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Use of *Vendedores* (Mobile Food Vendors), *Pulgas* (Flea Markets), and *Vecinos o Amigos* (Neighbors or Friends) as Alternative Sources of Food for Purchase among Mexican-origin Households in Texas Border *Colonias*

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Abstract

There is a paucity of studies acknowledging the existence of alternative food sources, and factors associated with food purchasing from three common alternative sources: *vendedores* (mobile food vendors), *pulgas* (flea markets), and *vecinos/amigos* (neighbors/friends). This analysis aims to examine the use of alternative food sources by Mexican-origin women from Texas-border *colonias* and determine factors associated with their use. The design was cross-sectional.

Promotora-researchers (*promotoras de salud* trained in research methods) recruited 610 Mexican-origin women from 44 *colonias* and conducted in-person surveys. Surveys included participant characteristics and measures of food environment use and household food security. Statistical analyses included separate logistic regressions, modeled for food purchase from mobile food vendors, *pulgas*, or neighbors/friends (NFs). Child food insecurity was associated with purchasing food from mobile food vendors, while household food security was associated with using *pulgas* or NFs. School nutrition program participants were more likely to live in households that depend on alternative food sources. Efforts to increase healthful food consumption such as fruits and vegetables should acknowledge all potential food sources (traditional, convenience, non-traditional, and alternative), especially those preferred by *colonia* residents. Current findings

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support the conceptual broadening of the retail food environment, and the importance of linking use with spatial access (proximity) to more accurately depict access to food sources.

Introduction

Good nutritional health, which relies on the adequate consumption of healthful foods, is essential for the prevention and management of nutrition-related health conditions such as obesity, diabetes, and cardiovascular disease (1-3). It is widely recognized that access to the food environment may have an effect on dietary intake and overall health (4-8). Common among these and other studies on food access is a focus on potential spatial access (proximity or distance) to food stores, primarily supermarkets (9-15). Use of the retail food environment or realized access is the outcome of a complex interaction between consumers and characteristics of the food environment, such as proximity or density of retail food sources (10), and presence of culturally specific foods in accessible markets (16-18). Further, studies of food access have expanded to include diverse outlets such as convenience stores, non-traditional food stores, and alternative retail food sources (11, 18-22).

The Mexican-origin population is the fastest growing racial/ethnic subpopulation in the United States, and the subpopulation at greatest risk for food insecurity, obesity, and diabetes (23-26). This population growth has been occurring in the burgeoning *colonias* along the U.S. border with Mexico, especially in Texas and in new destination immigrant communities throughout the U.S. (27-29). New destination communities are characterized by a high concentration of Mexican-origin residents and rapid growth in locations previously unsettled by Mexican immigrants (28, 29). As an archetype for new destination communities, *colonias* are smaller, more dispersed communities comprised of disproportionately poor families of Mexican-origin with limited access to resources (30, 31). Two distinguishing features of *colonias* in Texas include their existence since the 1960's and current inclusion of native and immigrant residents of Mexican-origin (30). There is limited work that acknowledges the existence of alternative food sources (11, 19, 21, 22, 32), and apparently no studies that examine factors associated with the purchase of foods from three common alternative food sources for Mexican-origin families in Texas border *colonias*: *vendedores* (mobile food vendors), *pulgas* (flea markets), and *vecinos o amigos* (neighbors or friends) (25). The purpose of this research is to examine the use of these three alternative food sources by 610 Mexican-origin women from Texas border *colonias* and determine factors associated with use.

METHODS

Data were collected from 610 adult women in 44 *colonias* as part of the 2009 *Colonia* Household and Community Food Resource Assessment (C-HCFRA). Spanish is the primary language spoken in these areas. Details of training, participant eligibility and recruitment, and administration of a face-to-face survey in Spanish by trained *promotora*-researchers (*promotoras de salud* trained in research methods) has been previously described in detail (25). The survey and all protocols were approved by the BLINDED FOR REVIEW Institutional Review Board, and each participant provided written informed consent, which was conducted in Spanish.

Measures

C-HCFRA data included demographic characteristics, participation in food and nutrition assistance programs, access and mobility, main food store, perception of the community food environment, household food security, and *alternative food sources*. Demographic characteristics included age, education (years completed), marital status (married vs. all

others), country of birth, and household composition (number of adults and children). Participants were asked whether they or members of their household participated (yes or no) in Supplemental Nutrition Assistance Program (SNAP), Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and school nutrition (school breakfast and/or lunch) programs. For access and mobility, participants were asked (yes or no) whether someone in their household owned a vehicle, whether a vehicle was available to them during the day, and typical method of transportation to purchase groceries (walk, own car, neighbor or friend, or taxi). Main food store questions included type of food store (supercenter, supermarket, convenience store, dollar store, or other) and one-way distance in miles to this store from the residence. Perception of the community food environment used a 4-point Likert scale (1 = strongly agree, 2 = agree, 3 = disagree, and 4 = strongly disagree) to assess agreement or disagreement with three community food environment items: 1) little variety in the types of foods that can be purchased; 2) few grocery stores or supermarkets; and 3) food prices are high (7). Binary variables were constructed as strongly agree/agree vs. all others (25).

Household food security was measured using eleven items from the 12-item Radimer/Cornell measure of hunger and food insecurity (33, 34). Four mutually-exclusive categories representing a four-stage process that describes depletion of household food supplies were constructed from affirmative responses (sometimes/often true): food secure household, household food insecure, household with adult food insecure, and household with child(ren) food insecure (25). The use of alternative food sources included the purchase of food from *vendedores* (mobile food vendors in the neighborhood), *pulgas* (flea markets), and *vecinos o amigos* (neighbors or friends).

Analysis

All statistical analyses were conducted using Stata Statistical Software (Release 11, 2009, Stata Corporation, College Station, TX). Descriptive statistics examined the distribution of demographic characteristics, food and nutrition program participation, access and mobility, main food store, perception of the community food environment, food security, and use of alternative food sources. Bivariate correlations measured the relationships between alternative food sources and all variables. Two separate logistic regressions were modeled for each of the three alternative food sources: Model 1 included demographic characteristics, food and nutrition program participation, household food security, main food store, access and mobility, and perception of the community food environment; Model 2 added alternative food sources and an interaction term for alternative food sources (e.g., mobile food vendors X *pulgas*). Variables from the bivariate correlations ($p < 0.10$) were simultaneously entered into regression models; backward elimination strategy was used (35), which sequentially removed statistically non-significant variables ($p > 0.05$).

RESULTS AND DISCUSSION

Table 1 shows the sample distributions for demographic characteristics, food environment access, availability, and use of alternative food sources. Briefly, the average age was approximately 40 y, 60% were married, 67.7% were born in Mexico, almost 20% were the lone adult in the household, and 26.9% participated in both SNAP and WIC. More than 16% of households were considered adult food insecure and 49% child food insecure. Almost 70% of the women had a car available during the day; 61.3% traveled at least 10 miles one-way to purchase groceries; and 29.5% rode with a friend or family member to purchase groceries. More than 90% strongly agreed or agreed that there was little variety in types of foods, few grocery stores or supermarkets, or high food prices in their community. Fifty-two percent of households used at least one type of alternative food source for the purchase of food. More than 30% of all participants and 59% of households that used alternative food

sources purchased food from *pulgas* (flea markets). Among those who purchased food at a *pulga*, 62% purchased fresh fruit and vegetables. More than 25% of participants purchased food from at least two of the three types of alternative food sources.

Results of regression models that examined the sample characteristics associated with use of alternative retail food sources are shown in Table 2. Interaction variables were not statistically significant in any of the models and were removed. The odds for purchasing food from a mobile food vendor were greater for households that participated in school nutrition programs, were child food insecure, or also purchased food at a *pulga* or from a neighbor or friend. With inclusion of purchasing food from a mobile vendor or neighbor, the odds for purchasing food from a *pulga* were greater for participants in school nutrition programs, food secure households, purchasing food from a mobile food vendor, or purchasing food from a neighbor or friend. Women more likely to purchase food from a neighbor or friend (Model 2) were younger, in a lone adult household, participated in the school nutrition program, were food secure, purchased food from a mobile food vendor, or purchased food at a *pulga*. Recipients of SNAP benefits were less likely to purchase food from a neighbor or friend. WIC participation was not associated with any of the alternative food sources.

This study is apparently the first study to examine the extent of use of three types of alternative food sources for the purchase of food by Mexican-origin households in Texas border *colonias* and the sample characteristics associated with use of each food source. The findings indicate the importance of these alternative food sources to Mexican-origin families. Notably, *vendedores* (mobile food vendors) who market food in the *colonias* were primarily a source for snacks, such as *nieves* (ice cream) or *elotes* (roasted corn), which reflects findings from urban settings such as Los Angeles (21) and Oakland, CA (22) where mobile food vendors primarily served as a near-school source of snack foods. *Pulgas* were a source for fresh fruits and vegetables, along with other prepared food items, reinforcing recent observations in South Texas (19); and prepared foods were purchased from neighbors or friends.

Demographic characteristics were only associated with purchasing food from a neighbor or friend. Younger women and households with a lone adult were more likely to purchase food from a neighbor or friend. Possible explanations may be that younger women or lone adult households may not have an available car or the necessary resources such as time to prepare “scratch” meals (36, 37). Food secure households were more likely to purchase food from *pulgas* or from neighbors, which suggests that this may be a strategy used to remain food secure. Earlier research identified the lack of culturally specific fruits and vegetables as an obstacle to the consumption of healthy foods among Latinos in Connecticut and North Carolina (16). The use of *pulgas* as an inexpensive source of culturally specific fresh fruits and vegetables (19) allows women to overcome this obstacle to food acquisition, and offers a plausible explanation for greater levels of food security among households who shopped at *pulgas* (25). Conversely, the most food insecure households were more likely to purchase snacks or ice cream from mobile food vendors. For food insecure households, use of mobile food vendors may be a strategy to complement reduced household food supplies and purchase snacks or ice creams from mobile food vendors when small amounts of money were available. In a prior study of household food availability using multiple, comprehensive inventories of household food supplies, it was observed that ice cream and other snack foods were not available in the homes (38). Individual perception of the community food environment was only associated with purchasing food from a *pulga*; that is, participants who believed that there were few places in their community to buy groceries were more likely to frequent a *pulga*, where most households purchased fresh fruits and vegetables. Interestingly, the use of alternative food sources was significantly associated

with using other alternative food sources. This suggests that households that rely on alternative food sources may use multiple types of alternative food sources to prevent or mitigate food insecurity (39-41). In addition, these findings suggest a community-based food system in *colonias* integrates consumers and vendors associated with local and culturally relevant sources of food, such as mobile food vendors, *pulgas*, and residentially-based entrepreneurs (e.g., neighbors/friends who sell food) (42).

Although there are not published studies of mobile food vendors or neighbors marketing foods within the *colonia* context, this study presents the consumer side of the *pulga* retail counter. Dean and colleagues described the variety of foods available in *pulgas* and the demographic and business characteristics of *pulga* vendors (19, 32). This study builds on that research and presents a picture of the extensive reliance by Mexican-origin households on *pulgas* as a source for food purchases.

There are a number of strengths to this study, including a large sample of hard-to-reach Mexican-origin households in Texas border *colonias* and a comprehensive survey instrument administered face-to-face by trained *promotora*-researchers. This study was also unique in the examination of multiple alternative food sources. There are also a number of limitations, such as the cross-sectional study design, lack of data on frequency of use of each alternative food source, and the type of food items purchased from neighbors or friends (e.g., home-prepared foods, hot dishes, or store-bought items).

CONCLUSION

Notwithstanding these limitations, two findings are of special importance. First, Mexican-origin households in this sample relied to a large extent on *pulgas* for fresh fruits and vegetables. This suggests that practitioners and researchers who develop interventions or programs to increase the consumption of healthful foods, such as fruits and vegetables, be aware of all potential food sources (traditional, convenience, non-traditional, and alternative), especially those preferred by community residents. Second, almost 25% of households purchased food from a neighbor or friend. Future research should help practitioners and researchers understand why and what types of foods are purchased from neighbors or friends. Our findings support further broadening the food environment concept to account for the breadth and importance of alternative food sources, and the importance of linking use of food sources with proximity to more accurately depict access to food sources.

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Table 1

Sample Characteristics, Food Environment Access, Availability, and Use of Alternative Food Sources ($n = 610$)

	Mean \pm SD	% (n)
Demographic characteristics		
Age, y	39.9 \pm 14.4	
Education		
Not reported		3.6 (22)
<7 th grade		30.7 (187)
7 th -11 th grade		31.6 (193)
High school graduate		34.1 (208)
Marital status		
Married		60.0 (366)
Country of birth		
Mexico		67.7 (413)
Household composition		
Adults	1.9 \pm 0.7	
Children	2.0 \pm 1.6	
Total adults and children	3.9 \pm 1.8	
Lone adult household		19.7 (120)
Employment		
No one employed full time		52.8 (322)
Food assistance program participation		
SNAP		55.1 (336)
WIC		35.6 (211)
School nutrition		43.9 (268)
Both SNAP and WIC		26.9 (164)
Household Food Security Status ¹		
Food secure		22.1 (135)
Household insecure		12.1 (74)
Adult insecure		16.7 (102)
Child insecure		49.0 (299)
Access and mobility		
Own a car		70.7 (431)
Car available during the day		69.2 (422)
Main food store		
Supermarket		62.3 (380)
Distance (one-way), 10 miles		61.3 (374)
Perception of the community food environment		
Little variety in types of foods that can be purchased in my community		92.5 (564)
Few grocery stores or supermarkets in my community		93.1 (568)

	Mean ± SD	% (n)
Food prices are high in my community		94.4 (576)
<i>Alternative retail food sources</i>		
Mobile food vendors		29.7 (181)
Foods purchased ²		
<i>Nieves</i> (ice cream)	91.2	(165)
<i>Elotes</i> (roasted corn)	54.7	(99)
<i>Raspas</i> (shaved ice)	13.3	(24)
Chips	11.0	(20)
<i>Pulgas</i>	30.7	(187)
Foods purchased ³		
<i>Frutas y verduras</i> (fresh fruit and vegetables)	62.0	(116)
<i>Raspas</i>	25.7	(48)
<i>Elotes</i>	25.7	(48)
<i>Aguas frescas</i> (fruit water with sugar)	25.7	(48)
<i>Tacos</i>	21.9	(41)
<i>Refrescos</i> (Mexican soft drinks)	11.2	(21)
<i>Nieves</i>	6.9	(13)
<i>Tamales</i>	9.1	(17)
Neighbor ⁴		24.9 (152)
Multiple alternative food sources		
Mobile food vendor and <i>pulga</i>	15.9	(97)
Mobile food vendor and neighbor	11.6	(71)
<i>Pulga</i> and neighbor	13.4	(82)
Mobile food vendor, <i>pulga</i> , and neighbor	7.7	(47)

SNAP = Supplemental Nutrition Assistance Program; WIC = Special Supplemental Nutrition Program for Women, Infants, and Children; School nutrition = participate in National School Breakfast and/or Lunch Programs

¹Based on 11-item food security module

²Foods purchased by participants who reported that purchased from mobile food vendors

³Foods purchased by participants who reported that purchased from *pulgas*

⁴Purchased food from a neighbor or friend

Table 2

Sample Characteristics Associated with Use of Alternative Food Sources for the Purchase of Food among 610 Mexican-origin Participants¹

	MFV		Pulga		Neighbor	
	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)
Demographic characteristics						
Age, y					0.98** (0.96, 0.99)	0.98** (0.96, 0.99)
Single-adult household ²					1.7* (1.1, 2.7)	2.0** (1.2, 3.2)
Food assistance programs						
SNAP ²					0.60** (0.4, 0.9)	0.58** (0.4, 0.9)
School nutrition ²	2.0*** (1.4, 2.9)	1.5* (1.1, 2.2)	2.3*** (1.6, 3.3)	1.8** (1.2, 2.6)	2.3*** (1.5, 3.4)	1.8** (1.2, 2.8)
Household food security status						
Food secure ²			2.0*** (1.3, 3.0)	1.7* (1.1, 2.7)	3.1*** (2.0, 4.8)	3.1*** (2.0, 4.8)
Child insecure ²	1.4* (1.1, 2.1)	1.9*** (1.3, 2.8)				
Access and mobility						
Car available ²	1.8** (1.2, 2.8)	1.6* (1.1, 2.5)	1.6* (1.1, 2.5)	1.5 (0.9, 2.3)		
Perception of food environment						
Few places to buy groceries ²			2.3* (1.1, 5.2)	1.9 (0.8, 4.6)		
Alternative retail food sources						
MFV				3.5*** (2.4, 5.2)		2.1*** (1.4, 3.32)
Pulga						2.8*** (1.8, 4.3)

	MFV		Pulga		Neighbor	
	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 1 OR (95% CI)	Model 2 OR (95% CI)
Neighbor		2.1*** (1.4, 3.3)		2.6*** (1.7, 4.0)		
Pseudo R²	0.04	0.12	0.06	0.15	0.10	0.17

MFV = purchase food from a mobile food vendor; *Pulga* = purchase food at a *pulga* (flea market); and Neighbor = purchase prepared food from neighbor or friend; SNAP = Supplemental Nutrition Assistance Program; School nutrition = participate in National School Lunch Program

Model 1 included demographic, food assistance, food security, access, and perception of food environment variables; Model 2 added alternative food sources to Model 1.

¹ Using multivariable logistic regression models; odds ratio (OR) reported with 95% CI in parenthesis.

² Referent group: all others

* Statistically significant: $p=0.05$

** $p=0.01$

*** $p=0.001$