005) and have pronounced socioeconomic disparities across ethnic groups. Some ethnic groups (Asian Indian, Filipino, and Chinese) have incomes and educational levels far exceeding national averages, while others (Hmong, Cambodian, and Vietnamese) have the lowest income and education levels in the U.S. (Cook et al., 2011). Among Asians, there are also some subgroup differences in uninsurance. For example, in the 2006 Current Population Surveys, 29.8% of Koreans, 21.5% of Vietnamese and 16.8% of Chinese were uninsured, compared with only 7.9% of Japanese (Huang and Carrasqullo, 2008). A recent study also found that Koreans have the highest rate of uninsurance (39.5%), far more than other Asian ethnic groups such as Chinese, Vietnamese and Filipino (Nguyen et al., 2015).

2.3. Social-behavioral factors influencing health insurance coverage

Studying the factors related to uninsurance will decrease uninsurance, which is of great significance for governments at all levels to formulate policies and for insurance companies to develop real market business. Previous studies have shown that factors such as gender, race, citizenship, marital status, education, employment, geographic context, income, level of inclusion of state immigrant policies, and physical health may influence uninsurance (Shi, 2001; Ruy et al., 2002; Huang and Carrasqullo, 2008; Kao et al., 2010; Nguyen et al., 2015; Wang and Xie, 2017; Young et al., 2017; Tan et al., 2018; Kim et al., 2019). However, there is very limited research examining insurance coverage among Asian Americans (Huang and Carrasqullo, 2008; Kao, 2010; Nguyen et al., 2015; Tan et al., 2018); while a few studies have looked at smoking that may also influence uninsurance (Wilper et al., 2009; Wang and Xie, 2017). Understanding specific health behaviors associated with uninsurance can inform additional investigation into their influence on the acquisition and retention of insurance coverage. Furthermore, some social-behavioral factors may be correlated.

3. Materials and methods

3.1. Study population

This study used the 2013–2014 data files for adults from the publicly accessible CHIS. CHIS is a collaborative study conducted by the University of California, Los Angeles (UCLA) Center for Health Policy Research, the California Department of Health Services, and the Public Health Institute. The CHIS provides representative data for all 58 counties in the state through a random-dial telephone interview. Details about the sampling design can be found elsewhere (CHIS, 2016). In the current study, we excluded 16,104 individuals aged 65 or above while 24,136 adults aged 18–64 years were included. CHIS oversampled Asian Americans to increase the precision of estimates for those ethnic groups. Interviews were conducted in five languages (English, Spanish, Chinese (both Mandarin and Cantonese), Vietnamese, and Korean). There was an Institutional Review Board exemption due to secondary data analysis.

3.2. Insurance status

Insurance status was constructed as a categorical variable (yes/no) using response to the question on whether the participants had health insurance coverage in the last 12 months. Insurance type was recoded as uninsurance, medi-cal (MediCaid)) only, employer-base or military only, privately purchased only, and other insurance.

3.3. Social-behavioral factors

Gender was coded as either male or female based on self-report. Age was categorized as 18–44, 45–54 and 55–64 years. Race consisted of five groups: Whites, Latinos, Asians, AAs, and other. We used the self-reported Asian ethnicity variable constructed by CHIS, which includes five subgroups: Chinese, Japanese, Koreans, Filipinos, and Vietnamese. Citizenship status had 3 categories: U.S. born citizen, naturalized citizen, and non-citizen. Health status had three self-rated health categories

(excellent/very good, good, and fair/poor). Poverty level was categorized into three levels, including 0–99% federal poverty level (FPL), 100%–299% FPL, and 300% FPL or above. Marital status was classified into married/living with partner, widowed/divorced/separated, and never married. Education attainment included three categories as high school, college, or graduate. Smoking status was categorized as never smoking, current smoking, and past smoking.

3.4. Statistical methods

All analyses were accounted for complex sampling designs and non-response by employing weights, which are based on the State of California's Department of Finance population estimates and projections, so that the results represent California's residential population. Additional information on how to use the CHIS sampling weights, including sample code, is available at: http://healthpolicy.ucla.edu/chis/analyze/Pages/sample-code.aspx. All the analyses were performed with SAS statistical software, version 9.4 (SAS Institute, Cary, NC, USA).

3.4.1. Weighted prevalence

Generally, for a representative sample, the prevalence is defined by the number of people in the sample with the characteristic of interest (such as uninsurance), divided by the total number of people in the sample.

$$\text{Prevalence} = \frac{\text{\# of people in sample with characteristic}}{\text{Total \# of people in sample}} \tag{1}$$

To represent an entire population, statistical "weights" may be applied, where weighting the sample mathematically adjusts the sample characteristics to match with the target population. The SAS PROC SURVEYFREQ procedure was used to weight and estimate population proportions/prevalence. SAS PROC SURVEYMEANS was used to estimate the overall prevalence. These procedures estimate the variances of proportion estimates using jackknife variance estimation (Wolter, 1985; Lohr, 2009). Point prevalence (%) and 95% confidence intervals (CIs) were calculated. The Chi-square test was applied to compare the prevalence of uninsurance by racial group dissected by demographical, behavioral and health status related characteristics.

3.4.2. Weighted univariate and multivariate logistic regression analyses

SAS PROC SURVEYLOGISTIC was used to estimate the odds ratios (ORs) and 95% confidence intervals (CIs) for the relation between potential factors and uninsurance. Simple logistic regressions were used to examine the independent roles of all potential risk factors in uninsurance. Afterwards, multivariate logistic regressions were used to simultaneously adjust for all potential risk factors of uninsurance. We also examined the associations between race/ethnicity and uninsurance among California Adults (Whites as reference) and also among Asian Americans (Koreans as reference). Multivariate logistic regression analysis of uninsurance as a binary trait adjusted for other factors, was performed using SAS PROC SURVEYLOGISTIC.

$$\text{logit}(p(\text{Y1} = 1)) = \beta_0 + \beta_1 \text{X}_1 + \beta_2 \text{X}_2 + \ldots + \beta_k \text{X}_k \quad (2)$$

where Y_1 is uninsurance (1 if uninsured) and X_1, X_2, …, and X_k are independent variables.

3.4.3. Oblique principal component cluster analysis (OPCCA)

Social-behavioral factors may be correlated and cause collinearity, which may tend to inflate the variance of at least one estimated regression coefficient. The PROC VARCLUS procedure was used to divide a set of numeric variables into disjoint clusters. The variables in the same clusters are as strongly correlated as possible with each other and as uncorrelated as possible with the variables in the other clusters (Muthen, 2005; Aggarwal and Kosian, 2011). Considering the categorical variables, the polychoric correlation is applied to ordinal data (Lee et al., 1995), where the polychoric correlation is a technique for estimating the correlation between two theorized normally distributed continuous latent variables, from two observed ordinal variables (Lee et al., 1995). Higher squared correlation (R^2) values with its own cluster, lower R^2 values with next closest cluster, and lower $1–R^2$ ratios (the ratio of $1–R^2$ for a variable's own cluster to $1–R^2$ for its nearest cluster) indicate a good fit of the respective item.

$$1 - R^2 \text{ ratio} = \frac{1 - R^2 \text{ own cluster}}{1 - R^2 \text{ next closest cluster}} \quad (3)$$

4. Results

4.1. Prevalence of uninsurance

Table 1 shows the weighted prevalence of uninsurance in Californian adults from 2013–2014. The overall prevalence of uninsurance was 15.4% and in terms of each racial category, it was 8.5%, 10.3%, 24.7%, 12.6%, and 15.1% for Whites, AAs, Latinos, Asians and other races, respectively. Males had a higher prevalence than females (18.4% vs. 12.5%). The prevalence decreased with age (17.4%, 13.5% and 11.1% for age groups 18–44, 45–54 and 55–64 years, respectively). The prevalence decreased with education level (23.4%, 11.8% and 4.1% for high school, some college and graduate, respectively). Higher prevalence was found in never married than married and other (19.6 vs. 18.7% vs. 11.4%). The prevalence decreased with decreasing poverty (24.8%, 23.8% and 6.3% for poverty level groups <100% FPL, 100%–299% FPL and ≧ 300% FPL, respectively). The prevalence was higher in non-citizen comparing with U.S. born citizen and naturalized citizen (33.9% vs. 10.7% vs 12.6%). The prevalence was higher in current smokers than former and never smokers (23.4% vs. 14.7% vs. 14.0%). Those with fair/poor health had a higher prevalence than those with good health and excellent/very good health (23.4% vs. 15.9% vs. 12.1%).

Among Asians, the prevalence of uninsurance was 15.1%, 9.2%, 6.2%, 20.8% and 12.1% for Chinese, Filipinos, Japanese, Koreans, and Vietnamese, respectively (Table 2). Among all racial groups, the highest proportion of study participants had employer based or military type insurance (62.2%, 49.2%, 35.5% and 55.5% for Whites, AAs, Hispanics and Asian Americans). Latinos and AAs were more likely to use Medi-Cal (19.1% and 9.8%) closely followed by Vietnamese (14.3%) and Filipinos (12.7%). Koreans had the highest proportion of people with private insurance (17.9%).

Table 1. Prevalence of uninsurance (%) among California adults (%).

Variable	Total (N)	Uninsured	Prevalence (%)	95%CI	p-value
Sex					
Male	10280	1386	18.4	17.1–19.7	< 0.0001
Female	13856	1369	12.5	12.5–13.6	
Age group					
18–44 years	8758	1316	17.4	16.2–18.6	< 0.0001
46–54 years	6259	643	13.5	11.9–15.1	
55–64 years	9119	796	11.1	9.6–12.7	
Race					
White	13392	1011	8.5	7.6–9.4	< 0.0001
AA	1118	98	10.3	7.3–13.3	
Asian	2060	213	12.6	10.4–14.9	
Hispanic	6341	1323	24.7	23.0–26.4	
Other	733	68	15.1	8.8–21.4	
Marital status					
Married	12716	1022	11.4	10.3–12.5	< 0.0001
Other	5965	817	18.7	16.7–20.6	
Never married	5455	916	19.6	17.7–21.5	
Education					
High school	7910	1471	23.4	21.8–25.0	< 0.0001
Some college	12461	1135	11.8	10.8–12.8	
Graduate	3765	149	4.1	2.8–5.4	
Poverty level					
< 100% FPL	3767	734	24.8	22.3–27.2	< 0.0001
100%–299% FPL	7345	1430	23.8	22.0–25.6	
≧ 300% FPL	13024	591	6.3	5.6–6.9	
Citizenship status					
US Born citizen	17793	1514	10.7	9.8–11.6	< 0.0001
Naturalized citizen	3488	404	12.6	10.4–14.8	
Non-citizen	2855	837	33.9	30.9–36.8	
Smoking					
Current	3123	538	23.4	19.9–26.9	< 0.0001
Former	5638	564	14.7	12.6–16.8	
Never	15375	1653	14.0	13.1–14.9	
Health					
Excellent/Very good	12146	1061	12.1	11.2–13.1	< 0.0001
Good	7177	941	15.9	14.3–17.5	
Fair/poor	4813	753	23.4	21.2–25.6	
Overall	24136	2755	15.4	14.5–16.2	

Note: Abbreviations: AA—African American; FPL—Federal poverty level; CI—Confidence interval; p-value is based on χ^2 test.

Table 2. Prevalence of uninsurance (%) by insurance type among California adults.

Variables	White	AA	Hispanic	All Asians	Chinese	Filipino	Japanese	Korean	Vietnamese
Uninured only	8.5	10.3	24.7	12.6	15.1	9.2	6.2	20.8	12.1
Medi-Cal (MediCaid) only	6.8	19.8	19.1	8.7	6.1	12..7	0.7	3.6	14.3
Employer-based or Military only	62.2	49.2	35.5	55.5	54.2	56.0	65.7	44.8	60.2
Privately purchased only	8.5	2.3	2.8	9.1	10.3	6.2	9.2	17.9	6.4
Other insurance	14.0	18.4	17.9	14.0	14.4	16.0	19.4	13.0	7.1

Note: Abbreviations: AA—African American.

4.2. Characteristics of uninsured Californian adults by racial category

The characteristics of Californian Adults without insurance coverage are described in Table 3. Among males and females, Latinos and Koreans had the highest prevalence of uninsurance (30.2% vs 26.4—males, 19.3% vs 16.5—females). Figure 1 reveals racial differences by gender. An increasing prevalence of uninsurance was seen among Koreans as age increased with those 55–64 having an uninsurance prevalence of 31.4%. Lower education revealed higher uninsurance rates, especially among Koreans (46.6%), Latinos (29.2%) and Chinese (25.9%). A higher prevalence of uninsurance among non-citizens was found in AAs (50.7%), Latinos (39.9%), Chinese (33.6%), and Koreans (28.1%). The highest prevalence of uninsurance among current smokers was found in Vietnamese (33.6%), Latino (32.9%) and Chinese (32.8%). A greater proportion of uninsured Chinese and Korean participants rated their health as fair/poor (31.4% and 29.0%).

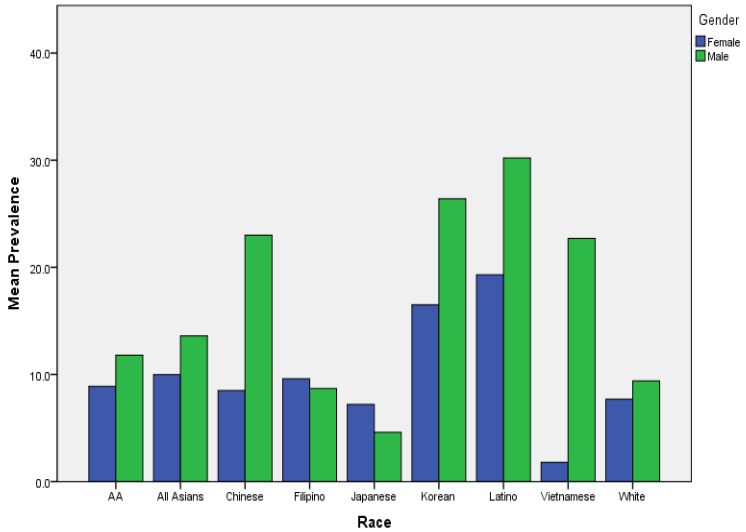

Figure 1. Prevalence of uninsurance among race groups by gender.

Table 3. Prevalence of uninsurance (%) among racial groups in California adults.

Variable	White	AA	Hispanic	All Asians	Chinese	Filipino	Japanese	Korean	Vietnamese	p-value
Sex										
Male	9.4	11.8	30.2	17.1	23.0	8.7	4.6	26.4	22.7	< 0.0001
Female	7.7	8.9	19.3	8.7	8.5	9.6	7.2	16.5	1.8	< 0.0001
Age group										
18–44 years	9.9	11.4	26.1	13.3	16.7	9.0	8.8	16.1	13.4	< 0.0001
45–54 years	7.4	8.6	23.4	11.2	11.7	5.7	4.3	26.5	16.8	< 0.0001
55–64 years	6.5	9.2	19.6	12.1	11.3	14.2	2.8	31.4	4.2	< 0.0001
Marital status										
Married	4.1	5.9	21.3	11.7	14.6	9.2	2.7	21.4	7.0	< 0.0001
Other	13.7	14.6	25.1	12.9	12.0	9.4	3.7	14.9	29.6	< 0.0001
Never married	13.6	10.6	29.5	16.9	16.2	9.1	11.4	21.3	15.9	< 0.0001
Education										
High school	13.3	10.1	29.2	22.5	25.9	15.3	3.0	46.6	15.4	< 0.0001
Some college	8.1	11.6	18.4	10.6	12.9	8.7	8.3	11.3	12.6	< 0.0001
Graduate	3.4	1.5	6.9	5.6	6.7	3.2	0.3	13.2	0	< 0.0001
Poverty level										
< 100% FPL	18.3	15.0	29.4	20.5	24.8	11.8	8.2	33.3	21.8	0.0006
100%–299% FPL	17.0	9.9	29.7	23.2	30.7	13.4	21.6	34.1	16.3	< 0.0001
≧ 300% FPL	4.4	8.3	10.9	5.4	4.8	6.6	2.5	7.4	4.6	< 0.0001
Citizenship Status										
US born citizen	8.7	8.6	15.6	6.7	7.1	7.1	5.9	1.1	9.3	< 0.0001
Naturalized citizen	7.0	6.1	18.2	9.2	6.4	6.7	1.9	22.4	11.2	< 0.0001
Non-citizen	6.7	50.7	39.9	26.5	33.6	17.1	13.1	28.1	21.2	< 0.0001
Smoking										
Current	19.1	14.4	32.9	23.8	32.8	13.0	8.8	21.9	33.6	0.0025
Former	8.2	12.7	25.2	14.9	17.5	7.0	2.3	33.5	18.7	< 0.0001
Never	5.8	8.5	23.4	10.7	12.6	9.1	6.6	16.0	7.9	< 0.0001
Health										
Excellent/Very good	7.1	6.6	22.4	9.6	13.2	5.4	2.2	18.7	2.3	< 0.0001
Good	9.9	4.5	23.1	11.9	7.8	12.3	14.4	18.6	15.1	< 0.0001
Fair/poor	13.8	16.5	30.2	22.5	31.4	15.4	8.7	29.0	15.9	< 0.0001

Note: Abbreviations: AA—African American; FPL—Federal poverty level; CI—Confidence interval; p-value is based on χ^2 test.

4.3. Logistic regression analysis of uninsurance among California adults

Table 4 presents the results from both univariate and multivariate logistic regression analyses among Californian adults. The first column is variable name and value, the second column is crude OR, the third column and the fourth column are 95% confidence intervals and P values, the fifth column is adjusted OR, the sixth column and the seventh column are corresponding 95% confidence intervals and P values, respectively. As can be seen from table 4, in the univariate analyses, all factors were associated with uninsurance ($p < 0.05$). After adjusting for other factors, compared to Whites, Latinos had a higher odds of uninsurance (OR = 1.48, 95% CI = 1.23–1.78). The following characteristics were also associated with an increased odds of uninsurance-being male (OR = 1.61, 95% CI = 1.38–1.88), lower education (OR = 2.13, 95% CI = 1.44–3.16; OR = 1.88, 95% CI = 1.29–2.75 for high school and some college respectively), higher poverty (OR = 2.25, 95% CI = 1.78–2.83; OR = 2.71, 95% CI = 2.27–3.23 for < 100% FPL and 100%–299% FPL), and current smoking (OR = 1.68, 95% CI = 1.29–2.17) was

positively associated with uninsurance. Naturalized citizen and non-citizen were associated with increased odds of uninsurance (OR = 1.38, 95% CI = 1.08–1.77; OR = 3.28, 95% CI = 2.64–4.06).

Table 4. Univariate and multivariate logistic regression analyses among Californian adults.

Variable	Crude OR	95% CI	p-value	Adjusted OR	95% CI	p-value
Gender (ref=female)						
Male	1.61	1.39–1.86	<0.0001	1.61	1.38–1.88	<0.0001
Age group (ref=18–44)						
45–64	0.75	0.63–0.88	0.0006	0.94	0.78–1.12	0.4926
55–64	0.58	0.48–0.69	<0.0001	0.94	0.77–1.14	0.5257
Race (ref=Whites)						
AA	1.22	0.89–1.70	0.2106	0.85	0.60–1.21	0.3771
Latino	3.52	3.00–4.13	<0.0001	1.48	1.23–1.78	<0.0001
Other	1.91	1.17–3.11	0.0095	1.41	0.83–2.41	0.2057
All Asians	1.55	1.24–1.65	0.0002	0.94	0.73–1.21	0.6273
Marital status (ref=married)						
Other	1.78	1.49–2.12	<0.0001	1.52	1.24–1.86	<0.0001
Never married	1.90	1.61–2.25	<0.0001	2.06	1.69–2.49	<0.0001
Education (ref=Graduate)						
High school	6.83	4.82–6.67	<0.0001	2.13	1.44–3.16	0.0002
Some college	2.95	2.09–4.15	<0.0001	1.88	1.29–2.75	0.0011
Poverty level (ref=300% FPL)						
<100% FPL	4.80	4.02–5.74	<0.0001	2.25	1.78–2.83	<0.0001
100%–299% FPL	4.57	3.96–5.28	<0.0001	2.71	2.27–3.23	<0.0001
Citizenship status (ref=US born citizen)						
Naturalized citizen	1.24	1.00–1.53	0.0458	1.38	1.08–1.77	0.0107
Non-citizen	4.56	3.82–5.44	<0.0001	3.28	2.64–4.06	<0.0001
Smoking (ref=never smoking)						
Current	1.84	1.47–2.31	<0.0001	1.68	1.29–2.17	<0.0001
Former	1.05	0.87–1.27	0.6016	1.14	0.92–1.41	0.2407
Health (ref= Excellent/very good)						
Good	1.32	1.14–1.51	0.0001	0.87	0.74–1.03	0.1010
Fair/poor	2.17	1.86–2.54	<0.0001	1.09	0.88–1.36	0.4286

Note: Abbreviations: AA—African American; FPL—federal poverty level; OR—Odds ratio; CI—Confidence interval.

4.4. Logistic regression analysis of uninsurance in Asian Americans

Table 5 shows the results of logistic regression analyses for the association between race/ethnicity and uninsurance among Asian Americans. In the univariate analyses, being male, Filipino and Japanese, non-citizen, lower education, higher poverty and current smoking were positively significantly associated with uninsurance. After adjusting for other factors, compared to Koreans, being Filipino and Vietnamese were associated with lower odds of uninsurance but such associations were at borderline significant level. In addition, the following characteristics had a significantly increased likelihood of uninsurance-being male (OR = 2.40, 95% CI = 1.48–3.90), lower education (OR = 2.76, 95% CI = 1.20–6.34 for high school), higher poverty (OR = 3.35, 95%

CI = 1.95–5.78 for 100%–299% FPL). Non-citizen was associated with increased odds of uninsurance (OR = 4.20, 95% CI = 2.05–8.61).

Table 5. Univariate and multivariate logistic regression analyses among Asian Adults.

Variable	Crude OR	95% CI	p-value	Adjusted OR	95% CI	p-value
Gender (ref = female)						
Male	2.17	1.41–3.34	0.0004	2.40	1.48–3.90	0.0004
Age group (ref = 18–44)						
45–64	0.82	0.51–1.32	0.4159	0.87	0.52–1.45	0.5889
55–64	0.90	0.52–1.56	0.6995	0.99	0.53–1.88	0.9840
Race (ref = Korean)						
Chinese	0.67	0.38–1.21	0.1836	0.80	0.43–1.49	0.4834
Filipino	0.39	0.19–0.79	0.0096	0.49	0.22–1.11	0.0857
Japanese	0.25	0.06–0.97	0.0458	0.71	0.16–3.12	0.6535
Vietnamese	0.52	0.24–1.15	0.1072	0.58	0.23–1.44	0.0857
Marital status (ref = Married)						
Other	1.11	0.54–2.30	0.7702	1.52	0.64–3.59	0.3417
Never married	1.22	0.77–1.93	0.4065	1.39	0.79–2.46	0.2530
Education (ref = graduate)						
High school	4.93	2.45–9.92	< 0.0001	2.76	1.20–6.34	0.0169
Some college	2.02	1.06–3.87	0.0334	1.80	0.85–3.84	0.1267
Poverty level (ref = ≧ 300% FPL)						
< 100%	4.55	2.34–8.84	< 0.0001	1.89	0.91–3.93	0.0860
100%–299% FPL	5.35	3.25–8.79	< 0.0001	3.35	1.95–5.78	< 0.0001
Citizenship status (ref = US born citizen)						
Naturalized citizen	1.41	0.73–2.74	0.3054	1.53	0.75–3.12	0.2384
Non-citizen	5.01	2.69–9.33	< 0.0001	4.20	2.05–8.61	< 0.0001
Smoking (ref = Never)						
Current	2.63	1.30–5.33	0.0075	1.44	0.67–3.09	0.3551
Former	1.47	0.85–2.56	0.169	1.19	0.64–2.20	0.5820
Health (ref = Excellent/very good)						
Good	1.29	0.72–2.30	0.3928	1.06	0.56–2.02	0.8653
Fair/poor	2.75	1.53–4.92	0.0007	1.53	0.77–3.06	0.2260

Note: Abbreviations: AA—African American; FPL—Federal poverty level; OR—Odds ratio; CI—Confidence interval.

4.5. Variable cluster analysis using PROC VARCLUS

Based on criteria of the eigenvalue smaller than 1, 9 variables were clustered into 2 clusters (Figure 2 and Table 6) in terms of inter-correlations. For example, race group had strong correlations with education level, poverty, smoking status, and health status (all p values < 0.0001); health status had strong correlations with age, race, marital status, education, poverty, citizenship, and smoking (all p values < 0.0001).

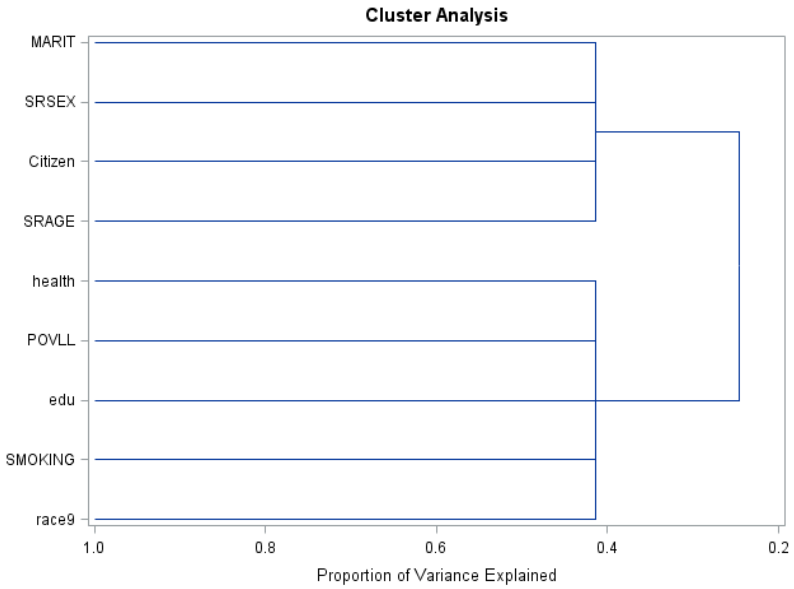

Figure 2. Oblique principal component cluster analysis of 9 variables.

Table 6. Polychoric correlation coefficients.

Variable	Sex	Age	Race	Marital status	Education	Poverty	Citizen	Smoking	Health
Sex	1.000	0.101#	–0.009	–0.407##	–0.0301	–0.077**	0.057*	0.460##	0.072*
Age		1.0000	0.037	–0.407##	0.011	–0.014	0.054*	–0.043	0.228##
Race			1.000	0.025	–0.244##	–0.239##	0.024	–0.144##	0.234##
Marital status				1.000	–0.269##	–0.245##	–0.336##	–0.036	–0.005
Education					1.000	0.551##	–0.035	0.099#	–0.353#[#]
Poverty						1.000	–0.188##	0.097**	–0.452##
Citizen							1.000	–0.046	0.165##
Smoking								1.000	–0.169##
Health									1.000

Note: Abbreviations: *p<0.05; **p<0.01; # p<0.001; ## p<0.0001.

5. Discussion

In this study, we provided the updated prevalence of uninsurance in California adults and demonstrated a high prevalence of uninsurance among Latinos and Asians. For Asians specifically, the prevalence was higher in Chinese and Korean study participants. After adjusting for other factors, compared to Whites, Latinos had significantly increased odds of uninsurance. Other characteristics with significantly higher odds of uninsurance were being male, lower education, higher poverty, non-citizen, and current smoking. In the subgroup analysis of Asians, compared to Koreans, being Filipino and Vietnamese, male gender, having lower education, non-citizen, and higher poverty was associated with a significantly increased likelihood of uninsurance.

The prevalence of uninsurance was higher in Latinos and AAs than Whites (24.7% vs. 10.3% vs. 8.5%) in Table 1, which are consistent with previous studies. For example, in the 2015 estimates from the National Health Interview Survey, a representative survey of U.S. households and noninstitutional group

quarters, it was found that Latinos were three times as likely to be uninsured compared to Whites and twice as likely to be uninsured compared to AAs (Ward et al., 2016). The prior studies have shown that Asians have lower rates of uninsurance than AAs (Denavas-Walt et al., 2012; Barnett and Vornovitsky, 2016); whereas in our present study the prevalence of uninsurance was 2.3% higher in Asians than AAs (Table 1). Still, both findings do not contradict each other because our study represents uninsurance statistics for California adults while the studies cited represents national-level estimates of uninsurance.

Among Asians, our results are similar to prior work demonstrating that individuals with Koreans, Vietnamese and Chinese heritage have higher prevalence of uninsurance in the Asian community (Huang and Carrasqullo, 2008; Kao, 2010; Nguyen et al., 2015). The prevalence of uninsurance in Koreans (20.8%) and Vietnamese (12.1%) in Table 2, however, was much lower than estimates provided by Kao (2010) (36.1% and 20.7% for Koreans and Vietnamese respectively), Nguyen et al. (2015) (39.5% and 11.7%) and Tan et al. (2018) (30.5% for Koreans). This could be due to the fact that the estimates in these analyses were based on older CHIS surveys—Kao's study was based on the 2003 and 2005 CHIS surveys while Nguyen's study with his collaborators was based on the 2009 CHIS; while Tan et al. (2018) using the data from New York City. The present study used the latest CHIS-2013–2014 data; whereas the finding is indicative of a downtrend in uninsurance rates in California.

It is well known that individuals with low educational attainment, low income and higher poverty are more likely to be uninsured (Kao, 2010; Barnett and Vornovitsky, 2016; Nguyen et al., 2015; Smith and Medalia, 2015; Tan et al., 2018). We further added that being male is associated with an increased odds comparing with females (Tables 5 and 6) as shown by Tan et al. (2018); while age group was associated with uninsurance in the whole sample but there is no association among Asians (Tables 5 and 6) as stated in Tan et al., (2018). Health status revealed weak association with uninsurance in the whole sample. The present results among Asians are consistent with previous findings (Nguyen et al., 2015).

Citizenship status is a potential factor influencing uninsurance (Carrasquillo et al., 2000; Huang and Carrasqullo, 2008). The prevalence of uninsurance in the non-citizen California adults is 33.9% (Table 1), which is lower than previous report as 43.6% (Carrasquillo et al., 2000). The prevalence of uninsurance in the non-citizen Asians adults was 26.5% (Table 3), which is lower than previous report as 30.9% (Huang and Carrasqullo, 2008). We further added that the non-citizen AAs, Latinos, Chinese and Korean had higher prevalence (50.7% vs. 39.9% vs. 33.6% vs. 28.1%) as shown in Table 3. Among non-citizen Asians, non-citizen Chinese and Vietnameses had similar prevalence (33.6% and 21.2%) to those estimated by Huang and Carrasqullo 2008 (32.3% and 21.2%); whereas non-citizen Filipino, Japanese and Korean had lower prevalence (17.1%, 13.1% and 28.1%) than previous report (21.8%, 24.1% and 33.6%) (Huang and Carrasqullo 2008). Logistic regression analysis further revealed that the odds for non-citizen California adults are about 232% higher than the odds for those U.S. born citizen (Table 4); whereas the odds for non-citizen Asian adults are about 320% higher than the odds for U.S. born citizens (Table 5).

Smoking has been correlated with uninsurance (Wilper et al, 2009); while another study showed that smoking is correlated with not gaining and sometimes even losing private insurance coverage (Jerant et al., 2012). A recent study also found that nicotine dependence is associated with low insurance coverage (Wang and Xie, 2017). The present study showed that the prevalence of uninsurance in current smoking (23.4%) was much higher than those in former smoking and never smoking groups (14.7% and 14.0%, respectively) in California adults as shown in Table 1; while logistic regression further revealed that the odds for current smoking adults are about 68% higher than the odds for those never smoking (Table 4). Furthermore, the univariate analysis in Asian Americans also revealed significant association between current smoking and unisurance (OR = 2.63, 95% CI = 1.30–5.33); however, such association

disappeared after adjusting for other factors. One reason may be the strong correlation of smoking and other factors, which may cause collinearity in the logistic regression. As shown in Table 6 and Figure 2 based on the variable cluster analysis, smoking is within the same cluster with race, education, poverty and health status; while smoking had strong correlations with race, education, poverty, and health status. However, the present study did not really test the collinearity among independent variables, the variable cluster analysis just helped somehow in the explanation of association's differences between bivariate and multivariate logistic regression analyses. In the future, it will be useful to detect the collinearity among independent variables using critical statistics and then remove some highly correlated variables for further analysis. Additional research is needed to determine if the observed association is due to discriminatory practices of insurance companies or a result of unmeasured confounding from other factors as well as if the relationship is significant in the Asian population across the U.S.

This study has several strengths. First, California has the largest Asian population in the U.S. (U.S. Census Bureau, 2016) and thus, provides a representative sample of Asians for research purposes. The percentage of Asian American in the present study (8.5%) is higher than the National Health Interview Survey NHIS 2012–2014 data (5.3%) (Ward et al., 2017), Behavioral Risk Factor Surveillance System (BRFSS) 2012–2014 data (2.2%) (Tung et al., 2017) and the National Survey on Drug Use and Health (NSDUH) 2013–2014 data (4.1%) (Wang et al., 2018). Furthermore, the CHIS survey was conducted in five languages (English, Spanish, Mandarin Chinese and Cantonese Chinese, Vietnamese, and Korean) facilitating the inclusion of subjects who are unable to speak English fluently or at all. This helps to improve the generalizability of the results in the state. Additionally, the sample was large, randomly selected and included comprehensive information with a wide age range on uninsurance and social, behavioral, and health characteristics enabling the adjustment of confounding. Investigating insurance gaps in Asians is important because they have pronounced socioeconomic disparities across ethnic groups (Cook et al., 2011).

Several limitations need to be acknowledged. First, a cross-sectional design cannot determine causal relationships between correlated factors and uninsurance. Hence, there is a need for longitudinal data to further explore observed relationships. Second, data were collected by self-report, making responses prone to social desirability bias and recall bias. Third, the CHIS data were collected in California, which places limitations for generalizability in the U.S. A previous study has suggested that the choice of data source can have an impact on the conclusions of the uninsurance difference (Johnson et al., 2010). In the present study, we used the largest state-level health survey data in the U.S. - the pooled weighted data from the latest cycle of California population 2013–2014 data which is representative of Asian ethnic groups: Chinese, Filipinos, Japanese, Koreans, and Vietnamese (Hoeffel et al., 2010; CHIS, 2016) because most national surveys on health sample a small number of Asian Americans. Furthermore, we focused on health disparity of uninsurance across racial groups. However, we did not touch racial discrimination policy (such as insurance redlining) of financial institutions (Squires, 1997; Ong et al., 2010); furthermore, the present data is not involved in such policy. In addition, this study was not able to consider the 2010 Affordable Care Act (ACA), which really caused changes in 2015 and 2016 (Tan et al., 2018; Park et al., 2018).

6. Conclusion

There are differences in prevalence of uninsurance between Asians and Whites, and among Asian subgroups. However, compared to previous estimates, there appears to be a downtrend in uninsurance

estimates for Koreans and Vietnamese. Being male, lower education, higher poverty, non-citizen, and current smoking were positively significantly associated with uninsurance. These findings can help design better interventions to reduce racial and ethnic disparities in uninsurance, especially for Asian Americans. To date, there is very limited research examining uninsurance among Asian Americans. Therefore, it is important to identify the factors propelling the uninsurance rate in this population, in order to effectively reduce the number of uninsured individuals. For example, although the uninsurance rate is higher in Asian than that of Whites, there are still large differences among Asian groups, which highlights more efforts to address the issue. Non-citizen and poor poverty level are two important factors influencing insurance coverage in Asian adults. Furthermore, the uninsurane rates also reveal differences among insurance type among Asian groups. For example, Koreans showed higher uninsurance rates in private insurance; whereas Vietnamese and Filipinos had higher uninsurance rate in MediCaid. Through the above analysis, we can get some inspiration on how to decrease uninsurance rate. First, when looking for new customers, insurance companies can choose characteristic groups with low insurance coverage, such as being male, Filipino and Japanese, non-citizen, lower education, higher poverty and current smoking. Besides, the government should take some effective measures to encourage people with the above characteristics to participate in insurance and improve the social insurance coverage rate. In addition, the social and behavioral variables may be correlated, and thus in the future studies, data mining and structure equation modeling could be considered to deal with the complex data structure.

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Conflict of interest

The authors declare no conflict of interest in this paper.

References

Aggarwal V, Kosian S (2011) Feature Selection and Dimension Reduction Techniques in SAS, NESUG.

Barnett JC, Vornovitsky MS (2016) *Health insurance coverage in the United States: 2015*, Washington, DC: U.S. Government Printing Office.

Budhwani H, De P (2016) Disparities in influenza vaccination across the United States: Variability by minority group, Asian sub-populations, socio-economic status, and health insurance coverage. *Public Health* 138: 146–153.

California Health Interview Survey (CHIS) (2016) CHIS 2013–2014 Methodology Report Series. Available from: http://healthpolicy.ucla.edu/chis/design/Documents/chis2013-2014-method-1_2017-01-12.pdf.

Carrasquillo O, Carrasquillo AI, Shea S (2000) Health insurance coverage of immigrants living in the United States: differences by citizenship status and country of origin. *Am J Public Health* 90: 917–923.

US Census Bureau (2016) Asian/Pacific American Heritage Month: May 2016. Facts for Features. Available from: http://www.census.gov/newsroom/facts-for-features/2016/cb16-ff07.html.

Cook WK, Chung C, Tseng W (2011) Demographic and socioeconomic profiles of Asian Americans, Native Hawaiians, and Pacific Islanders. Asian and Pacific Islander American Health Forum, San Francisco, CA & Washington, D.C.

Denavas-Walt C, Proctor BD, Smith JC (2012) *Income, poverty, and health insurance coverage in the United States*, Washington, DC: U.S. Government Printing Office.

Grieco EM, Acosta YD, Patricia de la Cruz G, et al. (2012) The foreign-born population in the United States: 2010 American community survey reports (ACS-19). Available from: https://www.census.gov/prod/2012pubs/acs-19.pdf.

Hoeffel EM, Rastogi S, Kim MO, et al. (2012) The Asian population: 2010. Washington DC: U.S. Census Bureau. 2012. Available from: https://www.census.gov/prod/cen2010/briefs/c2010br11.pdf.

Huang K, Carrasquillo O (2008) The role of citizenship, employment, and socioeconomic characteristics in health insurance coverage among Asian subgroups in the United States. *Medical Care* 46: 1093–1098.

Jerant A, Fiscella K, Franks P (2012) Health characteristics associated with gaining and losing private and public health insurance: a national study. *Med Care* 50: 145–151.

Johnson PJ, Blewett LA, Call KT, et al. (2010) American Indian/Alaska Native uninsurance disparities: a comparison of 3 surveys. *Am J Public Health* 100: 1972–1979.

Kao D (2010) Factors associated with ethnic differences in health insurance coverage and type among Asian Americans. *J Commun Health 35:* 142–155.

Kim J, Ford KL, Kim G (2019) Geographic Disparities in the Relation between English Proficiency and Health Insurance Status among Older Latino and Asian Immigrants. *J Cross Cult Gerontol* 34: 1–13.

Lee SY, Poon WY, Bentler PM (1995) A two-stage estimation of structural equation models with continuous and polytomous variables. *Brit J Math Stat Psy* 48: 339–358.

Lohr SL (2009) *Sampling: Design and Analysis*, Second Edition, Pacific Grove, CA: Duxbury Press.

Mossaad N (2016) U.S. lawful permanent residents: 2014. Annual Flow Report. Office of Immigration Statistics. U.S. Department of Homeland Security. Available from: https://www.dhs.gov/sites/default/files/publications/LPR%20Flow%20Report%202014_508.pdf.

Muthen BDK (1985) A comparison of some methodologies for the factor analysis of non-normal Likert variables. *Brit J Math Stat Psy* 18: 171–189.

Nguyen D, Choi S, Park SY (2015) The Moderating Effects of Ethnicity and Employment Type on Insurance Coverage: Four Asian Subgroups in California. *J Appl Gerontol* 34: 858–878.

Stoll OMA (2007) Redlining or Risk? A Spatial Analysis of Auto Insurance Rates in Los Angeles. *J Policy Anal Manag* 26: 811–829.

Park JJ, Humble S, Sommers BD, et al. (2018) Health Insurance for Asian Americans, Native Hawaiians, and Pacific Islanders Under the Affordable Care Act. *JAMA Intern Med* 178: 1128–1129.

Pew Research Center (2013) The rise of Asian Americans. Washington, DC: Pew Research Center. Available from: http://www.pewsocialtrends.org/2012/06/19/the-rise-of-asian-americans/.

Ruy H, Young WB, Kwak H (2002) Differences in health insurance and health service utilization among Asian Americans: method for using the NHIS to identify unique patterns between ethnic groups. *Int J Health Plan M* 17: 55–68.

Sanche R, Lonergan K (2006) Variable Reduction for Predictive Modeling with Clustering. Available from: http://casualtyactuarialsociety.net/pubs/forum/06wforum/06w93.pdf.

Shi L (2001) The convergence of vulnerable characteristics and health insurance in the U.S. *Soc Sci Med* 53: 519–529.

Smith JC, Medalia C (2015) *Health insurance coverage in the United States: 2014*, Washington, DC: U.S. Government Printing Office. Available from: https://www.census.gov/content/dam/Census/library/publications/2015/demo/p60-253.pdf.

Squires GD (1997) *Insurance redlining: Disinvestment, reinvestment, and the evolving role of financial institutions,*The Urban Insitute.

Tan C, Wyatt LC, Kranick JA, et al. (2018) Factors Associated with Health Insurance Status in an Asian American Population in New York City: Analysis of a Community-Based Survey. *J Racial Ethn Health Disparities* 5: 1354–1364.

The Kaiser Family Foundation (2010) Summary of coverage provisions in the Patient Protection and Affordable Care Act. Available from: http://www.kff.org/healthreform/upload/8023-R.pdf.

Tung EL, Baig AA, Huang ES, et al. (2017) Racial and Ethnic Disparities in Diabetes Screening Between Asian Americans and Other Adults: BRFSS 2012–2014. *J Gen Intern Med* 32: 423–429.

Wang KS, Liu Y, Ouedraogo Y, et al. (2018) Principal component analysis of early alcohol, drug and tobacco use with major depressive disorder in US adults. *J Psychiatr Res* 100: 113–120.

Wang N, Xie X (2017) The Impact of race, income, drug abuse and dependence on health insurance coverage among U.S. adults. *Eur J Health Econ* 18: 537–546.

Wang N, Ouedraogo Y, Chu J, et al. (2019) Variable reduction of past year alcohol and drug use with unmet need of mental health service use among U.S. adults. *J Affect Disorder*s 256: 110–116.

Ward BW, Nugent CN, Blumberg SJ, et al. (2017). Measuring the Prevalence of Diagnosed Chronic Obstructive Pulmonary Disease in the United States Using Data From the 2012–2014 National Health Interview Survey. *Public Health Rep* 132: 149–156.

Ward BW, Clarke TC, Nugent CN, et al. (2016) Early Release of Selected Estimates Based on Data From the 2015 National Health Interview Survey. Available from: https://www.cdc.gov/nchs/data/nhis/earlyrelease/earlyrelease201605.pdf.

Wilper AP, Woolhander S, Lasser KE, et al. (2009) Health Insurance and Mortality in U.S. Adults. *Am J Public Health* 99: 2289–2295.

Wolter KM (1985) *Introduction to Variance Estimation*, New York: Springer-Verlag.

Yi SS, Kwon SC, Wyatt L, et al. (2015) Weighing in on the hidden Asian American obesity epidemic. *Prev Med* 73: 6–9.

Young MT, Leon-Perez G, Wells CR, et al. (2017) Inclusive state immigrant policies and health insurance among Latino, Asian/Pacific Islander, Black, and White noncitizens in the United States. *Ethn Health* 20: 1–13.

Zhou M, Xiong YS (2005) The multifaceted American experiences of the children of Asian immigrants: lessons for segmented assimilation. *Ethn Racial Stud* 28: 1119–1152.

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