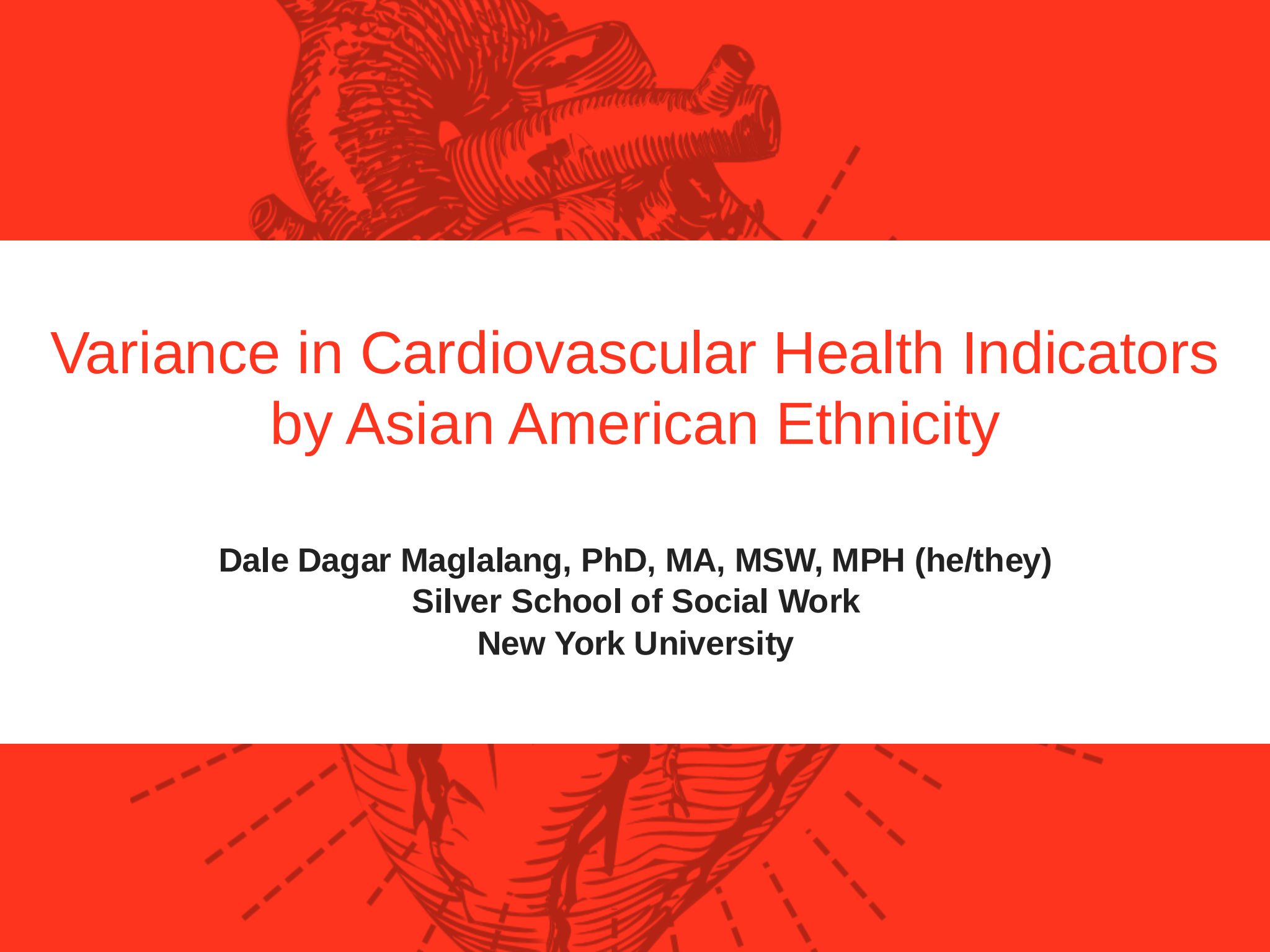
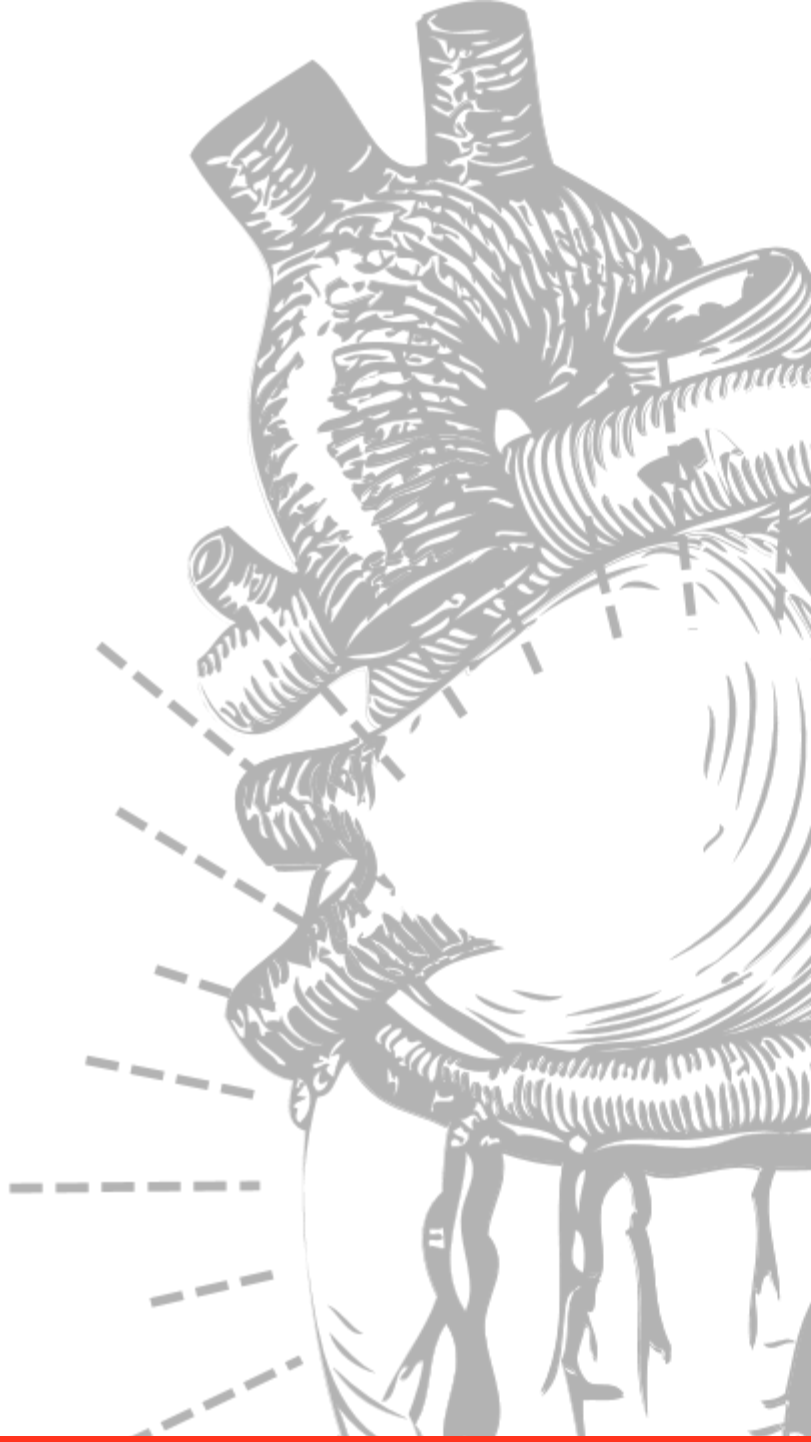


Variance in Cardiovascular Health Indicators by Asian American Ethnicity

Dale Dagar Maglalang, PhD, MA, MSW, MPH (he/they)
Silver School of Social Work
New York University

AGENDA

- Background
- Research Aims
- Methods
- Findings
- Discussion
  - Implications
  - Future Directions



Co-Authors

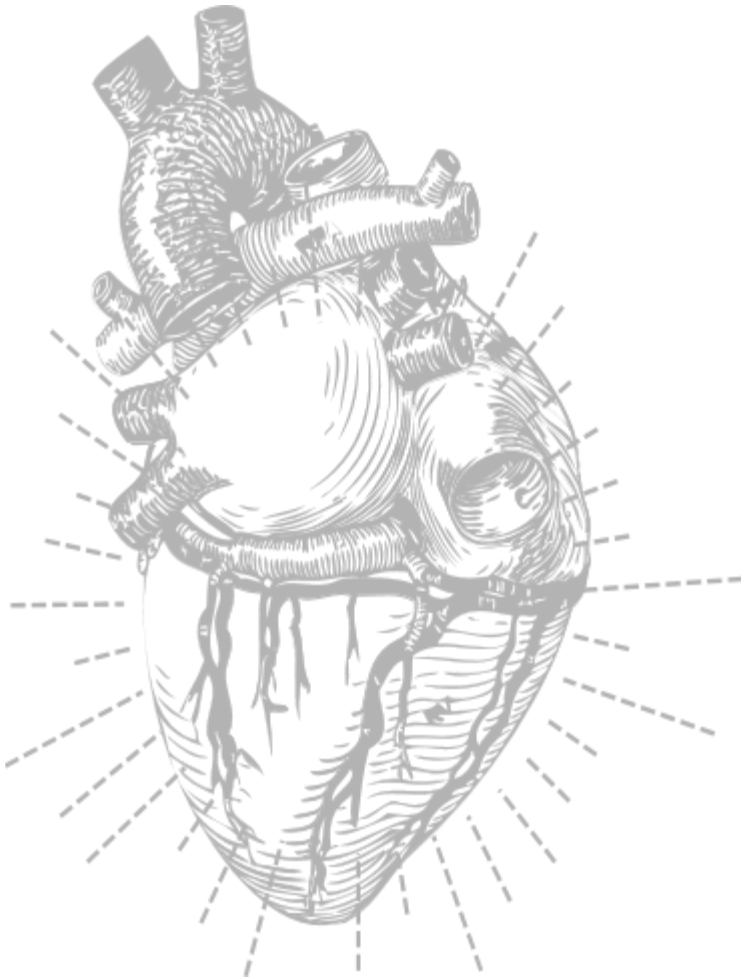
Dr. Lainey Sevillano

Assistant Professor
School of Social Work
Portland State University

Dr. Adrian Bacong

Postdoctoral Scholar
Stanford Center for Asian Health Research and Education (CARE)
Stanford University School of Medicine

A HEART TO HEART



- Cardiovascular disease is the **leading cause of death** globally, taking an estimated **17.9 million** lives each year (World Health Organization).
- **695,000 people** in the United States died from heart disease in 2021— **1 in every 5 deaths** (CDC).
- **One person dies every 33 seconds** in the United States from cardiovascular disease (National Center for Health Statistics, 2023).

Race of Ethnic Group	% of Deaths
American Indian or Alaska Native	15.5
Asian	18.6
Black (Non-Hispanic)	22.6
Native Hawaiin or Other Pacific Islander	18.3
White (Non-Hispanic)	18.0
Hispanic	11.9
All	17.4

Source: National Center for Health Statistics, 2023

ASIAN AMERICANS AND CVD

TABLE 1. Estimates of CVD and CVD risk factors	Chinese	Asian Indian	Filipino	Viet-namese	Korean	AsA
CVD						
Age-adjusted mortality rate, 2017 (US vital statistics)	464.1 M 337.0 F	621.7 M 459.8 F	611.1 M 374.4 F	576.8 M 418.2 F	518.8 M 416.8 F	540.2 M 379.4 F
Coronary artery disease (%), 2016 (n. CA EHR)	4.2	8.3	6.5	4.7[a]	3.6	5.4
History of CVD (%), 2013-2019 (US, BRFSS)	2.8	3.8	5.7	3.0[b]	2.2	--
CVD Risk Factors						
Hypertension (%)						
1. 2009-2013 (NYC survey)	22.2[c]	27.1[c]	--	--	--	--
2. 2016 (n. CA EHR)	33.8	43.4	56.1	35.7[a]	33.9	42.8
3. 2015-2016 (CA, CHIS)	19.3	19.9	32.1	27.4	17.4	24.1
4. 2013, 2015, 2017 (US, BRFSS)	17.9	16.9	31.5	16.4[b]	16.4	20.8
Diabetes (%)						
1. 2016 (n. CA EHR)	15.6	29.1	31.9	18.7[a]	18.0	23.1
2. 2013-2019 (US, BRFSS)	5.1	10.7	14.4	6.6[b]	4.7	8.7
3. 2015-2016 (CA, CHIS)	6.5	8.7	12.6	6.4	7.0	8.7
Obesity (%)						
1. 2016 (n. CA EHR)	8.3	20.0	20.8	7.6[a]	7.6	14.7
2. 2013-2019 (US, BRFSS, ≥27.5)	12.1	21.7	27.4	21.3[b]	16.2	--
3. 2015-2016 (CA, CHIS)	10.6	11.9	24.5	10.2	6.6	14.1
4. 2002-2015 (US, NHIS), ≥27.5)	15.0 M	19.8 M	34.7 M	--	--	21.8 M
Current smoker (%)						
1. 2016 (n. CA EHR)	4.8	3.0	7.3	7.3	7.7	5.9
2. 2013-2019 (US, BRFSS)	6.0	6.2	9.1	9.7[b]	14.0	--
3. 2015-2016 (CA, CHIS)	4.4	7.2	7.8	12.0	13.7	8.1
Physical Activity (%)						
1. Sedentary 2013-2019 (US, BRFSS)	16.9	19.7	20.5	21.2	17.6	--
2. Engaged in regular walking (CA, CHIS)	44.2	44.0	39.3	42.3	53.2	42.3
3. Inactive 2002-2015 (US, NHIS)	69.6 M	70.0 M	72.5 M	--	--	69.4 M

[a]Southeast Asian; [b]Vietnamese + Other; [c]Immigrants; M=male; F=female

PRESENT STUDY

Research Aim

Aim: To investigate heterogeneity in CVD risk factors among the three largest Asian American sub-ethnic groups in the U.S.

METHODS

Dataset: 2013-2018 National Health Interview Survey

- **Weighted Sample**: Asian American identifying individuals (N= 10,353)
  - Asian Indian
  - Chinese
  - Filipino
  - Other Asian

- **Outcomes**: Self-reported cardiovascular disease, coronary heart disease (CHD), heart attack, or stroke, by a health professional

- **Covariates:**
  - Demographic Factors: Age, Sex (male/female)
  - Socioeconomic Factors: Educational Attainment, Income to Federal Poverty Level Ratio
  - Comorbidities: Hypertension, Diabetes
  - Health Behaviors/Conditions: Presence of Obesity, Presence of psychological distress, smoking status, hours of sleep, physical activity

METHODS Cont.

- **Analysis**:
- Hamad et al. (2022) – to explain variance by calculating adjusted R-squared
  - Hamad R, Glymour MM, Calmasini C, Nguyen TT, Walter S, Rehkopf DH. Explaining the variance in cardiovascular disease risk factors: a comparison of demographic, socioeconomic, and genetic predictors. Epidemiology. 2022 Jan 1;33(1):25-33.

- R-Squared is indicative of the amount of variance in the outcome/health condition of interest that is explained by variables included in the model

- Models

  Calculation of R-Squared for five models for each outcome:

  - Model 1: Demographic Factors
  - Model 2: Model 1 + Socioeconomic Factors
  - Model 3: Model 1 + Health Behaviors
  - Model 4: Model 1 + Health Conditions
  - Model 5: All Factors

FINDINGS

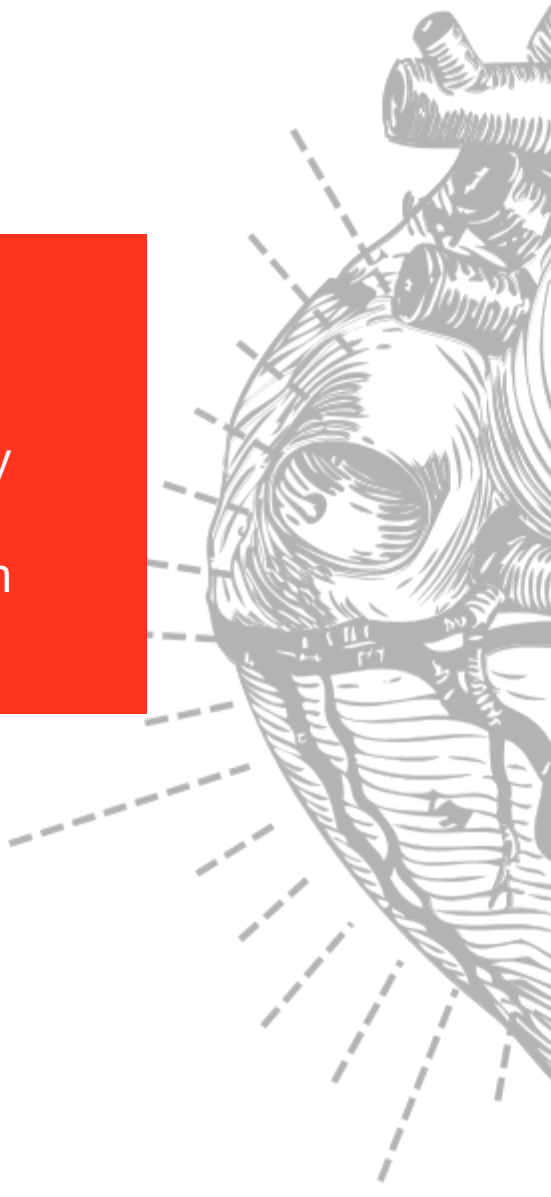
	All Asian	Chinese	Filipino	Asian Indian	Other Asian
N	**10,353**	**2,153**	**2,466**	**2,156**	**3,578**
Variable	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Health Outcome					
% Any CVD	3.9 (3.5, 4.4)	2.7 (2.0, 3.6)	**5.9 (4.7, 7.3)**	2.9 (2.2, 3.8)	4.2 (3.5, 5.0)
% Coronary Heart Disease	2.6 (2.2, 3.0)	1.9 (1.3, 2.8)	**4.0 (3.1, 5.2)**	2.1 (1.5, 2.8)	2.3 (1.8, 2.9)
% Heart Attack	1.4 (1.2, 1.7)	0.8 (0.5, 1.5)	**2.5 (1.7, 3.5)**	1.1 (0.7, 1.8)	1.3 (0.9, 1.8)
% Stroke	1.5 (1.2, 1.8)	0.9 (0.6, 1.5)	**2.0 (1.4, 2.8)**	0.7 (0.4, 1.4)	**2.0 (1.4, 2.7)**
Diabetes, %	8.2 (7.6, 8.9)	4.4 (3.5, 5.5)	**10.4 (8.9, 12.1)**	8.7 (7.3, 10.3)	8.8 (7.7, 10.1)
Hypertension, %	23.4 (22.3, 24.5)	17.8 (15.7, 20.1)	**32.9 (30.5, 35.4)**	19.0 (16.8, 21.5)	23.3 (21.6, 25.1)

Health Behaviors	All Asian	Chinese	Filipino	Asian Indian	Other Asian
Smoking Status, %					
Never Smoked	78.7 (77.6, 79.8)	85.3 (83.2, 87.2)	70.2 (67.7, 72.7)	87.0 (85.0, 88.8)	74.5 (72.4, 76.6)
Formerly/Has Smoked	12.9 (12.1, 13.8)	8.7 (7.1, 10.7)	18.7 (16.7, 20.9)	8.3 (7.0, 9.9)	14.8 (13.3, 16.4)
Currently Smokes	8.4 (7.7, 9.1)	6.0 (4.8, 7.4)	**11.0 (9.4, 12.9)**	4.7 (3.7, 5.9)	10.7 (9.4, 12.2)
Obesity, %	11.7 (10.9, 12.6)	5.6 (4.4, 7.0)	**19.9 (17.9, 22.0)**	11.4 (9.9, 13.2)	10.1 (8.7, 11.6)
Hours of Sleep, %					
Less than 7 Hours	31.8 (30.6, 33.1)	26.3 (23.8, 29.0)	**38.3 (35.6, 41.1)**	25.3 (22.9, 27.8)	35.5 (33.4, 37.6)
7 to 9 Hours	65.8 (64.5, 67.1)	71.9 (69.1, 74.4)	59.3 (56.5, 62.1)	73.0 (70.5, 75.4)	61.3 (59.2, 63.4)
More than 9 Hours	2.4 (2.0, 2.8)	1.8 (1.2, 2.7)	2.3 (1.7, 3.2)	1.7 (1.2, 2.4)	3.2 (2.5, 4.2)

Socioeconomic Factors	All Asian	Chinese	Filipino	Asian Indian	Other Asian
Educational Attainment					
Less than High School	9.0 (8.2, 9.9)	8.9 (7.1, 11.2)	8.4 (7.0, 10.0)	5.2 (3.9, 6.8)	**12.3 (10.7, 14.1)**
High School or GED Equivalent	15.9 (14.8, 17.1)	14.8 (12.4, 17.4)	18.8 (16.7, 21.1)	10.1 (8.5, 12.0)	18.9 (17.1, 20.9)
Some College, Associate's or Technical Degree	21.2 (20.1, 22.3)	18.1 (17.1, 20.9)	29.9 (27.6, 32.3)	12.1 (10.4, 14.1)	23.6 (21.9, 25.5)
Bachelor's Degree and Above	53.3 (51.6, 55.1)	57.6 (54.3, 60.8)	42.3 (39.5, 45.3)	72.4 (69.4, 75.3)	44.6 (41.2, 47.0)
Missing	0.5 (0.4, 0.7)	0.6 (0.3, 1.4)	0.6 (0.3, 1.2)	0.2 (0.1, 0.5)	0.6 (0.3, 0.9)
Federal Poverty Level (FPL), %					
Less than 1.00 FPL	11.2 (10.3, 12.1)	**14.2 (12.2, 16.5)**	7.6 (6.4, 9.1)	8.1 (6.7, 9.7)	14.0 (12.3, 15.8)
1.00 to 1.99 FPL	14.7 (13.7, 15.7)	13.3 (11.5, 15.3)	15.5 (13.5, 17.7)	9.8 (8.3, 11.5)	18.5 (16.5, 20.7)
2.00+ FPL	68.6 (67.0, 70.2)	66.2 (63.0, 69.3)	70.7 (67.9, 73.4)	77.5 (75.1, 79.7)	62.2 (59.6, 64.7)
Undefinable or Unknown	5.6 (4.9, 6.3)	6.3 (4.7, 8.4)	6.2 (4.8, 7.9)	4.6 (3.6, 5.8)	5.4 (4.5, 6.5)

13%

of heart disease prevalence is explained by individual-level demographic, socioeconomic, health behavior, and health condition factors alone



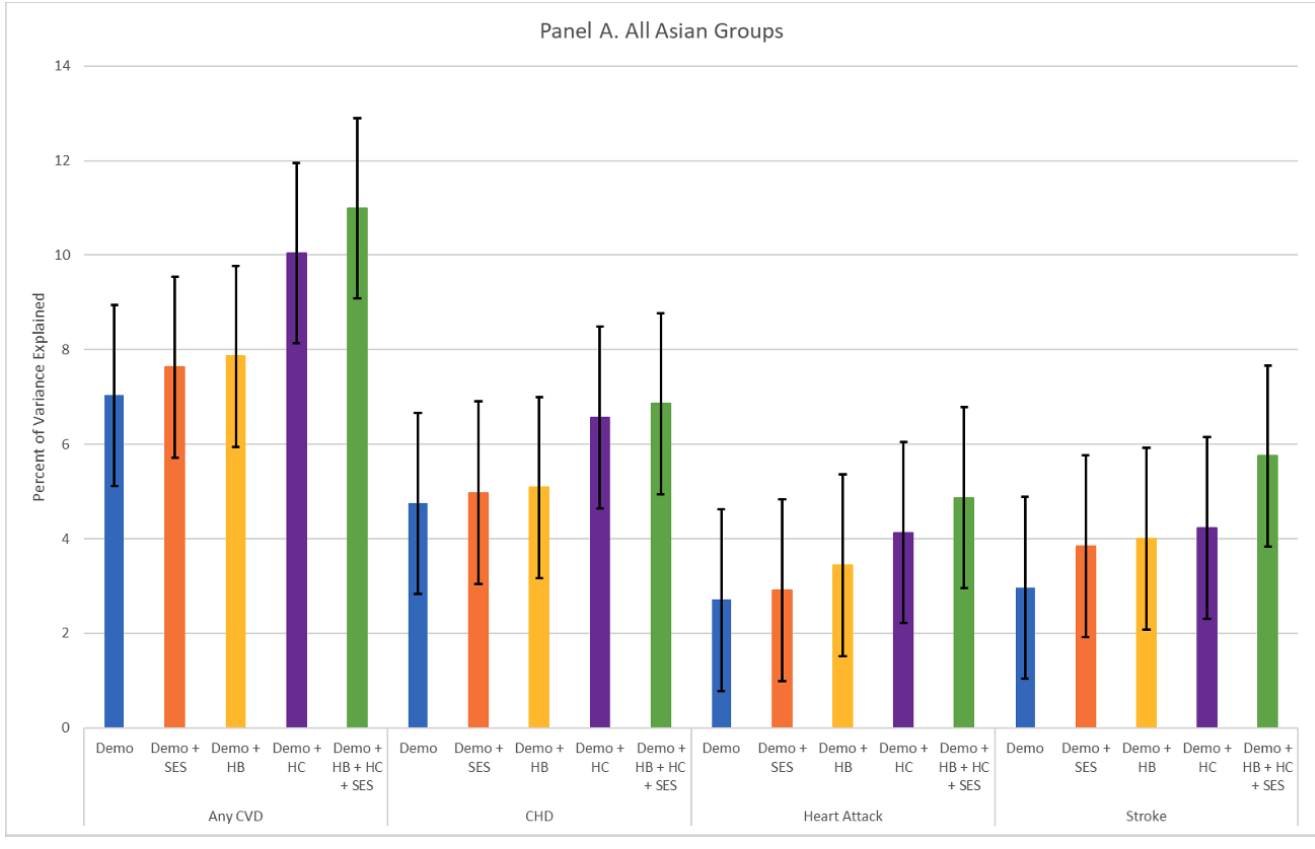


Table 2. Percent of Variance Explained by Demographic, Behavioral, Health Factor, and Socioeconomic Factors, All Asian Groups, N = 10,353

	R-Squared (95% Confidence Interval)			
Model Covariates	Any CVD	CHD	Heart Attack	Stroke
Demographic	7.04 (5.12, 8.95)	4.75 (2.83, 6.67)	2.71 (0.78, 4.63)	2.97 (1.04, 4.89)
Demographic + SES	7.63 (5.71, 9.54)	4.97 (3.05, 6.90)	2.91 (0.98, 4.83)	3.84 (1.92, 5.76)
Demographic + Health Behavior	7.87 (5.95, 9.78)	5.09 (3.17, 7.00)	3.44 (1.51, 5.36)	4.00 (2.08, 5.92)
Demographic + Health Condition	10.05 (8.14, 11.95)	6.57 (4.65, 8.49)	4.13 (2.21, 6.05)	4.23 (2.31, 6.15)
Demographic + Health Behavior + Health Condition + SES	11.00 (9.09, 12.90)	6.86 (4.94, 8.77)	4.87 (2.95, 6.79)	5.75 (3.83, 7.67)

-For all AA participants, demographic characteristics (age and gender) alone explained at least half of the variance from combined predictors

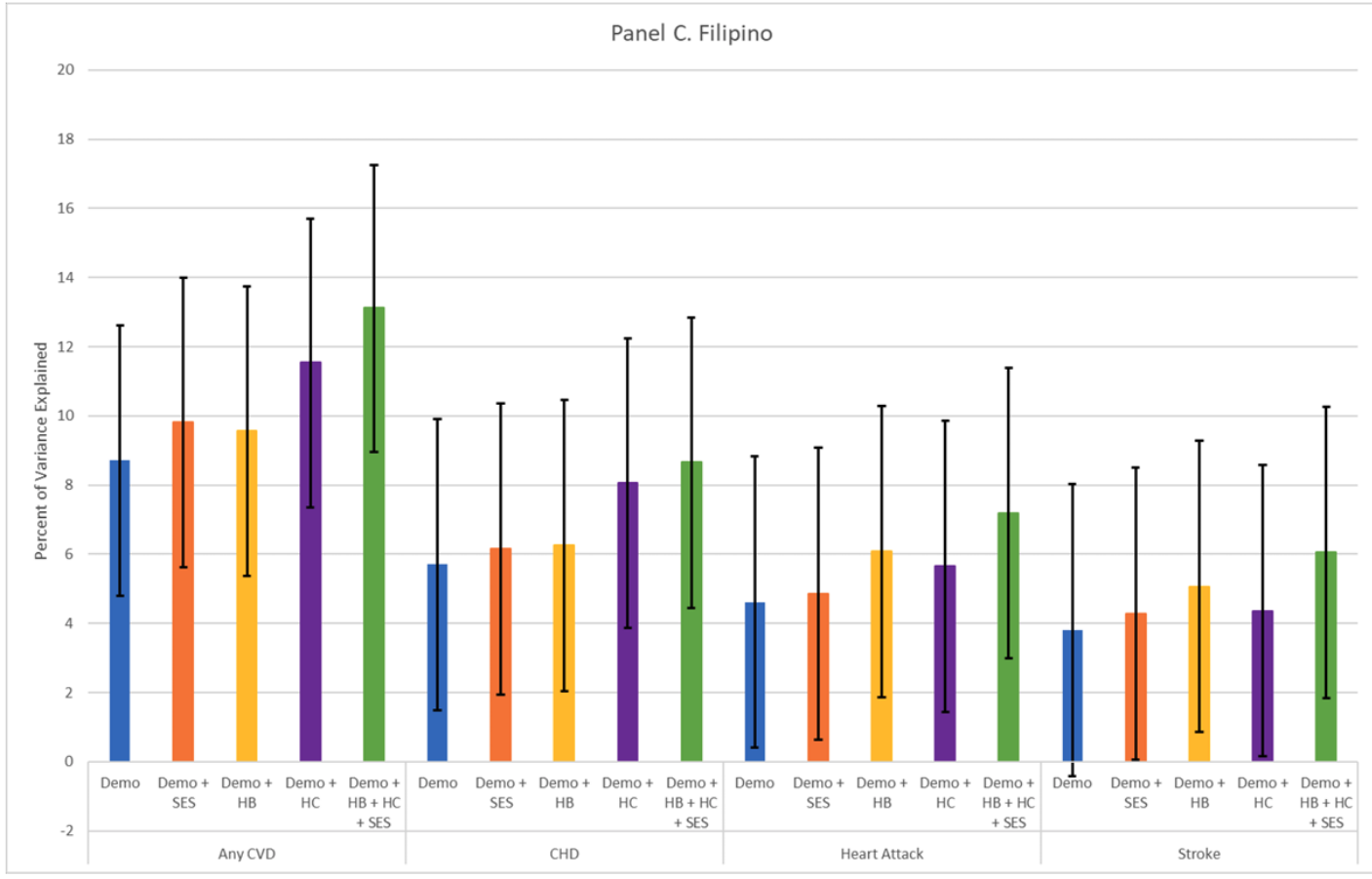


Table 4. Percent of Variance Explained by Demographic, Behavioral, Health Factor, and Socioeconomic Factors, **Filipino, N = 2,466**

	R-Squared (95% Confidence Interval)			
Model Covariates	Any CVD	CHD	Heart Attack	Stroke
Demographic	8.72 (4.79, 12.62)	5.72 (1.50, 9.92)	4.62 (0.40, 8.83)	3.81 (-0.42, 8.02)
Demographic + SES	9.83 (5.63, 14.00)	6.15 (1.93,10.35)	4.86 (0.64, 9.07)	4.29 (0.07, 8.50)
Demographic + Health Behavior	9.57 (5.37, 13.74)	6.26 (2.04, 10.46)	6.08 (1.86, 10.28)	5.07 (0.85, 9.27)
Demographic + Health Condition	11.55 (7.36, 15.70)	8.07 (3.86, 12.25)	5.65 (1.43, 9.85)	4.37 (0.15, 8.58)
Demographic + Health Behavior + Health Condition + SES	13.12 (8.95, 17.25)	8.66 (4.45, 12.84)	7.20 (2.98, 11.39)	6.06 (1.84, 10.26)

-However, the contribution of explained variance due to demographics (age & gender) seems especially pronounced for Filipino participants, as shown by having the highest percentage of explained variance across all CVD outcomes between ethnic groups and when compared to the entire AA sample.

-When combining all predictors, Filipinos had the highest percentage of variance explained for any CVD, CHD, and heart attack.

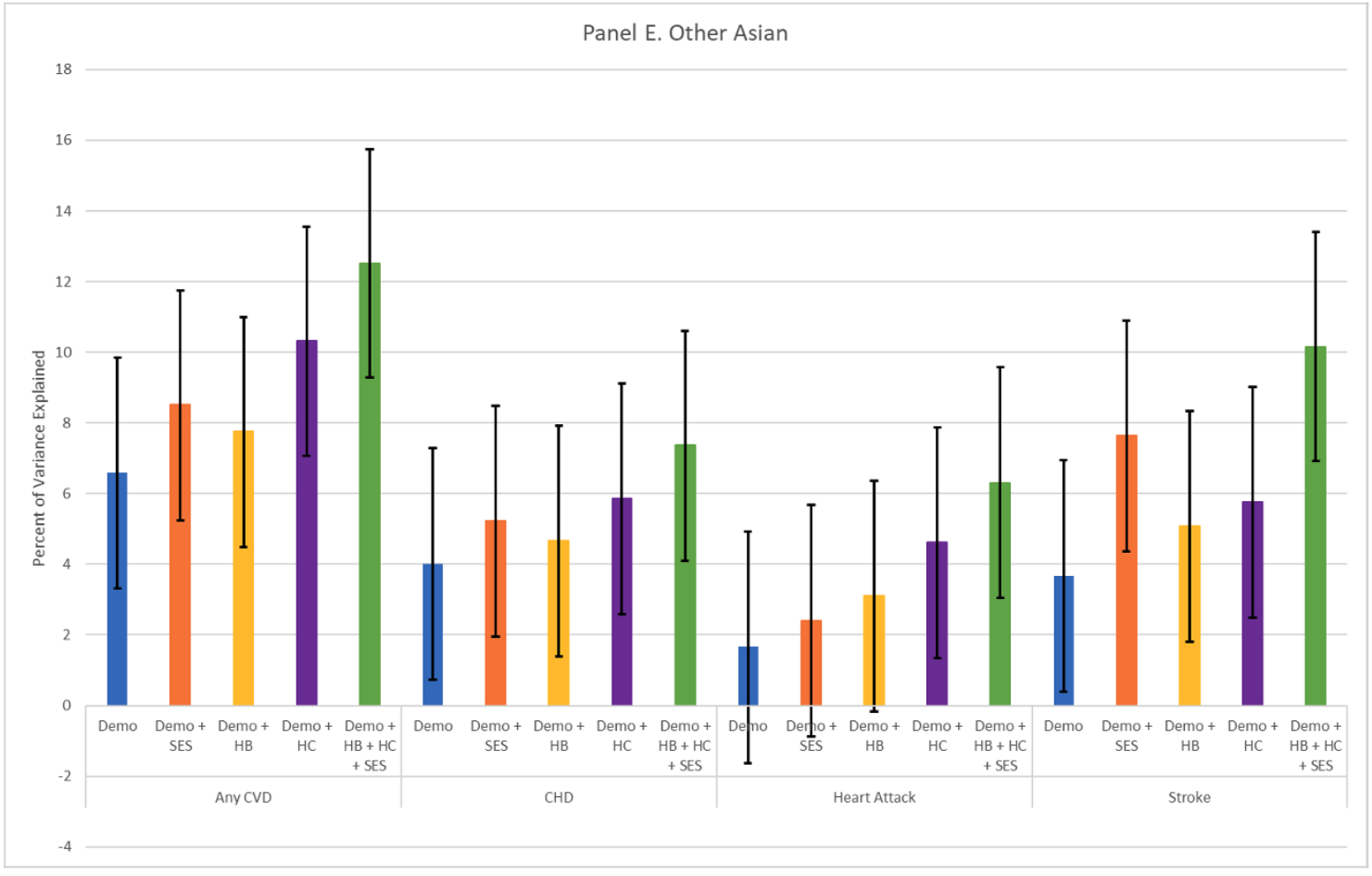


Table 6. Percent of Variance Explained by Demographic, Behavioral, Health Factor, and Socioeconomic Factors, **Other Asian, N = 3,578**

	R-Squared (95% Confidence Interval)			
Model Covariates	Any CVD	CHD	Heart Attack	Stroke
Demographic	6.59 (3.32, 9.85)	4.02 (0.74, 7.29)	1.66 (-1.62, 4.93)	3.68 (0.40, 6.95)
Demographic + SES	8.51 (5.25, 11.75)	5.22 (1.95, 8.48)	2.40 (-0.88, 5.67)	7.64 (4.37, 10.89)
Demographic + Health Behavior	7.75 (4.48, 11.00)	4.66 (1.39, 7.92)	3.10 (-0.18, 6.37)	5.08 (1.81, 8.34)
Demographic + Health Condition	10.32 (7.07, 13.55)	5.86 (2.59, 9.12)	4.61(1.34, 7.88)	5.76 (2.49, 9.02)
Demographic + Health Behavior + Health Condition + SES	12.52 (9.28, 15.73)	7.36 (4.09, 10.61)	6.31(3.04, 9.57)	10.16 (6.91,13.39)

- Contributions of explained variance due to SES characteristics also differed across groups, with the largest contributions found among the Other Asian group across all CVD outcomes when compared to the other ethnic groups, and when compared to the entire AA sample.

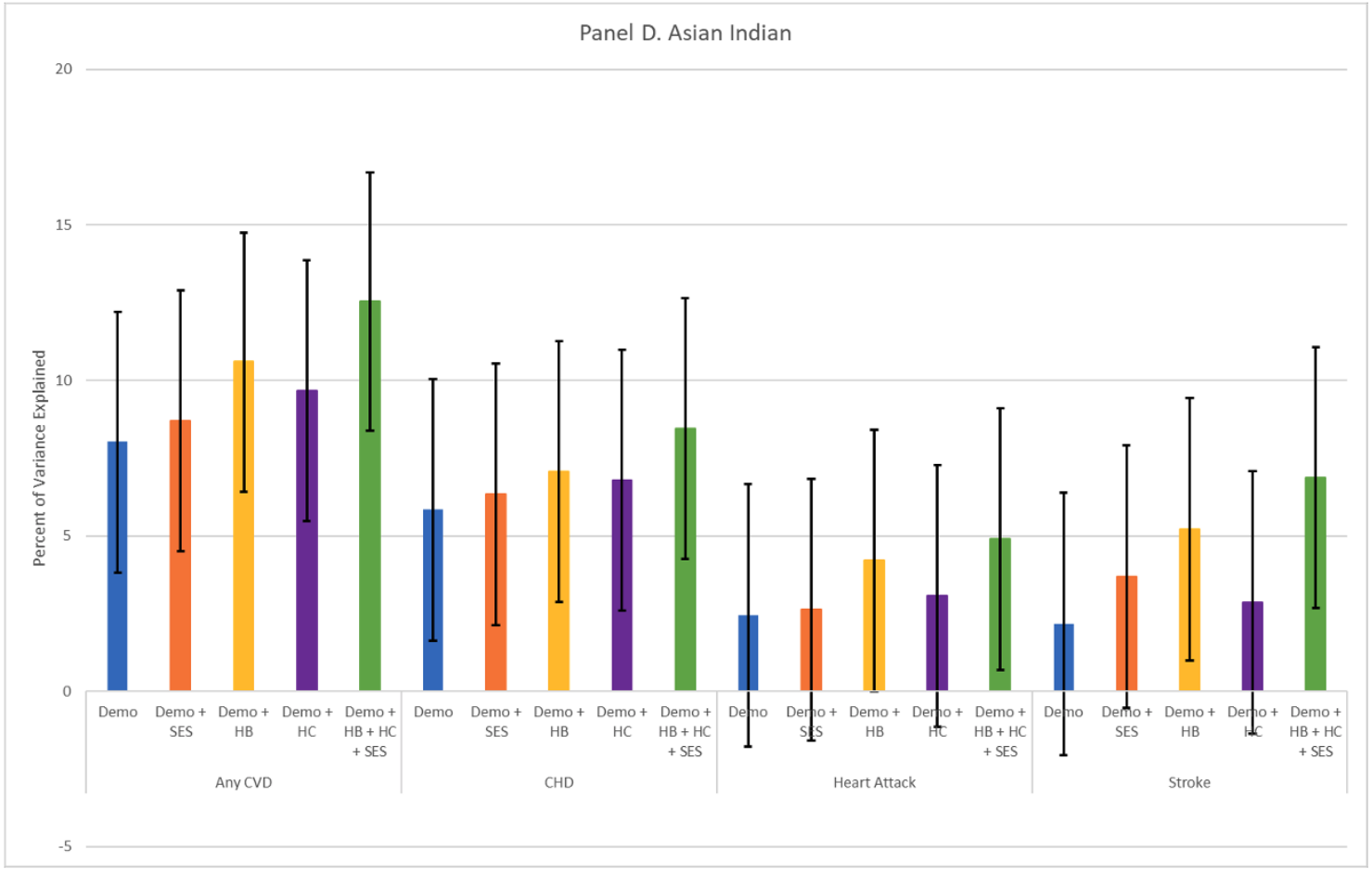


Table 5. Percent of Variance Explained by Demographic, Behavioral, Health Factor, and Socioeconomic Factors, **Asian Indian, N = 2,156**

	R-Squared (95% Confidence Interval)			
Model Covariates	Any CVD	CHD	Heart Attack	Stroke
Demographic	8.02 (3.81, 12.20)	5.84 (1.62, 10.04)	2.45 (-1.77, 6.66)	2.17 (-2.05, 6.39)
Demographic + SES	8.71 (4.50, 12.88)	6.35 (2.13, 10.54)	2.63 (-1.59, 6.84)	3.69 (-0.53, 7.90)
Demographic + Health Behavior	10.60 (6.41, 14.76)	7.07 (2.86, 11.26)	4.20 (-0.02, 8.41)	5.22 (1.00, 9.42)
Demographic + Health Condition	9.68 (5.48, 13.85)	6.79 (2.58, 10.98)	3.07 (-1.15, 7.28)	2.86 (-1.36, 7.07)
Demographic + Health Behavior + Health Condition + SES	12.55 (8.37, 16.68)	8.46 (4.25, 12.64)	4.91 (0.69, 9.11)	6.88 (2.67, 11.07)

-Compared to Chinese, Filipino, and Other Asians, health behaviors were an essential predictor for all CVD outcomes among Asian Indians. Inversely, existing health conditions were significant predictors of CVD for all AA ethnic groups compared to Asian Indians.

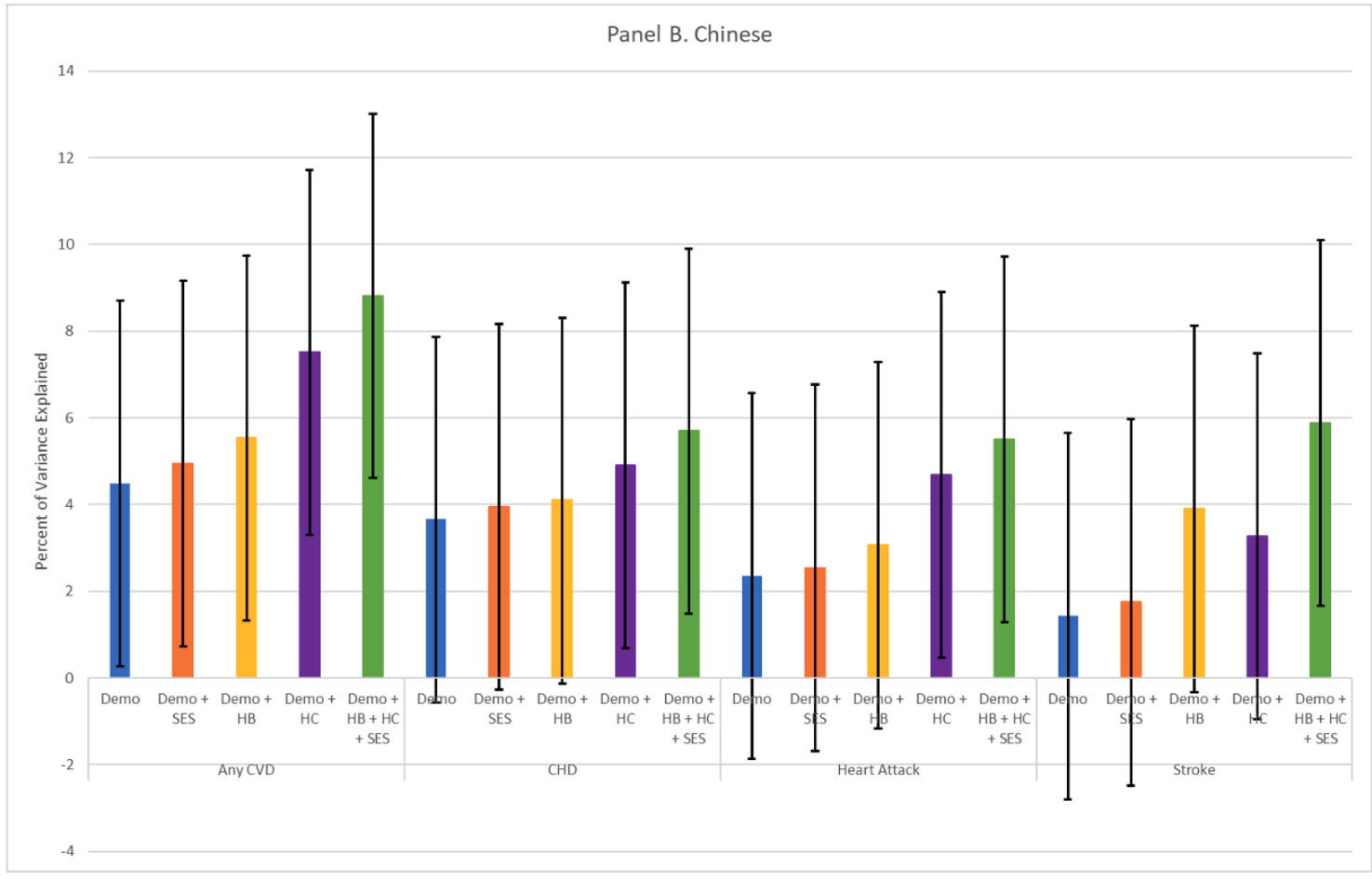


Table 3. Percent of Variance Explained by Demographic, Behavioral, Health Factor, and Socioeconomic Factors, **Chinese, N = 2,153**

	R-Squared (95% Confidence Interval)			
Model Covariates	Any CVD	CHD	Heart Attack	Stroke
Demographic	4.49 (0.27, 8.70)	3.66 (-0.57, 7.87)	2.36 (-1.87, 6.58)	1.44 (-2.79, 5.66)
Demographic + SES	4.95 (0.73, 9.16)	3.95 (-0.27, 8.16)	2.54 (-1.69, 6.76)	1.75 (-2.48, 5.97)
Demographic + Health Behavior	5.54 (1.32, 9.74)	4.10 (-0.12, 8.31)	3.07 (-1.16, 7.29)	3.91 (-0.32, 8.12)
Demographic + Health Condition	7.52 (3.31, 11.71)	4.91 (0.69, 9.12)	4.69 (0.47, 8.90)	3.28 (-0.95, 7.49)
Demographic + Health Behavior + Health Condition + SES	8.82 (4.61, 13.00)	5.70 (1.48, 9.90)	5.51 (1.29, 9.71)	5.89 (1.67, 10.09)

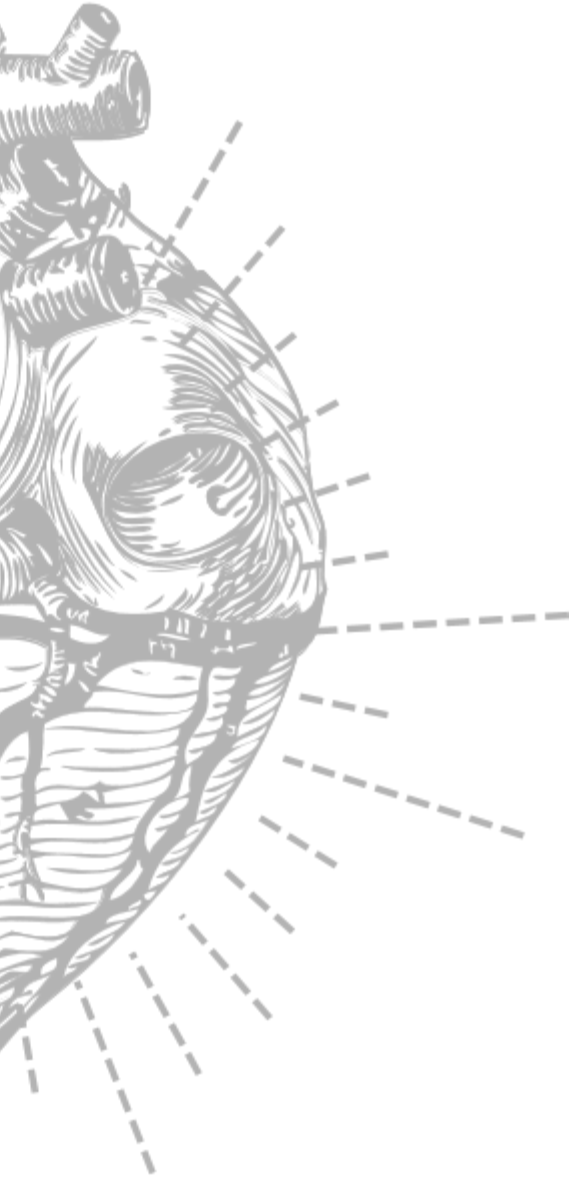
-Covariates chosen were not as high in explaining the variance for all outcomes in Chinese Americans compared to the overall AA sample and other Asian ethnic groups (Filipino, South Asian, other Asian)

DISCUSSION

Key Takeaways

- Individual level factors explain a modest proportion of the variance in CVD prevalence among Asian Americans
- Demographic factors (e.g., age and sex) contribute the greatest explained variance in CVD
- There are differences in contributions of various domains by Asian group
  - A greater relative burden of CVD was observed in Filipino Americans, particularly for CHD, heart attack, and any CVD
  - Other Asians had a greater burden of stroke
  - Health behaviors contribute more for Asian Indians

Future Directions



- Continuing advocacy for data disaggregation
  - California Health Interview Survey
    - Sexual orientation, gender identity expression + Asian American ethnicity
- Targeted CVD-related public health messaging and interventions are needed for different AA ethnic groups
  - Health behaviors for Asian Indian
  - Messaging/interventions about stroke for other Asians
- Identifying other factors that can explain the variance in CVD among different AA groups

GET IN TOUCH

Dr. Lainey Sevillano

L.Sevillano@pdx.edu

Dr. Adrian Bacong

Abacong@stanford.edu

Dr. Dale Dagar Maglalang

dam506@nyu.edu