

UC Davis

Cardiovascular Medicine

Title

A Zip Code Tabulation Area-Level Analysis of Food Insecurity and Social Determinants of Coronary Heart Disease in California

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The data associated with this publication are not available for this reason: N/A

Background

- Coronary heart disease (CHD) is the most common type of cardiovascular disease (CVD), affecting 7.2% of adults ≥ 20 years of age in the United States (U.S.).
- CHD prevalence is disproportionately high among California's (CA) racial and ethnic minority populations.
- Social determinants of health (SDOH) play a significant role in CHD and CVD risk factors, which have a higher prevalence among Hispanics and Blacks.
- Among the key SDOH that drive disparities in CHD is access to nutritious food. There are barriers to the availability of foods that support healthy eating patterns, such as living in a "food desert," or low-income areas where nutritious food sources are limited.
- Other SDOH associated with CHD outcomes include socioeconomic (SES) factors, such as education and health insurance status.

Objectives

- Describe geographic distributions of CHD prevalence and food deserts in CA by Zip Code Tabulation Area (ZCTA).
- Quantify associations between ZCTA-level prevalence of CHD, CVD risk factors, and SDOH in CA.
- Compare CHD and CVD risk factor prevalence and SDOH by food desert status in CA at the ZCTA level.

Methods

- The U.S. Department of Agriculture (USDA) Food Access Research Atlas, U.S. Census Bureau, and PLACES: Local Data for Better Health were used to obtain data for 1,715 of the 1,769 ZCTAs in CA.
- Following USDA criteria, food deserts are defined as:
 1. "Low-income" areas with a poverty rate of $\geq 20\%$ or a median family income $\leq 80\%$ of the statewide or metropolitan area median family income.
 2. "Low-access" areas with ≥ 500 people or 33% of the population living $> 1/2$ mile for urban areas or > 10 miles for rural areas from the nearest supermarket.
- Heatmaps were generated to show the geographical distribution of CHD prevalence and food deserts in CA at the ZCTA level.
- Correlations were used to describe the relationship between SDOH and CHD prevalence in CA by ZCTA.
- Wilcoxon rank-sum tests and t-tests were conducted to compare variables by food desert status in CA by ZCTA.

Results

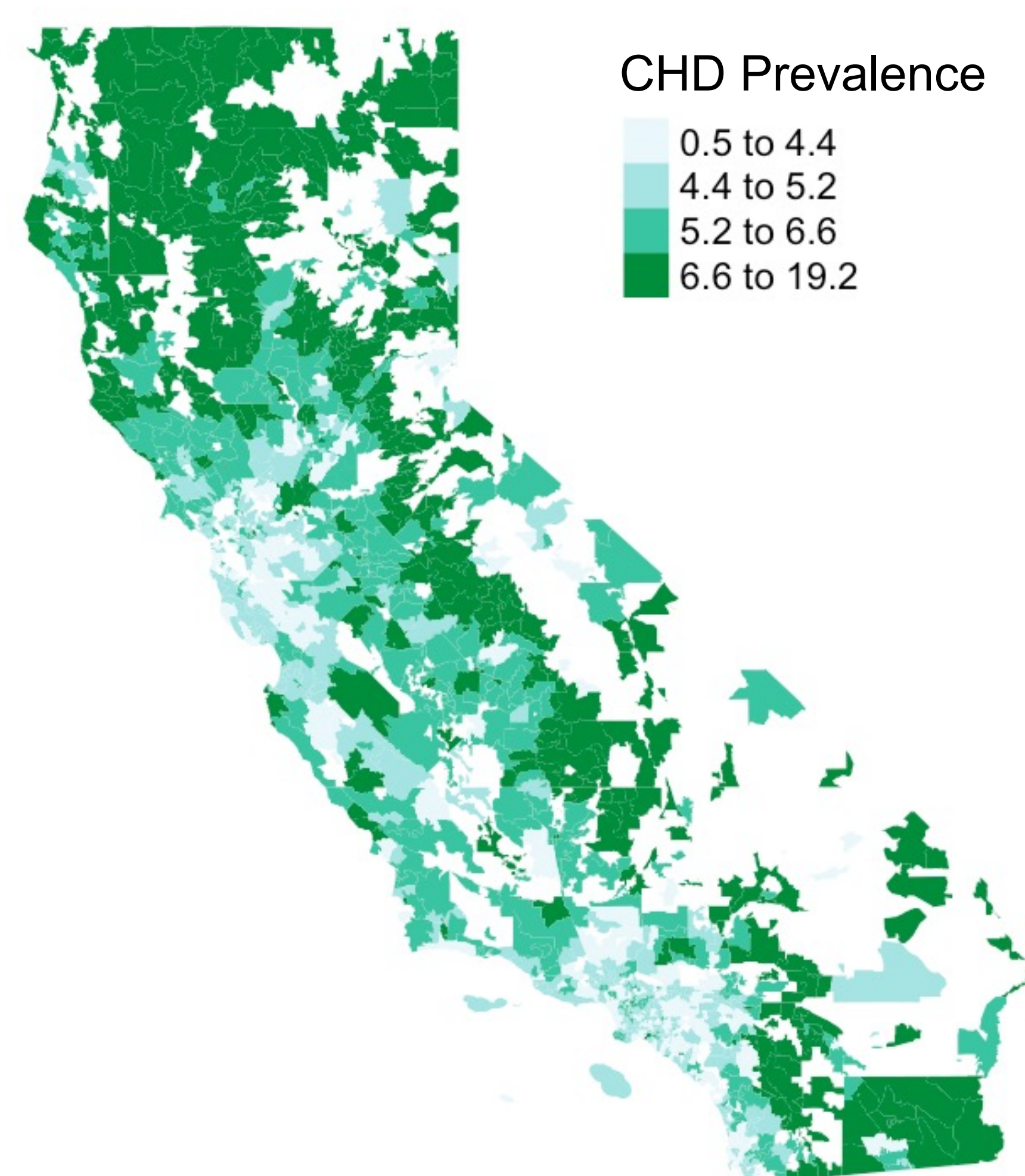


Figure 1. Geographical distribution of CHD prevalence in CA at the ZCTA level.

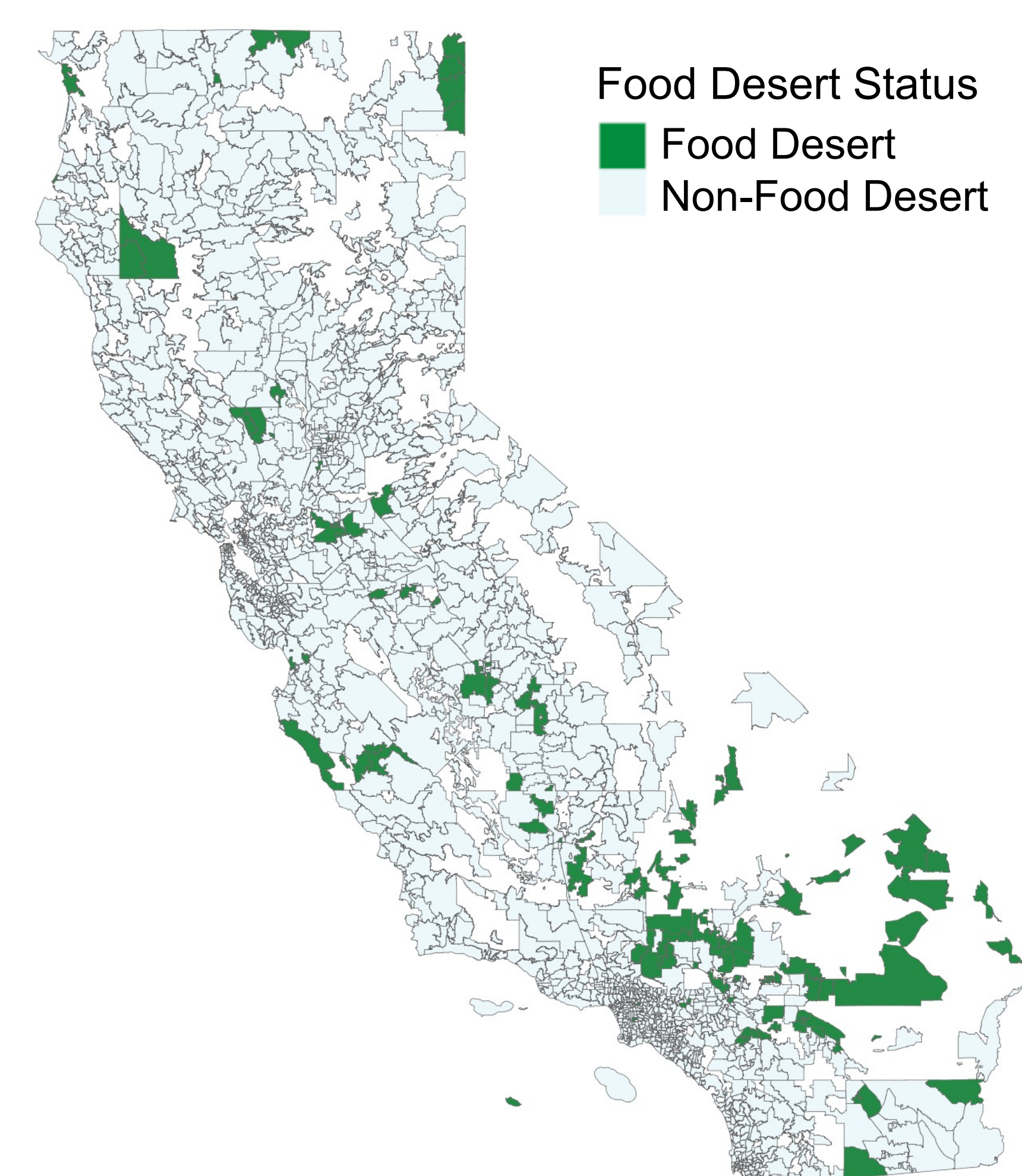


Figure 3: Geographical distribution of CA's 133 food deserts and 1,582 non-food deserts at the ZCTA level.

Figure 2. Correlation Between SDOH and CHD Prevalence in CA's ZCTAs

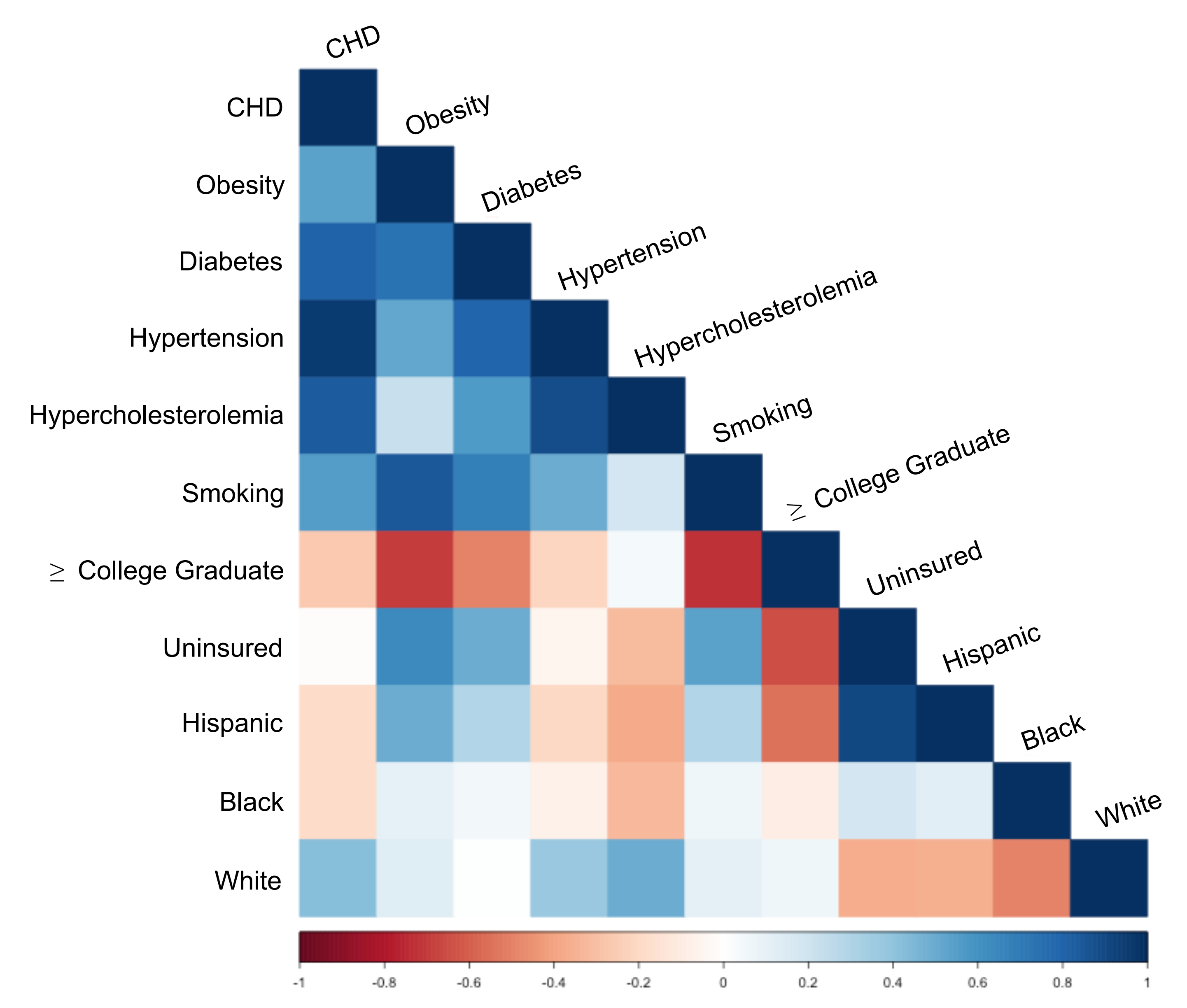


Table. Comparisons by Food Desert Status in CA at the ZCTA Level

Health Outcome	Overall (n = 1715)		Food Desert (n = 133)		Non-Food Desert (n = 1582)		P-value
	Mean	SD	Mean	SD	Mean	SD	
CHD Prevalence	5.59	1.88	6.24	2.54	5.54	1.81	<0.001
CVD Risk Factor Prevalence							
Obesity	27.76	5.44	32.76	4.92	27.34	5.27	<0.001
Diabetes	10.17	2.64	11.55	3.75	10.05	2.49	<0.001
Hypertension	28.79	5.63	30.10	7.81	28.68	5.39	<0.01
Hypercholesterolemia	30.41	4.92	29.63	7.15	30.48	4.68	0.4573
Smoking	13.56	3.59	16.86	3.00	13.29	3.50	<0.001
Socioeconomic Status							
\geq College Graduate	22.82	15.77	9.73	8.13	23.92	15.76	<0.001
Uninsured	14.24	7.09	19.40	7.53	13.81	6.88	<0.001
Race and Ethnicity							
Hispanic	30.32	24.48	43.49	28.53	29.22	23.80	<0.001
Black	4.39	6.90	6.46	7.92	4.31	6.78	0.0401
White	69.95	2.74	68.88	18.95	69.06	20.89	0.5211

Note: n = 1,579 for \geq College Graduate and all races and ethnicities. Abbreviations: ZCTA=Zip Code Tabulation Area; CHD=coronary heart disease; CVD=cardiovascular disease.

Summary

- There is geographical variation in the distribution of CHD prevalence and food deserts in CA at the ZCTA level.
- 7.5% of CA's ZCTAs are food deserts, or low-income, low-access (LILA) areas.
- There are strong correlations between CHD prevalence and CVD risk factors in CA at the ZCTA level.
- The mean CHD prevalence in CA's food deserts (6.24%) is significantly higher than in non-food deserts (5.54%).
- The mean prevalence of obesity, diabetes, hypertension, and smoking, are significantly higher in CA's food deserts.
- The mean prevalence of uninsured individuals in CA's food deserts (19.40%) is significantly higher than in non-food deserts (13.81%).
- The mean prevalence of college graduates in CA's food deserts (9.73%) is significantly lower than in non-food deserts (23.92%).
- There is a significantly higher proportion of Hispanics and Blacks living in CA's food deserts.

Conclusion

- Geographical variations in the distribution of CHD prevalence and food insecurity help identify ZCTAs that may benefit from region-specific interventions.
- CHD and CVD risk factor prevalence in CA vary based on access to nutritious food sources.
- Educational attainment and health insurance status are associated with food access in CA.
- Racial and ethnic disparities exist in food insecurity in CA.
- ZCTA-level analyses are meaningful for characterizing health outcomes and socioeconomic inequities in CHD.

Further Study

- As an immediate next step, we plan to examine relationships between CHD prevalence and combined SDOH using multiple linear regression.
- We plan to compare the combined and independent associations of CHD prevalence and SDOH.
- We hope to conduct similar analyses for Sacramento County and the greater U.S. to provide regional and national population-level data to better understand CHD racial and ethnic disparities.

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