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Immigration and Diet-related Disparities Among Hispanic Populations in California

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Abstract

This study aimed to examine the relationships between fruit and vegetable (FV) and fast food (FF) consumption and immigration-related factors among Hispanics in California. The analysis of data from the 2015 California Health Interview Survey was performed using the Chi-square test and Spearman's correlation. The sample included 4,959 adults, 311 adolescents, and 969 children, all Hispanics. Significant relationships were found between: parents' countries of origins and FV consumption, $X2$ (8, $N = 963$) = 18.29, $p < .05$; fathers' immigration status and FF consumption, $X2$ (6, $N = 351$) = 15.40, $p < .05$; adult immigration status and their FF consumption, $X2$ (6, $N = 4,549$) = 41.91, $p < .05$; father's length of residence and FV consumption, $X2$ (8, $N = 963$) = 26.38, $p < .05$. The findings of this study can be used to guide public health nutrition policy and interventions.

Keywords: Diet-related Disparities; Immigration; Hispanic Populations

Introduction

Diet-related disparities refer to differences in dietary intake, dietary behaviors, and dietary patterns in different segments of the population, resulting in poorer dietary quality and inferior health outcomes for certain segments of the population, such as racial and ethnic groups [1]. This phenomenon has increasingly become a major focus of public health research, practice, and policy, since diet is a significant contributor to disparities in many chronic diseases and conditions, such as cardiovascular diseases (CVD), cancer, obesity, and osteoporosis [1], which contribute to approximately 60% of the 56.5 million reported deaths in the world and 46% of the global burden of disease in 2008 [2]. Healthy diet significantly reduces the risk of cardiovascular and cerebrovascular accidents [3]. About 1.7 million (2.8%) deaths worldwide are attributable to low FV consumption, known as poor sources of calories [4]. Increased FV intake is inversely associated with the risk of CVD. Further, insufficient intake of FV is associated with approximately 14% of gastrointestinal cancer deaths, 11% of ischemic heart disease deaths, 9% of stroke deaths globally, and approximately 16.0 million (1.0%) disabilities [5]. On the contrary, high consumption of foods rich in fat and sugar is associated with high caloric intake and increased CVD risks [6]. Researchers found a positive association between FF consumption, high-fat diet, and elevated body mass index (BMI) [7,8].

In California, only 30% of the population consume FV less than once daily, and the rest of the population has not reached that minimal amount yet [9,10]. Although the percentage of the California population that consumes FV at least daily appears higher than the national average (37.7%), the WHO recommended standard (at least 400g 5 portions of fruits and vegetables a day) [4] has not been met yet, and this gap is a public health concern. More specifically, in the Hispanic population that represents 38 % (14.5 million) of the population in California, with 1.3 million enrolled in California colleges, the state's largest population of college students [11], less than 30 % of adults consume FV, and approximately 32.0% and 22.4 % of children aged 2-11 and 12-17, respectively, consume the recommended amount of FV (at least five servings per day); compared to their white counterparts in California, Hispanics consume less FV [12,13].

While the percentage of Hispanic children in California consuming the recommended amount of FV tends to be low, the percentage of the same population consuming FF meal at least weekly (37%) appears to be relatively higher than the 34%-reported national average [14,15]. The frequent consumption of FF, and the gap observed between recommended and self-reported FV consumption in the California Hispanic population, constitute a public health concern. This should be addressed through research, health promotion, and health education, without overlooking immigration factors and other related conditions that are likely to affect dietary behaviors of Hispanic populations in California, primarily composed of foreign-born immigrants [16].

Examining the relationship between immigration and dietary behaviors among Hispanic populations in California can provide nutrition education specialists in government agencies, schools, and colleges, with a better understanding of the level of influence of immigration factors on diet-disparities among Hispanic populations in California. Although researchers have investigated dietary behaviors in Hispanic populations in the United States, little is known about the relationship between immigration-related factors (geographic origins, immigration status, and number of years spent in the United States) and FV and FF consumption among the Hispanic population in California and how that relationship varies from one group (children, adolescents, or adults) to another.

This study aimed to: a) Examine the relationships between FV consumption and immigration-related factors (geographic origins, immigration status, and years spent in the United States); and b) Examine the relationships between FF consumption and immigration-related factors (geographic origins, immigration status, and years of residence in the United States) among Hispanic population in California.

Methodology

Research Design

This cross-sectional study was a secondary analysis of selected data from the 2015 California Health Interview Survey (CHIS). The CHIS Researchers had used a two-stage dual-frame design where eligible households were identified through a landline or cell phone number in the first stage, and participants were chosen from households in the second stage. Fifty-eight California counties were grouped into 44 ge-

ographic sampling strata and 14 sub-strata. Within each geographic stratum, residential households were randomly selected either through a landline telephone frame, a cell phone frame, an address frame, or a combination of two or more frames. Within each selected household, one adult respondent (age 18 or over) was randomly selected for participation. For households with adolescents (age 12-17) and/or children (under age 12), one adolescent and/or one child were randomly selected. The adolescent was interviewed directly and the adult most knowledgeable about the child's health completed the child interview.

Sample Size

The total sample in 2015 was 21,034 adults, 754 adolescents, and 2,157 children; of these totals, 4,959 adults, 311 adolescents, and 969 children were Hispanic. The Hispanic population used in the 2015 CHIS constituted the sample size for this study (see Table 1).

Table 1: Sample size per group

Group	California population	Hispanic population	Total
Adults	21,034	4,959	25,993
Adolescents	754	311	1065
Children	2,157	969	3,126
Total	23,945	6,239	30,184

Material, Instrumentation, and data Collection Procedure

Data about geographic origin, immigration status, years of stay in the United States, FV consumption, and FF consumption were collected using 24-hour-recall and 7-day recall questions included in the CHIS survey questionnaires.

Data Analysis

The measurement scales used for this study are indicated in Table 2. The extracted sub-databases analyzed separately using SPSS software, and comparisons were made. The researcher used graphical and inferential methods to determine if FV/FF-related data are normally distributed. The normal Q-Q plot was generated using SPSS and the Shapiro-Wilk test were subsequently used.

Table 2: Type of variables

Variables	Scale
Geographic origin	Nominal
Immigration status	Nominal
Years of residence in the United States	Ratio
FV consumption	Ratio
FF consumption	Ratio

Ratio Data

When the graphical method did not indicate significant outliers, a Shapiro-Wilk test was used to confirm the non-violation of the normality assumption. As the assumption of normality was violated, the researcher did not use parametric methods to test study hypotheses. Pearson's correlation coefficient (r) was not used to measure relationship between ratio variables (length of residence in the United States and FF consumption) for each subgroup (children, adolescents, adults) because significant outliers were identified using the graphical method and the Shapiro-Wilk test was significant ($p <$

0.05), leading to the rejection of the null hypothesis of normal distribution. The normality assumption being violated, the researcher used Spearman's rank correlation coefficient (r_s) to test the study hypotheses related to the association between duration of residing in the United States and FF consumption of Hispanics in California in each group of the population (children, adolescent, and adults). The r_s values are between 1.00 to -1.00; zero indicates the absence of association: very strong positive or negative correlation (.90 to 1.00; -.90 to -1.00); strong positive or negative correlation (70 to .89; -.70 to -.89); moderate positive or negative correlation (50 to .69; -.50 to -.69); weak positive or negative correlation (.30 to .49; -.30 to -.49); negligible positive or negative correlation (.00 to .29; .00 to -.29) [17].

Nominal Variables

A Chi-square test was used to test hypothesis involving nominal variables such as geographic origins and immigration status. Because FV and FF consumption and years of residence in the United States are ratio variables, the researcher transformed FV and FF consumption into categorical variables to meet the assumptions of the Chi-square test. Data pertaining to FV consumption were categorized into consumed and did not consume. For FF consumption, data were grouped into less than one FF meal per week, one to three FF meals per week, and more than three FF meals per week before running the Chi-square test. When a relationship between X and Y was significant, the Cramer's V was used to measure the strength of relationships between correlation variables (immigration status and FV and FF consumption, and country of origin and FV and FF consumption). The Cramer's V values are between 0.00 and 1.00 where zero indicates no association and one indicates a very strong association. For each group, the researcher compared Cramer's values based on the following scale defined by Rea and Parker: no association to very weak association (0-0.1); weak association (0.11-0.19); moderate association (0.20-0.39); strong association (0.40-0.79); very strong association (0.80-0.10) [18].

Results

Sample Distribution

The actual sample was 4,549 Hispanic adults, 351 adolescents, and 963 children (see Table 3). This reflects data available for analysis in the SPSS database because the 2015 CHIS did not secure the sample size of Hispanics reported in the methodology report (4,959 Hispanic adults, 311 adolescents, and 969 children).

Table 3: CHIS Sample Distribution

Group	All races	Hispanics	Total
Adults	21,034	4,549	25,583
Adolescents	754	351	1,105
Children	2,157	963	3,129
Total	23,945	5,863	29,817

In each group, the sample included males and females of different ages. The sample included more females (51.3%) than males (48.7%) in the children group and the adult group (57.4% females and 42.6% males). However, in the adolescent group, the sample consisted of 55% males and 45 % females (see Table 4).

Research Questions and Hypothesis Verification

What is the relationship between geographic origin (CO) and FV and FF consumption of Hispanics in California?

In the children group, a significant relationship was found between parents' countries of origins and fruit consumption, X^2 (8, N = 963) = 18.29, p = .02. However, no significant relationship was found between CO and vegetable consumption, X^2 (8, N = 963) = 9.44, p = .30 although variations were observed in the amounts of vegetables consumed by children from different CO. Likewise, no significant relationship was found between CO and FF consumption, X^2 (16, N = 963) = 14.42, p = .56 in the children group (see Table 5).

Table 4: Characteristics of Hispanic Sample

Characteristics	n	%
Children (N = 963)		
Sex		
Male	469	48.7
Female	491	51.3
Age		
< 5	295	30.6
5-11	668	69.4
Adolescents (N = 351)		
Sex		
Male	193	55.0
Female	158	45.0
Age		
12-14	197	56.1
15-17	154	43.9
Adults (N = 4,549)		
Sex		
Male	1939	42.6
Female	2610	57.4
Age		
18-40	2011	44.2
> 40	2538	55.8

Table 5: Chi-square Test Results of the Relationship between CO and FV and FF Consumption among Children, Adolescents, and Adults

	Consumption									
	Fruits			**Vegetables**			**FF**			**N**
	df	X^2	p	df	X^2	p	df	X^2	p	
Children CO	8	18.29	0.02	8	9.44	.30	16	14.42	.56	963
Adolescents CO	6	3.0	.79	6	7.1	.30	12	7.1	.85	351
Adults CO	ND						16	14.42	.56	4549

ND: No data available

In the adolescent group, no significant relationship was found between CO and FV consumption; X^2 (6, N = 351) = 3.0, p = .79 for fruits and X^2 (6, N = 351) = 7.1, p = .30 for vegetables. Further, no significant relationship was found between countries of origin and FF consumption, X^2 (12, N = 351) = 7.1, p = .85

In the adult group, no significant relationship was found between CO and FF consumption, X^2 (16, N = 4,549) = 14.42, p =.56.

What is the relationship between immigration status (IS) and FV and FF consumption of Hispanics in California?

Four IS were identified by the study: U.S. born citizen, naturalized U.S. citizen, non-U.S. citizen with green card, and non-U.S. citizen without green card. For the children group, a significant relationship was found between fathers' IS and FF consumption, X^2 (6, N = 963) = 14.06, p = .03. No significant relationship was found between mother's IS and FV/FF consumption, X^2 (3, N = 963) = 6.29, p = .09 for fruits and X^2 (3, N = 963) = 5.23, p = .15 for vegetables, X^2 (6, N = 963) = 3.94, p =.41 for FF. No significant relationship was found between children's IS and FV/FF consumption, X^2 (3, N = 963) = .1, p = .94 for fruits, X^2 (3, N = 963) = .68, p=.71 for vegetables, X^2 (6, N = 963) = 3.94, p = .41 for FF.

Among adolescents, a significant relationship was observed between fathers' IS and FF consumption, X^2 (6, N = 351) = 15.40, p = .02; no significant relationship was found between mothers' IS and FV consumption, X^2 (3, N = 351) = .80, p = 0.84 for fruits, and X^2 (3, N = 351) = .88, p = .82 for vegetables. Likewise, no significant relationship was found between fathers' IS and FV consumption, X^2 (3, N = 351) = 1.52, p =.67 for fruits, and X^2 (3, N = 351) = 1.38, p = .70 for vegetables; adolescents' IS and FV, X^2 (3, N = 351) = .84, p= .65 for fruits and X^2 (3, N = 351) = .11, p = .94 for vegetables; FF consumption and mothers' and adolescents' IS, X^2 (6, N = 351) = 5.76, p = .45 for mothers and, X^2 (3, N = 351) = 3.30, p = .50 for adolescents . A significant relationship was found between adult IS and their FF consumption, X^2 (6, N = 4,549) = 41.91, p < .01. (see Table 6).

Table 6: Chi-square Test Results of the Relationship between Parents' IS and FV and FF Consumption among Children, adolescents and adults

	Fruits			**Vegetables**			**FF**			N
Children Group	df	X^2	p	df	X^2	p	df	X^2	p	963
Mothers' IS	3	6.29	.09	3	5.25	.15	6	3.94	.41	
Fathers' IS	3	6.29	.09	3	5.25	.15	6	14.06	.03*	
Children' IS	3	.10	.94	2	.68	.71	6	3.94	.41	
Adolescent Group										351
Mothers' IS	3	.80	.84	3	.88	.82	6	5.76	.45	
Fathers' IS	3	1.52	.67	3	1.38	.70	6	15.4	.02*	
Adolescents' IS	3	.84	.65	2	.11	.94	6	3.30	.50	
Adult Group	ND			ND			6	41.91	.01*	4,549

Note. *Significant relationship (p < .05) ND: No data available

What is the relationship between length of residence (LR) in the United States and FV and FF consumption of Hispanics in California?

The Chi-square test was used to measure the relationships between LR in the United States and FV consumption. FV consumption included two levels (consumed and did not consume). In the children group, nine levels were observed for parents' LR and two levels for children's LR. The Chi-square test revealed a significant relationship between father's LR and vegetable consumption, X^2 (8, N = 963) = 26.38, p = .01. Conversely, no significant relationship was found between father's LR and fruit consumption, X^2 (8, N = 963) = 7.7, p = .46. Likewise, no significant relationship was found between mothers and children LR in the United States and FV consumption, and also between parents' LR and FV consumption in children, and between: Fruit consumption and mother's LR, X^2 (8, N = 351) = 11.9, p = .15; vegetable consumption and mother's LR, X^2 (8, N = 351) = 2.96, p = .93; vegetable consumption and father's LR, X^2 (8, N = 351) = 12.83, p = .11; fruit consumption and father's LR, X^2 (8, N = 351) = 4.45, p = .81.

In the adolescents' group, nine levels were observed for parents' LR and six levels for adolescents' LR. The Chi-square test revealed a significant relationship between adolescents' LR and vegetable consumption, X^2 (5, N = 351) = 12.0, p = .03. However, no significant relationship was found between fruit consumption and adolescents' LR, X^2 (5, N = 351) = 8.2, p = .14. (see table 7).

Table 7: Chi-square Test Results of the Relationship between LR in the United States and FV Consumption among Children

	Fruits			Vegetables			N
Children Group	**df**	**X^2**	**p**	**df**	**X^2**	**p**	963
Mothers' LR	8	2.74	.94	8	6.0	.74	
Fathers' LR	8	7.7	.46	8	26.38	.01*	
Children's LR	1	.93	.33	1	.31	.57	
Adolescent Group							351
Mothers' LR	8	11.9	.15	8	2.96	.93	
Fathers' LR	8	4.45	.81	8	12.83	.11	
Adolescents' LR	5	8.2	.14	5	12.0	.03*	

Note. *Significant relationship (p < .05)

The Spearman's rank correlation was used to measure the relationship between LR in the United and FF (continuous variable in this case) among children. No significant correlation was found, r_s = -.02, p = .42 for children length of residence, r_s = .03, p = .33 for fathers' length of residence, and r_s = .01, p = .58 for mothers' LR (see Table 8).

Table 8: Spearman's Rank correlation between LR in the United States and FF Consumption among children

Spearman's rho	Years child has lived in US	Years father has lived in US	Years mother has lived in US
r_s	-.026	.031	-.018
Sig.(2-tailed)	.424	.338	.581

Note. N=963.

A Spearman's rank did not show a significant correlation between LR in the United States and FF consumption, r_s = -.017, p =.75 for adolescents' length of residence, r_s = -.08, p = .13 for fathers' length of residence, and r_s =.038, p = 0.48 for mothers' LR. In the adult's group, the Spearman's correlation indicated a significant correlation between adults' LR and FF consumption r_s = -.10, p < .01. (see Table 9).

Table 9: Spearman's Rank correlation between LR in the United States and FF Consumption among Adolescents and Adults

Spearman's Rho	# Years adolescents has lived in US	# Years father has lived in US	# Years mother has lived in US	#Years adults has lived in the US
r_s	-.017	-.08	-.038	-.10
Sig. (2-tailed)	.75	.13	.480	.01

Note. N=351 (Adolescents) N=4,549 (Adults)

Strength of Significant Relationships across Groups

When a relationship was found to be significant using the Chi-Square test, a Cramer's V was calculated to verify the strength of the association. However, the Cramer's V analysis showed revealed that the significant relationships were either very weak or weak: relationship between children's fruit consumption and their country of origin (weak, Cramer's V=0.11), relationship between fathers' IS and children's FF consumption (very weak, Cramer's V= 0.085), relationship between adolescents' LR and adolescents' vegetable consumption (weak, Cramer's V =.18), and correlation between adults' IS and adults' FF consumption (very weak, Cramer's V =.075). For adults' FF consumption and their LR, the Spearman's correlation indicated a weak and negative association (-0.1).

Discussion

The Chi-Square test revealed significant relationships between FV and FF consumption and immigration factors (CO, IS, LR) in children, adolescent, and adult groups, although relationships were found not to be strong by the Cramer's V test. However, the weakness of the association found on the Cramer's V scale does not negate the possible existence of meaningful relationships, because several researchers have indicated that the Cramer's V has the tendency to produce weak correlation measures, even for high significant results in social-related studies, which may be strong [22]. Our findings are consistent with previous studies that showed significant relationships between immigrants' country of origin and length of residence in the United States and their fruit and vegetable intake [20]. However, the unavailability of some data in the adult group and the low reliability of the self-reported FV and FF intake constituted limitations to this study. Due to that data unavailability, we were unable to examine the relationship between immigration factors and fruit and vegetable intake in the adult group. Moreover, with the self-reported FV and FF intake there was a risk of misclassification on the ratio scale. Despite those weaknesses, this study provided additional information regarding immigrants' dietary behaviors and their immigration status, which contribute to the understanding of diet-related health disparities between and within ethic groups in the United States.

Conclusion and Recommendations

Immigration factors such as country of origin, immigration status, length of residence in the United States, influence FV and FF consumption among Hispanic children, adolescents, and adults in California. The information provided by this study can be used to guide public health nutrition policy and interventions. As, the study was focused on Hispanic children, adolescents, and adults, further specific studies can be conducted in the adult group to determine if the relationships found between immigration factors and dietary behaviors also apply to the college Hispanic students' group in California, and the extent to which those factors and behaviors can influence their academic performances.

Declarations

Ethics Approval and Consent to Participate

Prior to data analysis, the researcher obtained Institutional Review Board approval from A.T. Still University. The researcher extracted data pertaining to Hispanics from each original SPSS-database (children, adolescents, and adults) of the 2015 CHIS.

Availability of Data and Materials

The UCLA Center for Health Research and Policy collects information through the California Health Interview Survey and make data available at https://healthpolicy.ucla.edu/chis/data/Pages/GetCHISData.aspx.

Competing Interest

The author declares no conflict of interest; no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work.

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