Comparative Analysis of Food Insecurity Among Immigrants and the U.S.-Born: Insights from the National Health and Nutrition Examination Surveys

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Abstract

This study employs a comparative analysis to explore the factors influencing food insecurity among immigrants versus U.S.-born citizens, utilizing data from the National Health and Nutrition Examination Surveys (NHANES). Food insecurity, a significant public health issue, affects approximately 20.7% of the immigrant population in the U.S., indicating a critical area of concern. This study reveals that non-citizenship, race/ethnicity, lower education levels, and limited English proficiency are strongly associated with increased food insecurity among immigrants. Notably, Mexican Americans and other Hispanic groups face disproportionately higher risks compared to non-Hispanic Whites.

The findings emphasize the substantial impact of socioeconomic and health-related variables on food insecurity, with poverty index ratios and citizenship status being potent determinants. Immigrants exhibit unique vulnerabilities, such as higher food insecurity rates and different risk profiles compared to their U.S.-born counterparts, highlighting the need for targeted interventions. The results from this study suggest that the intersectionality of immigration status, race/ethnicity, and socioeconomic factors complicates the food insecurity landscape, necessitating comprehensive public health strategies tailored to these dynamics.

Introduction

Food security, as defined by the United States Department of Agriculture (USDA), is a household-level economic and social condition of having consistent access to adequate food. Conversely, food insecurity occurs when this access is limited or uncertain, affecting not only nutrient intake but also increasing the risk of chronic illnesses such as depression, anxiety, diabetes, and hypertension (Gundersen & Ziliak, 2015). Despite its critical role in health and socioeconomic stability, food insecurity remains a significant public health burden, with approximately 17 million U.S households experiencing it at some point during 2022 (*USDA ERS - Definitions of Food Security*, n.d.).

The gradual increase in the United States population, primarily due to net immigration post-COVID-19, is expected to exacerbate this issue (Frey, 2023). Immigrants, in particular, face unique challenges such as cultural differences, legal status, and socioeconomic factors, which can impede their access to adequate food (Greenwald & Zajfen, 2017). These challenges are compounded by a lack of differentiation among immigrant subgroups in current research, which often fails to consider factors like place of origin, duration of residence, and specific immigration status (Myers & Painter, 2017).

Moreover, while some studies have begun to explore the intersectionality of risk factors for food insecurity, including income, education, and immigration status, comprehensive data remains scarce (Altman et al., 2020). This is further complicated by geographical variations and the distinct challenges of urban versus rural settings (Srivastava & Muhammad, 2022). Notably, existing research consistently finds immigrants at a higher risk of food insecurity due to factors such as income instability and low enrollment in safety net programs (Maynard et al., 2019).

Non-citizenship emerges as a significant risk factor, with structural racism and stigma potentially leading to higher rates of food insecurity among immigrants (Sharareh et al., 2023). These issues are exacerbated by financial constraints, language barriers, and limited knowledge of available resources (Carney & Krause, 2020). Despite these findings, no study to date has utilized nationally representative data, such as the National Health and Nutrition Examination Survey, to explore the correlates of food insecurity among immigrants—a gap that this research aims to address.

To bridge the existing research gap, this study will leverage data from the National Health and Nutrition Examination Survey (NHANES)—a resource previously untapped in this context—to examine the factors contributing to food insecurity among immigrants. The following research questions will guide the investigation:

1. What is the **current prevalence** of food insecurity among immigrants in the United States?

2. Which **sociodemographic and health-related factors** are most strongly associated with food insecurity in this group?
3. In what ways do the risk factors for food insecurity **contrast between immigrants and native-born U.S. citizens?**

By delving into the specific risk factors faced by immigrants, this study seeks to shed light on the complex nature of food insecurity within this demographic, contrasting it with the experiences of U.S.-born citizens. Understanding these unique challenges is vital for crafting nuanced public health policies and interventions designed to enhance the well-being of all individuals, particularly the most vulnerable (Haro-Ramos & Bacong, 2022). This comparative approach aims not only to identify distinct vulnerabilities and strengths within immigrant populations but also to place them within the broader context of food security in the United States.

Methods

Data Source and Participants

This cross-sectional study utilizes data from the 2009-2018 National Health and Nutrition Examination Survey (NHANES), conducted by the Centers for Disease Control and Prevention (CDC). NHANES is an annual survey that combines interview data and physical examinations to provide prevalence data, monitor trends, and explore public health needs across the United States. The survey employs a stratified, multistage probability design to

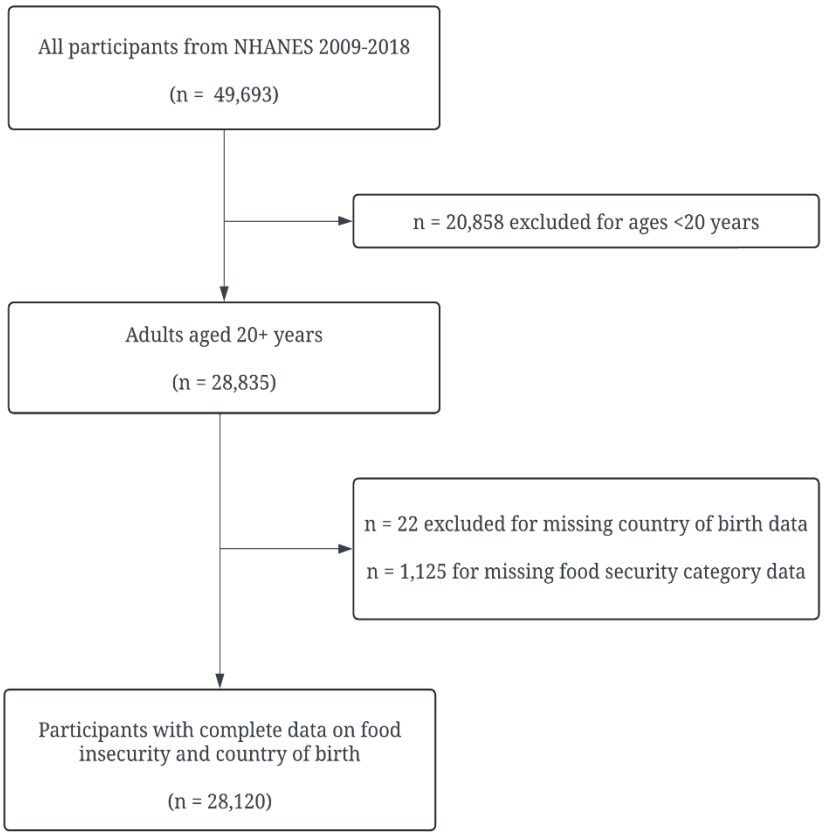

Figure 1. Flow chart of inclusion and exclusion criteria for the study sample.

select a sample representative of the civilian noninstitutionalized U.S. population of all ages. To ensure the production of reliable statistics, NHANES intentionally over-samples certain subpopulations, including persons 60 and older, African Americans, and Hispanics, due to ensure adequate sample sizes for more precise estimates in these groups (*NHANES - About the National Health and Nutrition Examination Survey*, 2023).

For this study, immigrants are defined as individuals who were not U.S. citizens at birth. The dataset was refined to include only adults aged 20 years and older, excluding 22 individuals missing country of birth data and 1,125 individuals missing food security category data. The final analytic sample comprised 28,120 participants.

Measures

Outcome

Food insecurity was measured using the using the US Food Security Survey Module (US FSSM), a validated adult food security scale that is the gold standard for measuring food security on a national level. Responses to the 10 FSSM questions about adult food security were categorized into four response levels based on the number of affirmative responses to FSSM questions.

Table 1. U.S. Food Security Survey Module (FSSM) Adult Food Security Classification

Number of affirmatives	Food Security Status
0 responses	Full Food Security
1 to 2 responses	Marginal Food Security
3 to 5 responses	Low Food Security
6 to 10 responses	Very Low Food Security

To simplify the analysis and facilitate the investigation of factors associated with food security, the food security categories combined into two broader groups:

1. Food Secure: This category merged the "Adult Full Food Security" and "Adult Marginal Food Security" categories. households with affirmative responses ranging from 0 to 2 were considered food secure.

2. Food Insecure: This category combined the "Adult Low Food Security" and "Adult Very Low Food Security" categories Households were considered food insecure if their raw food security score ranged from 3 to 10.

Table 2. Reclassification of Food Security Status as Food Secure and Food Insecure Categories

Number of affirmatives	Food Security Status
0 to 2 responses	Food Secure
3 to 10 responses	Food Insecure

Exposure

The primary exposure variable is the immigration status of the individual, which is determined based on the country of birth variable from the National Health and Nutrition Examination Survey (NHANES). This variable categorizes individuals into two groups: those born in the United States (including the 50 states and Washington, DC) and immigrants. Specifically, individuals who were born in the 50 U.S. states or Washington, DC are classified as U.S.-born. On the other hand, individuals born in Mexico, other Spanish-speaking countries , and other non-Spanish speaking countries are classified as immigrants.

Covariates

A comprehensive array of individual and household-level sociodemographic and health characteristics were incorporated into the study analysis. Demographic factors encompassed gender (male or female), age, racial/ethnic identity (non-Hispanic White, non-Hispanic Black/African American, Hispanic, or non-Hispanic other race), citizenship status, household size, educational attainment (<high school diploma, high school diploma, some college or 2-year degree, or > college degree), the length of time in the United States, and marital status (never married, separated or spouse not present, divorced, widowed, or married or cohabiting). Socioeconomic indicators are comprised of ratio of family income to poverty threshold, poverty index ratios, health insurance status (insured vs. uninsured within the past year) and the language used during the interview. Poverty Income ratio (PIR) was calculated by dividing family income by a poverty threshold (determined by

the U.S. Census Bureau) specific to family size. A PIR below 1.00 or 100 % indicates that the income for the respective family is below the official definition of poverty, while a ratio of 1.00 or greater indicates income above the federal poverty level.

Statistical Approach

Descriptive statistics summarized sociodemographic characteristics across food security categories and nativity status. The prevalence of food insecurity among immigrants was calculated as the proportion of immigrant respondents reporting food insecurity. Chi-square tests compared the prevalence between immigrants and U.S.-born citizens. Univariate linear regression models for continuous variables and chi-square tests for categorical variables examined differences in participant characteristics across food security status categories. Variables were selected for model inclusion based on significance in univariate analyses ($p < 0.05$) and relevance to the research questions. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for each variable.

To prevent collinearity in logistic regression models, Spearman correlation coefficients were calculated using the PROC CORR procedure in SAS 9.4. Correlation coefficients >0.7 indicated collinearity. In such cases, one of the correlated predictors was removed to maintain model accuracy. Interaction terms between immigration status and other variables were included in logistic regression models to compare risk factors for food insecurity. The significance of interaction terms was assessed using Wald tests, which determine the impact of specific variables within the model.

Results

Prevalence of Food Insecurity Among Immigrants

The analysis of NHANES data from 2009–2018 reveals a striking figure: 20.7% of immigrants in the United States experience food insecurity. This significant portion underscores the critical public health issue at hand, setting the stage for a deeper examination of the factors that contribute to this vulnerability.

Sociodemographic Influences on Food Insecurity Among Immigrants

The examination of sociodemographic characteristics associated with food insecurity among immigrants revealed several critical insights. While gender did not show a statistically significant difference in the odds of food insecurity (OR=1.031, p=0.5708), race and ethnicity emerged as significant factors. Specifically, Mexican Americans (OR=5.210, p<.0001) and Other Hispanics (OR=4.578, p<.0001) faced notably higher odds of food insecurity compared to Non-Hispanic Whites. The analysis also underscored the protective effect of higher education levels against food insecurity (Table 2), with the most pronounced benefit observed among those holding a college degree or higher (OR=0.116, p<.0001).

Notably, non-citizens exhibited significantly higher odds of food insecurity (OR=2.108, p<.0001), underscoring the impact of citizenship status. Additionally, the poverty index ratio was inversely related to food security, with lower ratios indicating higher odds of food insecurity (OR=0.463, p<.0001). Language proficiency also played a critical role; immigrants interviewed in Spanish had higher odds of facing food insecurity (OR=4.153, p<.0001). Health coverage did not provide protection against food insecurity, suggesting the complexity of factors influencing food security status among immigrants.

Comparative Analysis Between Immigrants and U.S.-born Citizens

A comparative analysis further highlighted distinct risk factors for food insecurity between immigrants and U.S.-born citizens (Table 6). While gender differences were not significant in influencing food insecurity across both groups, age and education level demonstrated a clear correlation. Younger U.S.-born citizens, in particular, exhibited higher odds of food insecurity compared to older age groups, a pattern not as evident among immigrants. This suggests age-related vulnerabilities specific to the U.S.-born population.

Moreover, the significant protective effect of higher education levels against food insecurity was consistent across both groups, emphasizing the universal benefit of education. Language

proficiency, particularly being interviewed in Spanish, significantly heightened the odds of food insecurity among immigrants (OR=1.567, p<.0001), highlighting language as a barrier to food security.

Interaction Effects and Their Implications

The analysis of interaction effects between sociodemographic characteristics and immigration status on food insecurity revealed intricate patterns (Table 7). Notably, the interaction terms between race/ethnicity and immigration status showed that being Mexican American (Log Odds=0.5396, p<.0001) or Other Hispanic (Log Odds=0.3738, p<.0001) significantly altered the odds of food insecurity for immigrants, underscoring the intersection of race/ethnicity with immigration status in shaping food security outcomes. Age group interactions with immigration status further illuminated age-specific vulnerabilities, with younger immigrants experiencing differentially higher risks.

Education level interactions, though less pronounced, hinted at the nuanced role of education in mitigating food insecurity risks, particularly among immigrants. The interaction between poverty index ratio and immigration status underscored the exacerbated impact of economic hardship on immigrants, amplifying food insecurity risks.

Discussion

This study utilized data from the National Health and Nutrition Examination Survey (NHANES) to explore the factors associated with food insecurity among immigrants in the United States. The findings revealed a prevalence of food insecurity among immigrants of 20.7%, with several sociodemographic and health-related characteristics significantly associated with higher rates of food insecurity. These included race and ethnicity, education level, citizenship status, poverty index ratio, interview language, and health insurance status. A comparative analysis also highlighted differences in risk factors for food insecurity between immigrants and U.S.-born citizens.

The results of this study contribute to the existing body of literature on food insecurity among immigrants in the United States. The findings align with previous research indicating that immigrants are at a higher risk of food insecurity, often attributed to income instability and low enrollment in safety net and federal nutrition programs (Alarcão et al., 2020). The study further illuminates the specific risk factors encountered by immigrants, providing a nuanced understanding of the multifaceted nature of food insecurity within this demographic.

The study's findings underscore the importance of considering various sociodemographic and health-related characteristics when examining food insecurity among immigrants. For instance, the study found that race/ethnicity plays a significant role in food insecurity, with Mexican Americans and Other Hispanics having significantly higher odds of food insecurity compared to Non-Hispanic Whites. This aligns with previous research highlighting the impact of race and ethnicity on food insecurity (Sharareh et al., 2023).

Education level also emerged as a significant factor, with those having less education facing higher odds of food insecurity. This finding is consistent with existing literature that has identified low education level as a risk factor for food insecurity (Carney & Krause, 2020). Furthermore, the study found that non-citizens had significantly higher odds of food insecurity compared to citizens, highlighting the impact of citizenship status on food insecurity.

While this study provides valuable insights, it is not without limitations. As noted by Myers & Painter, studies frequently lack differentiation among immigrant subgroups, neglecting critical factors such as place of origin, duration of residence, and specific immigration status. This study attempted to address this gap by including a range of sociodemographic characteristics in the analysis. However, the intersectionality of risk factors—including income, education, and immigration status—and their cumulative impact on food insecurity remains an area for further exploration (Altman et al., 2020). Geographical variations, such as differences between regions and the distinct challenges of urban versus rural settings, were not considered in this study due to the lack of data resulting from the aggregation of a national survey. While more detailed geographic information may be more difficult to

obtain from a national survey, this would allow for a more nuanced understanding of the impact of geographical variations on food insecurity. For instance, urban and rural settings may present distinct challenges and resources that can significantly influence food security status as seen in a regional variability study performed by Guerrero et al. Urban areas may offer greater access to food banks and public transportation, while rural areas may have more opportunities for home gardening or farming. However, these areas may also present unique challenges such as higher living costs in urban areas or limited access to grocery stores in rural areas. Therefore, including geographic information in future surveys could provide valuable insights into the role of geographical variations in food insecurity among immigrants and U.S.-born citizens. This could further inform the development of targeted interventions and policies to address food insecurity in these specific contexts.

The findings of this study have significant implications for public health policies and interventions. By identifying the specific risk factors associated with food insecurity among immigrants, the study provides a foundation for the development of targeted strategies to address this issue. These could include initiatives to increase enrollment in safety net and federal nutrition programs, educational programs to improve nutritional knowledge and food literacy, and policies to address income instability among immigrants. This strategy has the potential to help immigrants overcome barriers associated with enrolling in these programs, including hampering of their naturalization process, language barriers and lack of knowledge about their eligibility (Koball et al., 2013). The comparative approach adopted in this study also highlights the need for interventions that are sensitive to the unique vulnerabilities and strengths within immigrant populations, contextualized within the broader landscape of food security in the United States.

Now more than ever, the current political and economic climate exacerbates challenges for immigrants, making the findings of this study especially relevant. Immigration policies and public sentiment towards immigrants can significantly influence their access to resources, including food security programs. In periods of restrictive immigration policies or heightened anti-immigrant rhetoric, immigrants may face increased barriers to accessing public assistance programs due to fears

of deportation or jeopardizing future citizenship applications (Conzo et al., 2021). This climate can deter immigrants from seeking assistance, thereby increasing their risk of food insecurity.

In conclusion, this study contributes to a deeper understanding of food insecurity among immigrants in the United States, highlighting the need for targeted public health interventions to address this significant issue. Further research is needed to explore the intersectionality of risk factors and their cumulative impact on food insecurity, the impact on long term health outcomes, and geographical variations in food security among immigrants.

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Tables

Table 2. Prevalence of sociodemographic characteristics of survey participants by food security status, 2009–2018 National Health and Nutrition Examination Surveys (n = 28, 120)

Characteristic	Food Secure (n=22,296, 79.2%) (n,%)	Food Insecure (n=5,824, 20.7%) (n,%)	P-value[a]	Total (n=28,120)
Gender				
Female	11414 (51.2)	3108 (53.4)	0.0031	14522 (51.6)
Male	10882(48.8)	2716 (46.6)		13598 (48.4)
Age				
20-29	3492 (15.7)	1172 (20.1)	<.0001	4664 (16.6)
30-39	3596 (0.2)	1131 (19.4)		4727 (16.8)
40-49	3632 (16.3)	1051 (18)		4683 (16.7)
50-59	3545 (15.9)	1001 (17.2)		4546 (16.2)
60-69	3796 (17)	930 (16)		4726 (16.8)
70-79	2490 (11.2)	393 (6.7)		2883 (10.3)
80+	1745 (7.8)	146 (2.5)		1891 (6.7)
Race/Ethnicity				
Mexican American	2816 (12.6)	1231 (21.1)	<.0001	4047 (14.4)
Other Hispanic	2031 (9.1)	861 (14.8)		2892 (10.3)
Non-Hispanic White	9358 (42.0)	1754 (30.1)		11112 (39.5)
Non-Hispanic White	4637 (20.8)	1471 (25.3)		6108 (21.7)
Other	3454 (15.5)	507 (8.7)		3961 (14.1)
Country of Birth				
Born in 50 US States or Washington, DC	15728 (70.5)	3868 (66.4)	<.0001	19596 (69.7)
Born in Mexico	5760 (25.8)	1755 (30.1)		7515 (26.7)
Born in Other Spanish Speaking Country	337 (1.5)	136 (2.3)		473 (1.7)
Born in Other Non-Spanish Speaking Country	471 (2.1)	65 (1.1)		536 (1.9)
Citizenship Status				
Citizen by birth or naturalization	19320 (86.7)	4581 (78.7)	<.0001	23901 (85)
Not a citizen	2923 (13.1)	1223 (21)		4146 (14.7)
Education Level				
Less than 9th grade	1801 (8.1)	1046 (18)	<.0001	2847 (10.1)
9th to 11th grade	2622 (11.8)	1175 (20.2)		3797 (13.5)
High school graduate/GED or equivalent	4835 (21.7)	1485 (25.5)		6320 (22.5)
Some college or AA degree	6753 (30.3)	1682 (28.9)		8435 (30.0)
College Graduate or above	6258 (28.1)	427 (7.3)		6685 (23.8)
Marital Status				
Married	11811 (53.0)	2217 (38.1)	<.0001	14028 (49.9)
Widowed	1861 (8.3)	422 (7.2)		2283 (8.1)
Divorced	2314 (10.4)	799 (13.7)		3113 (11.1)
Separated	618 (2.8)	3108 (53.4)		3726 (13.3)
Never married	3964 (17.8)	2716 (46.6)		6680 (23.8)
Living with partner	1645 (7.4)	713 (12.2)		2358 (8.4)
Poverty Index Ratio				
Mean (95% Confidence Interval)	2.54 (2.52-2.57)	1.21 (1.19-1.24)	<.0001	

Due to missing data, some demographic categories may not sum to the n indicated in column heading. Percentages may not sum to 100.0 % due to rounding.

* Likelihood ratio and t-statistics between food security category and covariates

Table 3. Prevalence of sociodemographic characteristics of survey participants by nativity, 2009–2018 National Health and Nutrition Examination Surveys (n = 28,120)

Characteristic	Born in the U.S (n=19,596, 69.7%) (n, %)	Born Outside the U.S (n=8,524, 30.3%) (n, %)	P-value[a]	Total (n=28,120)
Gender				
Female	10099 (51.5)	4423 (51.9)	0.5864	14522 (51.6)
Male	9497 (48.5)	4101 (48.1)		13598 (48.4)
Age				
20-29	3530 (18)	1134 (13.3)	<.0001	4664 (16.6)
30-39	3169 (16.2)	1558 (18.3)		4727 (16.8)
40-49	2945 (15)	1738 (20.4)		4683 (16.7)
50-59	3008 (15.4)	1538 (18)		4546 (16.2)
60-69	3178 (16.2)	1548 (18.2)		4726 (16.8)
70-79	2180 (11.1)	703 (8.2)		2883 (10.3)
80+	1586 (8.1)	305 (3.6)		1891 (6.7)
Race/Ethnicity				
Mexican American	1634 (8.3)	2413 (28.3)	<.0001	4047 (14.4)
Other Hispanic	862 (4.4)	2030 (23.8)		2892 (10.3)
Non-Hispanic White	10576 (54.0)	536 (6.3)		11112 (39.5)
Non-Hispanic White	5396 (27.5)	712 (8.4)		6108 (21.7)
Other	1128 (5.8)	2833 (33.2)		3961 (14.1)
Citizenship Status				
Citizen by birth or naturalization	19596 (100)	4305 (50.5)	<.0001	23901 (85.0)
Not a citizen	0	4146 (48.6)		4146 (14.7)
Education Level				
Less than 9th grade	790 (4.0)	2057 (24.1)	<.0001	2847 (10.1)
9th to 11th grade	2620 (13.4)	1177 (13.8)		3797 (13.5)
High school graduate/GED or equivalent	4925 (25.1)	1395 (16.4)		6320 (22.5)
Some college or AA degree	6754 (34.5)	1681 (19.7)		8435 (30)
College Graduate or above	4486 (22.9)	2199 (25.8)		6685 (23.8)
Marital Status				
Married	8904 (45.4)	5194 (60.9)	<.0001	14098 (50.1)
Widowed	1751 (8.9)	532 (6.2)		2283 (8.1)
Divorced	2489 (12.7)	624 (7.3)		3113 (11.1)
Separated	564 (2.9)	392 (4.6)		956 (3.4)
Never married	4184 (21.4)	1110 (13)		5294 (18.8)
Living with partner	1692 (8.6)	666 (7.8)		2358 (8.4)
Poverty Index Ratio				
Mean (95% Confidence Interval)	2.55 (2.52-2.57)	1.21 (1.19-1.24)	<.0001	

Due to missing data, some demographic categories may not sum to the n indicated in column heading. Percentages may not sum to 100.0 % due to rounding.

[a] Likelihood ratio and t-statistics between nativity status and covariates.

Table 4. Univariate Analysis Between Sociodemographic Characteristics and Food Insecurity Among Immigrants Using Logistic Regression

Sociodemographic Characteristic	Odds Ratio (95% CI)	P-value
Gender (Ref: Male)		
Female	1.031 (0.928, 1.146)	0.5708
Race/Ethnicity (Ref: Non-Hispanic White)		
Mexican American	5.210 (3.848, 7.053)	<.0001*
Other Hispanic	4.578 (3.373, 6.215)	<.0001*
Non-Hispanic Black	2.772 (1.972, 3.897)	0.0188*
Other (including multi-racial)	0.966 (0.702, 1.327)	<.0001*
Age Group (Ref: ≥60)		
20-29	1.163 (0.987, 1.971)	0.1629
30-39	1.149 (0.990, 1.333)	0.1828
40-49	0.950 (0.819, 1.102)	0.0231*
50-59	1.108 (0.954, 1.287)	0.5194
Education Level (Ref: Less than 9th grade)		
9th to 11th grade	0.655 (0.561, 0.765)	<.0001*
High school graduate/GED or equivalent	0.562(0.484, 0.653)	<.0001*
Some college or AA degree	0.416 (0.359, 0.483)	0.1966
College Graduate or above	0.116 (0.096, 0.141)	<.0001*
Citizenship Status (Ref: Citizen)		
Non-Citizen	2.108 (1.899, 2.340)	<.0001*
Years in the U.S	0.950 (0.926, 0.974)	<.0001*
Poverty Index Ratio	0.463 (0.438, 0.489)	<.0001*
Interview Language (Ref: English)		
Spanish	4.153 (3.732, 4.621)	<.0001*
Health Insurance Status (Ref: No Coverage)		
Has health coverage	2.338 (2.074, 2.637)	<.0001*

Table 5. Multivariate Analysis Between Sociodemographic Characteristics and Food Insecurity Among Immigrants Using Logistic Regression

Sociodemographic Characteristic	Odds Ratio (95% CI)	P-value
Gender (Ref: Male)		
Female	0.97 (0.843, 1.116)	0.6678
Race/Ethnicity (Ref: Non-Hispanic White)		
Mexican American	1.793 (1.175, 2.738)	0.0068
Other Hispanic	2.309 (1.524, 3.5)	<.0001*
Non-Hispanic Black	2.595 (1.686, 3.995)	<.0001*
Other (including multi-racial)	1.194 (0.802, 1.777)	0.3836
Age Group (Ref: ≥60)		
20-29	1.254 (0.974, 1.615)	0.0795
30-39	1.489 (1.19, 1.863)	0.0005*
40-49	1.182 (0.949, 1.471)	0.136
50-59	1.439 (1.16, 1.785)	0.0009*
Education Level (Ref: Less than 9th grade)		
9th to 11th grade	0.822 (0.665, 1.017)	0.0716
High school graduate/GED or equivalent	0.889 (0.717, 1.103)	0.2851
Some college or AA degree	0.834 (0.665, 1.047)	0.1180
College Graduate or above	0.514 (0.386, 0.684)	<.0001*
Citizenship Status (Ref: Citizen)		
Non-Citizen	1.086 (0.921, 1.281)	0.3278
Years in the U.S	1.016 (0.981, 1.053)	0.3713
Poverty Index Ratio	0.505 (0.448, 0.57)	<.0001*
Interview Language (Ref: English)		
Spanish	1.586 (1.264, 1.991)	<.0001*
Health Insurance Status (Ref: No Coverage)		
Has health coverage	1.063 (0.906, 1.246)	0.4550

Table 6. Comparative Analysis of Risk Factors for Food Insecurity Between Immigrants and U.S.-born Citizens

Sociodemographic Characteristic	Immigrant Odds Ratio (95% CI)	P-value	U.S Born Citizen OR (95% CI)	P-value
Gender (Ref: Male)				
Female	0.972	0.6947	1.075	0.1208
Race/Ethnicity (Non-Hispanic White)				
Mexican American	1.828	0.005	1.294	0.0032*
Other Hispanic	2.364	<.0001	1.334	0.0136*
Non-Hispanic Black	2.582	<.0001	1.278	<.0001*
Other (including multi-racial)	1.183	0.4064	1.568	<.0001*
Age Group (Ref: ≥60)				
20-29	1.246	0.0812	1.701	<.0001*
30-39	1.501	0.0003	2.140	<.0001*
40-49	1.200	0.097	2.405	<.0001*
50-59	1.453	0.0006	1.953	<.0001*
Education Level (Ref: Less than 9th grade)				
9th to 11th grade	0.820	0.0657	0.732	0.0048*
High school graduate/GED or equivalent	0.872	0.2104	0.632	<.0001*
Some college or AA degree	0.837	0.1215	0.593	<.0001*
College Graduate or above	0.505	<.0001	0.293	<.0001*
Poverty Index Ratio	0.529	<.0001	0.495	<.0001*
Interview Language (Ref: English)				
Spanish	1.567	<.0001	0.772	0.3064
Health Insurance Status (Ref: No Coverage)				
Has health coverage	1.049	0.555	1.308	<.0001*

Table 7. Interaction Effects Between Sociodemographic Characteristics and Immigration Status on Food Insecurity: Log Odds, Confidence Intervals, and Significance

Sociodemographic Characteristic	Log Odds	95% CI	P-value
Race/Ethnicity * Immigration Status (Non-Hispanic White)			
Mexican American	0.5396	(0.3983, 0.6809)	<.0001*
Other Hispanic	0.3738	(0.1927, 0.5549)	<.0001*
Non-Hispanic Black	-0.1201	(-0.3074, 0.0673)	0.2092
Other (including multi-racial)	-1.0579	(-1.2481, -0.8677)	<.0001*
Age Group * Immigration Status (Ref: ≥60)			
20-29	-0.6600	(-0.8539, -0.466)	<.0001*
30-39	-0.5860	(-0.7696, -0.4025)	<.0001*
40-49	-0.7515	(-0.9364, -0.5665)	<.0001*
50-59	-0.4747	(-0.662, -0.2874)	<.0001*
Education Level * Immigration Status (Ref: Less than 9th grade)			
9th to 11th grade	-0.3325	(-0.5614, -0.1037)	0.0044*
High school graduate/GED or equivalent	-0.0253	(-0.2455, 0.195)	0.8222
Some college or AA degree	-0.1443	(-0.3619, 0.0734)	0.1939
College Graduate or above	-0.1108	(-0.38, 0.1585)	0.4200
Poverty Index Ratio * Immigration Status			<.0001*
Health Insurance Coverage * Immigration Status (Ref: No Coverage)	-0.1420	(-0.2932, 0.00932)	0.0657