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# Race and Sex Differences in the Association between Food Insecurity and Type 2 Diabetes

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**Objective:** To examine whether the relationship between food insecurity (FI) and type 2 diabetes (T2D) varies by race/ethnicity and sex.

**Methods:** We analyzed data from low-income adults participating in the 2009 and 2011 waves of the California Health Interview Survey (CHIS) (N=22,596). We used logistic regression models to estimate the sex and race-specific associations between FI and T2D.

**Results**: We observed positive associations between low food security and T2D for White men (AOR: 1.9, 95% CI: 1.2, 3.2), and between very low food security and T2D for White women (AOR: 1.6 95% CI: 1.1, 2.5). In Latinas, we observed positive associations between both low food security (AOR: 1.7, 95% CI: 1.3, 2.2) and very low food security (AOR: 1.8, 95% CI: 1.2, 2.6) and T2D. We did not observe any associations between FI and T2D in Latino men, or African American women and men.

**Conclusion**: The relationship between FI and T2D may be moderated by race and sex. For African Americans and Latino men, other distal factors may modify the effect of FI on rates of T2D. *Ethn Dis*. 2016;26(3):427-434; doi:10.18865/ed.26.3.427

**Keywords:** Race; Sex; Food Insecurity; Diabetes

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## Introduction

Food insecurity (FI), defined as the limited availability of nutritionally adequate and safe food, is a growing concern in the United States. The USDA recognizes two levels of food insecurity: low food security (formerly mild food insecurity, or food insecurity without hunger) and very low food security (formerly severe food insecurity or food insecurity with hunger). "FI" refers to both of these recognized levels of food insecurity. In 2013, the USDA estimated that nearly 17.5 million people (14.3% of all households) were FI.[1] This represents an increase of 34% since 2000, when the USDA reported that approximately 11 million people were food insecure.[2,3]

Food insecurity has been linked to a variety of health conditions, including type 2 diabetes (T2D). In their analysis of two waves of NHANES data (1999-2000 and 2001-2002), Seligman et al[4] found a positive association between food insecurity and diabetes after adjusting for BMI (AOR 1.2, 95% CI 1.1–4.0 severe FI). They corroborated these findings in a follow-up study[5] showing that FI was associated with a 50% higher prevalence of diabetes for women and men, again after adjusting for BMI. These findings were unexpected; the pathway between FI and T2D is unclear; however, previous researchers anticipated that elevated BMI was likely in the causal chain.[6,7] This was expected since not only is FI associated with a higher prevalence of obesity,[6,7] but several studies had also shown that obesity is associated with T2D.[8,9] The studies by Seligman et al suggest that the FI-T2D link may be unmediated by BMI.

*In 2013, the USDA estimated that nearly 17.5 million people (14.3% of all households) were FI[1]… an increase of 34% since 2000…*

Nevertheless, the extant literature on FI linked to T2D does not tell us how the association may vary by race/ethnicity and sex/gender. This is not an insignificant oversight. Several studies suggest that the association between FI and other health

conditions (eg, obesity) appear to vary greatly by sex/gender, [6,7,10–13] as well as race/ethnicity.[7,14]

The question as to whether the link between FI and T2D may be moderated by race/ethnicity and sex/gender is crucial. Indeed, while Seligman et al's research suggests that elevated BMI may not be in the pathway between FI and T2D, the extant literature on food insecurity and obesity is nevertheless a useful indication that the strength of the association between FI and a given health condition may vary by sub-population.

One notable study has already underscored the likelihood of a sub-population-specific association between FI and T2D. In 2011, Fitzgerald et al found that Latinas with very low food security were nearly 3.3 times more likely to have T2D than food secure Latinas.[15] This represents a much larger effect than that what Seligman et al found among the general, majority White population.

To our knowledge, there has not been another study to underscore the potential racial/ethnic or sex/gender contours of the association between FI and T2D. This is a significant oversight for a couple of reasons. First Black and Latino households have higher rates of food insecurity than witnessed in the general population; even within these racial sub-groups, Black women and Latinas have the highest rates of food insecurity.[16] Second, Black and Latino men and women have some of the highest rates of T2D in the nation. Per recent CDC analyses, 9.9% of Black women, 9.2% of Black men, 9.9% of Mexican American men, 9.6% of Mexican American women were diabetic in 2014. This is compared with 6.3% of White men and 5.3% of White women respectively.[17,18] While Mexican is not synonymous with Latino, the available data from the Centers for Disease Control and Prevention did not have data on the rates of diabetes among Latino men and women in the aggregate. We chose Mexican American data since most Latinos in our state (California) are Mexican (see: "The Hispanic Population: 2010-Census" http://www.census.gov/prod/cen2010/briefs/c2010br-04.pdf)

The higher rates of FI and the greater prevalence of T2D disease burden in some sub-populations, combined with evidence that the relationship between FI and chronic illness is likely moderated by race/ethnicity and sex/gender, suggest that studies of population specific-variation of the FI-T2D link are necessary. Researchers have routinely demonstrated that race/ethnicity and sex/gender, "jointly and simultaneously structure the production and maintenance of health in the United States."[19,20] Moreover, studies have shown that for many chronic illnesses, including T2D, the established relationships between distal and proximate causes and health effects differ by race/ethnicity and sex/gender.[19,20]

Testing the differential association between FI and chronic disease by race/ethnicity and sex/gender not only permits a better understanding of the well-recognized racial/ethnic disparities in health outcomes; it may also help inform population-specific interventions. In this study we use an intersectional approach to examine the association between FI and T2D among subgroups disaggregated by race/ethnicity and sex/gender. We hypothesized that there would be a statistically significant race/ethnicity by sex/gender by food security interaction with regard to prevalence of diabetes mellitus. Further, we hypothesized that the relationship would be stronger among women than men, and among women of color than among White women, given these groups' higher rates of FI and T2D.

## Methods

### Data Source

The California Health Interview Survey (CHIS) is a random-digit dial telephone survey of households in California, designed to provide an in-depth portrait of health profiles of California's diverse population. CHIS is the largest state-based health survey in the United States. The survey began in 2001, and until 2009, survey data were collected biennially. Since 2011, survey data have been collected continuously throughout a two-year data cycle.

We used data from the CHIS 2009 and 2011 publicly available adult data files (49,811 and 44,559 records, respectively). We combined the datasets to have sufficient representation of racial/ethnic minorities for our analyses. CHIS only collets data on food insecurity among adults at or below 200% of the federal poverty level; thus, we included this group most at-risk of food insecurity (n=27,798), and further excluded any women who self-identified as pregnant since they may be at risk of gestational diabetes (n=181) and

persons stating that they had type 1 diabetes (n=717). We also excluded 4304 individuals who identified as Asian American, or Native American (due to small sample sizes), or "mixed race," which does not specify which races comprised the individuals' identity. Our final sample size was 22,596 (Black=1486, Latino =10,118, and White=10,992). Response rates from 2009 and 2011 were 17.7% and 17.0% (landlines) and 10.8% and 18.3% (cell phones), respectively.

### Measures

Food insecurity was evaluated using the 6-item short form US Household Food Security Module. This scale measures level of food security in the household over the past 12 months; six items assess: the adequacy of the food budget; the quantity of food they could afford; if the food they could afford was sufficient to last until they had money to purchase more; and the nutritional quality of the food purchased. Response options varied across the six items. Responses of "sometimes true," "often true," "some months but not every month," "almost every month," and "yes" were coded as affirmative (ie, 1). For each respondent, a score of 0-6 was generated by adding the affirmative responses. Using the US Department of Agriculture's guidelines, scores of 0-1=food secure, 2-4=low food security, and 5-6=very low food security.

Our binary outcome variable for this study was type 2 diabetes. Respondents were asked to report if a physician had ever told them they had diabetes or sugar diabetes (yes/no).

Study covariates included: age in years (18-30, 31-44, 45-65, >65), educational attainment (less than high school, high school, some college, college), employment status (full-time (21+ hrs/wk), part-time (0-20 hrs/wk), employed, not at work, unemployed and looking, unemployed and not looking), marital status (married, living w/ partner, widowed/ divorced/ separated, never married), currently insured (yes/no), doctor's visit in the past year (yes/no), % of poverty level (<50%, 50%-100%, 100.1%-130%, >130.1%), family type (single adult 21+, single young adult 19-20, married no kids, married with kids, single 18 yrs old), and BMI (underweight 0-18.49, normal weight 18.5-24.9, overweight 25-29.9, obese 30+).

### Analysis

We used multivariate logistic regression to examine the association between study variables, adjusting for the covariates above. To test whether the association between food insecurity and diabetes differed by race/ethnicity and sex/gender, we included a 3-way interaction term. We present results stratified by race/ethnicity and sex/gender. All analyses were conducted using SAS version 9.3 (Cary, NC).

## Results

After restricting to Black, White, and Latino individuals at or below 200% of the federal poverty level and excluding individuals who were pregnant, had type 1 diabetes, or were missing data on the relevant exposure and relevant covariates, 22,596 individuals were available for analyses. The prevalence of food insecurity was 42%; 16% reported very low food security (Table 1). Nine percent of the sample reported having diabetes, which is consistent with national estimates.[21] Latino men and women were the least likely to be aged >65 years, currently insured, had visited a doctor in the past year, or to have attended college (Table 1). Compared with White women, Latinas and Black women were more likely to work full-time and have BMI > 30. Two-thirds of Latinas reported being foreign born, compared to 8-10% of White and Black women. Black women were the least likely to be married and reported the highest prevalence of diabetes. Among men, Latinos were more likely work full-time, be married, or have BMI > 25 and reported a slightly higher prevalence of diabetes compared to White and Black men.

The oldest (aged >65 years) and youngest (aged 18-30 years) participants reported greater food security compared with middle-aged adults (Table 2). Both Black and Latino participants reported high levels of food insecurity (44%-45%) with Black participants reporting higher prevalence of very low food security and Latino participants reporting higher prevalence of low food security. Participants with higher education, who were never married, born in the United States, currently insured, or reported being >130% above the poverty level were more likely to report being food secure. Overweight and obese participants were less likely to report being food secure compared with normal weight participants.

Because a significant interaction *(*$P<.1$) was found among food security status, race/ethnicity, and sex/gender in predicting type 2 diabetes

**Table 1. Distribution of sociodemographic and health-related characteristics of study participants by sex and race, (CHIS) 2009 and 2011 (N=22,596)**

| | | Women | | | Men | | |
|---|---|---|---|---|---|---|---|
| **Sociodemographic indicators** | **Total** | **White** | **Black** | **Latina** | **White** | **Black** | **Latino** |
| Age, years, % | | | | | | | |
| 18-30 | 31 | 25 | 32 | 31 | 33 | 27 | 33 |
| 31-44 | 29 | 18 | 17 | 35 | 31 | 24 | 34 |
| 45-65 | 28 | 30 | 32 | 25 | 21 | 39 | 27 |
| >65 | 12 | 27 | 19 | 9 | 15 | 10 | 6 |
| Education, % | | | | | | | |
| <High school | 36 | 12 | 15 | 49 | 12 | 27 | 48 |
| High school | 31 | 34 | 32 | 26 | 37 | 31 | 32 |
| Some college | 23 | 37 | 41 | 19 | 31 | 31 | 14 |
| College | 10 | 17 | 12 | 6 | 20 | 11 | 6 |
| Foreign born, % | | | | | | | |
| No | 53 | 90 | 92 | 33 | 92 | 93 | 30 |
| Yes | 47 | 10 | 8 | 67 | 8 | 7 | 70 |
| Health insurance, % | | | | | | | |
| No | 34 | 19 | 15 | 35 | 32 | 37 | 42 |
| Yes | 66 | 81 | 85 | 65 | 68 | 63 | 58 |
| Marital status, % | | | | | | | |
| Married | 40 | 32 | 15 | 45 | 33 | 18 | 48 |
| Living w/ partner | 11 | 9 | 8 | 12 | 11 | 6 | 12 |
| Widowed/divorced/separated | 20 | 36 | 35 | 20 | 19 | 20 | 8 |
| Never married | 29 | 22 | 42 | 23 | 37 | 55 | 31 |
| Poverty level, % | | | | | | | |
| <50% | 16 | 12 | 17 | 18 | 15 | 19 | 15 |
| 50.1-100% | 31 | 26 | 27 | 37 | 23 | 34 | 32 |
| 100.1-130% | 17 | 18 | 15 | 17 | 14 | 17 | 18 |
| >130% | 36 | 44 | 41 | 27 | 48 | 30 | 35 |
| Work status, % | | | | | | | |
| Full-time, ≥21 hrs/wk | 40 | 24 | 33 | 34 | 40 | 40 | 60 |
| Part-time, 0-20 hrs/wk | 10 | 13 | 8 | 12 | 10 | 8 | 7 |
| Employed, not at work | 0.6 | 0.5 | 0.4 | 0.6 | 0.6 | 0.2 | 0.6 |
| Unemployed, looking | 14 | 12 | 16 | 13 | 16 | 14 | 16 |
| Unemployed, not looking | 34 | 50 | 43 | 41 | 34 | 38 | 17 |
| Health-related indicators | | | | | | | |
| BMI, % | | | | | | | |
| Underweight | 2 | 3 | 1 | 2 | 2 | 1 | 1 |
| Normal weight | 32 | 44 | 32 | 30 | 36 | 42 | 25 |
| Overweight | 35 | 29 | 29 | 34 | 37 | 31 | 42 |
| Obese | 31 | 24 | 38 | 34 | 25 | 26 | 32 |
| Doctor visit in past year, % | | | | | | | |
| No | 27 | 17 | 14 | 21 | 31 | 34 | 38 |
| Yes | 73 | 83 | 86 | 79 | 67 | 66 | 62 |
| Food security | | | | | | | |
| Secure | 58 | 65 | 58 | 54 | 64 | 54 | 58 |
| Low food security | 26 | 18 | 20 | 31 | 20 | 27 | 28 |
| Very low food security | 16 | 17 | 22 | 15 | 16 | 19 | 14 |
| Diabetes, % | | | | | | | |
| No | 91 | 92 | 88 | 91 | 93 | 92 | 90 |
| Yes | 9 | 8 | 12 | 9 | 7 | 8 | 10 |

(wald chi-sq=13.0840, P=.0109), results are presented stratified by sex/gender and race/ethnicity in Table 3. Food insecurity was associated with a 90% increase in the odds of diabetes among White men. Very low food security was associated with a 70% increase in the odds of diabetes among White women and an 80% increase in the odds of diabetes among Latinas. These associations did not appreciably change after further adjusting for BMI. We did not observe any associations between food insecurity and diabetes among Black men or women or Latino men.

## Discussion

Food insecurity (FI) was significantly correlated with risk of diabetes (T2D) for Latinas and White women and men in the sample, but not Latino men or African American men or women. BMI did not significantly attenuate the results. This builds on the work of Seligman et al, which similarly suggests that BMI may not mediate the relationship between FI and T2D. It moreover speaks to new research indicating that BMI may not be the best tool for measuring metabolic health.[22]

Previous research has demonstrated an association between food insecurity and both T2D and gestational diabetes.[4,5,23] However, the majority of the literature has not examined the relationship between food security status and T2D for specific racial-sex subpopulations. Fitzgerald et al[15] proves a noted exception. However, it does not address variability in the link between FI and T2D across racial/ethnic and sex/

gender sub-populations. The clinic-based sample was also not generalizable to other populations or areas.

Few studies have considered the role of either race/ethnicity *or* sex/gender in the link between FI and T2D. One study examined the relationship between FI and T2D among men and women in Canada and found a stronger association among women.[24] To our knowledge, this is the only study to consider the specific role of sex —independent of race or ethnicity—undertaken in North America.

A recent study by Ding et al[25] showed that food insecure men were more likely than food insecure women or food secure men to have undiagnosed pre-diabetes. The authors suggested that men and women in poverty have different coping strategies, and that men may have higher rates of chronic illness than the data show. These findings suggest that there may be potential under-diagnosis of diabetes among men in our study, particularly among those who are poorest and most indigent (ie, those of very low food security). This could explain the lack of association between very low food security and T2D witnessed among White men, as well as Black and Latino men. There are, to date, no published studies using a racial analysis of the relationship between diabetes and food security; and our study is the first to employ a racial/ethnic and sex/gender analysis of the link between food insecurity and type 2 diabetes.

Our finding that the relationship between FI and diabetes may be moderated by race and sex is significant. Blacks and Latinos have significantly higher rates of both food insecurity

**Table 2. Distribution of sociodemographic characteristics of study participants by food security level, (CHIS) 2009 and 2011 (N=22,596)**

| Sociodemographic indicators | Food secure (58%) | Low food security (26%) | Very low food security (16%) | P |
|---|---|---|---|---|
| Age, % | | | | |
| 18-30 | 63 | 23 | 14 | <.0001 |
| 31-44 | 49 | 32 | 19 | |
| 45-65 | 53 | 28 | 19 | |
| >65 | 80 | 14 | 6 | |
| Sex, % | | | | |
| Men | 59 | 26 | 15 | .2 |
| Women | 57 | 26 | 16 | |
| Education, % | | | | |
| <High school | 50 | 33 | 17 | <.0001 |
| High school | 63 | 23 | 14 | |
| Some college | 60 | 23 | 17 | |
| College | 71 | 16 | 13 | |
| Foreign-born, % | | | | |
| No | 62 | 20 | 16 | <.0001 |
| Yes | 52 | 33 | 15 | |
| Race/ethnicity, % | | | | |
| White | 64 | 19 | 17 | <.0001 |
| Black | 56 | 23 | 21 | |
| Latino | 55 | 30 | 15 | |
| Marital status, % | | | | |
| Married | 58 | 28 | 14 | <.0001 |
| Living w/ partner | 46 | 34 | 19 | |
| Widowed/divorced/separated | 56 | 24 | 19 | |
| Never married | 64 | 21 | 15 | |
| Poverty level, % | | | | |
| <50% | 49 | 31 | 20 | <.0001 |
| 50.1-100% | 52 | 29 | 19 | |
| 100.1-130% | 59 | 26 | 15 | |
| >130% | 67 | 21 | 12 | |
| Work status, % | | | | |
| Full-time, ≥21 hrs/wk | 57 | 28 | 15 | <.0001 |
| Part-time, 0-20 hrs/wk | 54 | 29 | 17 | |
| Employed, not at work | 41 | 25 | 34 | |
| Unemployed, looking | 51 | 27 | 22 | |
| Unemployed, not looking | 63 | 23 | 14 | |
| Health-related indicators | | | | |
| BMI, % | | | | |
| Underweight | 64 | 21 | 15 | <.0001 |
| Normal weight | 64 | 23 | 13 | |
| Overweight | 57 | 27 | 16 | |
| Obese | 54 | 28 | 18 | |
| Diabetes, % | | | | |
| No | 56 | 26 | 15 | <.1 |
| Yes | 51 | 31 | 18 | |
| Doctor visit in past year, % | | | | |
| No | 56 | 27 | 16 | .4 |
| Yes | 59 | 26 | 15 | |
| Health Insurance, % | | | | |
| No | 52 | 29 | 19 | <.0001 |
| Yes | 61 | 24 | 14 | |

**Table 3. Odds ratios and 95% CI estimating the association between food security level and diabetes by sex and race. CHIS, 2009 and 2011 (N=22,596)**

| | Women | | | Men | | |
|---|---|---|---|---|---|---|
| | White | Black | Latina | White | Black | Latino |
| | n=7273 | n=1011 | n=6307 | n=3719 | n=475 | n=3811 |
| Model 1[a] | | | | | | |
| Food security level | | | | | | |
| Secure | 1 | 1 | 1 | 1 | 1 | 1 |
| Low food security | .8 (.6-1.1) | 1.4 (.8-2.5) | 1.6 (1.2-2.0)[d] | 1.1 (.7-1.8) | 2.3 (.9-5.6) | 1.5 (.9-2.5) |
| Very low food security | 1.0 (.6-1.5) | 1.2 (.6-2.3) | 1.7 (1.2-2.4)[d] | .5 (.3-.7)[d] | .2 (.02-1.6) | 2.0 (1.3-3.1) |
| Model 2[b] | | | | | | |
| Food security level | | | | | | |
| Secure | 1 | 1 | 1 | 1 | 1 | 1 |
| Low food security | 1.2 (.8-1.6) | 1.2 (.7-2.2) | 1.8 (1.4-2.4)[d] | 1.9 (1.2-3.1)[d] | 1.6 (.5-5.9) | 1.3 (.8-2.0) |
| Very low food security | 1.7 (1.1-2.6)[d] | 1.5 (.7-3.2) | 1.8 (1.3-2.7)[d] | .8 (.4-1.5) | .1 (.02-1.0) | 1.6 (.9-2.6) |
| Model 3[c] | | | | | | |
| Food security level | | | | | | |
| Secure | 1 | 1 | 1 | 1 | 1 | 1 |
| Low food security | 1.1 (.8-1.4) | 1.2 (.6-2.1) | 1.8 (1.3-2.3)[d] | 1.8 (1.1-2.8)[d] | 2.0 (.5-6.8) | 1.3 (.8-2.0) |
| Very low food security | 1.6 (1.1-2.4)[d] | 1.4 (.7-2.9) | 1.8 (1.2-2.6)[d] | .8 (.4-1.5) | .2 (.02-1.4) | 1.6 (.9-2.6) |

a. Model 1 is unadjusted.
b. Model 2 is adjusted for education, work status, marital status, currently insured, foreign born, doctor's visits in past year, and poverty level.
c. Model 3 additionally adjusted for BMI.
d. Significant.

and diabetes than Whites. While the national average of food insecurity is 14.3%, 23.7% of Latino and 26.1% of Black households are food insecure.[3,26] In addition, nearly 25% of all Black women and Latinas were food insecure, compared with 11.1% of White women, according to the last Women's Health USA survey.[26,27]

Moreover, recent CDC data show that, among adults aged >20 years, 13.2% of Blacks and 12.8% of Latinos were diagnosed as diabetic, compared with 7.6% of Whites.[21] While the prevalence of diabetes among White women and Black women was lower than their male counterparts, Latinas had a slightly higher prevalence of diabetes than Latino men. The preponderance of both food insecurity and diabetes among women and men of color — in tandem with the effect modifications by race and sex our analyses generated—indicate that tailored interventions for racial/gendered sub-populations may be optimal.

The finding that food insecurity has the strongest association with diabetes among Latinas suggests the significance of food affordability for health outcomes in this population. Studies have shown that for Latino men and women, rates of diabetes increase with longer tenure in the United States; elevations in BMI could not explain these findings.[28,29] Our research suggests that alongside acculturation,[29] one barrier to better health outcomes for Latinos may be poverty and the unaffordability of nutritious food. Additionally, poverty is a recognized social stressor and has been associated with increased levels of psychological distress[30] and may contribute to the development of biological perturbations that increase diabetes risk.[31,32] Given that we found no relationship between food insecurity and diabetes for Latino men, it may be that Latinas, due to sex role socialization, have an added responsibility as procurers and preparers of food for the household. Although there is limited research on sex-role socialization by race, one review suggests that, while contested, several studies indicate that Hispanic/Latino families may be more traditional than either Whites or Blacks. Black women were shown to have the least traditional and most sex-egalitarian attitudes related to family structure.[33] Thus, Latinas may be sacrificing healthy food options, or meals altogether, in ways that jeopardize health and glycemic control.

Among Whites, the finding that only women with very low food se-

curity and men with low food security had elevated odds of T2D may be explained by various factors. Ding et al[25] suggests that White men may have elevated rates of undiagnosed diabetes, which are confounding the results. An alternative explanation is differences in the coping mechanisms between men and women who are food insecure. Studies, which include a preponderance of White participants, suggest that women who live in households with low food security or very low food security may access services such as the Supplemental Nutrition Assistance Program (SNAP), and purchase more palatable foods.[23,34] Men are less likely to access these services. Therefore, while White men from food insecure households may have at least enough money to access salt-and-sugar-laden items to sate themselves, they may be forgoing meals altogether.

*Food insecurity (FI) was significantly correlated with risk of diabetes (T2D) for Latinas and White women and men in the sample, but not Latino men or African American men or women.*

We found no association between FI and T2D among African Americans. Studies show that African Americans report more stress exposure compared with Whites (differential exposure hypothesis). It could be that there are multiple insults that especially poor African Americans experience, and FI may not be the most compelling. For example, studies show that low-income Blacks, when compared with their White counterparts, are more likely to live in hyper-segregated communities and have higher rates of type-2 diabetes than poor Whites.[35–37] There may be several stressors associated with being a poor and residentially isolated Black person in America that contributes to rates of type 2 diabetes. Further research is needed to identify additional upstream social, environmental, and economic factors that may contribute to rates of type 2 diabetes for African Americans.

## Limitations

CHIS is a California-based random-digit dial survey of population health. Low response rates for the years included in this study limit generalizability. Additionally, our results are not generalizable to the US population since CHIS only samples the California population. Due to sample size restrictions, we were not able to include Asian Americans/Pacific Islanders or Native Americans in our analysis. For Native populations in particular, while the data are scant, some studies suggest native groups have higher rates of food insecurity and diabetes than African Americans and Latinas.[38,39] However, given the wide variability of tribes, regionally and culturally, these data do not provide a holistic portrait of health in these varied communities. Nevertheless, they suggest that investigations into food insufficiency in Native populations is needed.

### Conflict of Interest

No conflicts of interest to report.

### Author Contributions

Research concept and design: Strings, Ranchod, Laraia, Nuru-Jeter; Acquisition of data: Strings; Data analysis and interpretation: Strings, Ranchod, Laraia, Nuru-Jeter; Manuscript draft: Strings, Ranchod, Laraia, Nuru-Jeter; Statistical expertise: Ranchod, Nuru-Jeter; Administrative: Strings; Supervision: Strings, Ranchod, Laraia, Nuru-Jeter.

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