

Psychosocial Determinants of Food Purchasing and Preparation in American Indian Households

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ABSTRACT

Objective: Obesity and other diet-related chronic diseases affect American Indians at high rates, yet little is known about food use behaviors in this population, or of psychosocial factors that influence these behaviors. The study objective was to address this gap.

Design: Cross-sectional; part of baseline collection for an intervention trial.

Setting: White Mountain and San Carlos Apache reservations, Arizona.

Participants: Main household food shoppers and preparers of 270 randomly selected households on two American Indian reservations.

Analysis: Multivariate linear regression.

Variables Measured: Primary independent variables were healthy food knowledge, self-efficacy and intentions, assessed using multi-question scales. Dependent variables were frequency of purchasing healthy foods and a healthiness of cooking methods score.

Results: Higher-fat and/or higher-sugar items were commonly purchased, with limited purchasing of healthier alternatives. Pre-prepared foods are a substantial component of the diet. Cooking methods which add or have little impact on the fat content of foods were more commonly employed than methods which reduce fat. Food acquisition and use behaviors were predicted by food use intentions. Food intention scores were predicted by food self-efficacy; food self-efficacy by food knowledge.

Conclusions and Implications: These findings support the use of food knowledge, self-efficacy, and intentions in understanding food-related behavior in this setting.

Key Words: psychosocial, American Indians, diet, food stores, obesity, chronic disease, food purchasing, food preparation

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INTRODUCTION

Obesity and other diet-related chronic diseases are widespread in American Indian communities. Surveys conducted by the US Indian Health Services in the 1990s report obesity rates of 34% and 40% for American Indian men and women, respectively,^{1,2} and these rates appear to be increasing in children as well as in adults.^{3,4}

Nationally, the marked increase in the prevalence of obesity in the last two decades has led researchers to ex-

amine the food supply and patterns of consumption. Americans are buying more meals away from home, spending less time preparing meals at home, and eating larger portions.⁵ A variety of environmental factors, including advertising, pricing, and promotions, have contributed to this trend.⁶ Kaufman et al⁷ showed that food purchases made by families in the lowest-income quintile were very different from those in the highest-income quintile, including fewer high-quality meats, fish, seafood, fruits, and vegetables. As income decreases, families buy and consume more energy-dense foods, especially products higher in fats and sugars, which are also perceived as more palatable.⁸ Among First Nations and American Indians, the preparation and consumption of high-fat foods is common, and likely contributes to the high rates of obesity.⁹ However, there is little published information on food purchasing and preparation in American Indian populations.

To address the problem of obesity in American Indian populations, we developed Apache Healthy Stores (AHS),

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a store-based intervention program to reduce dietary risk factors for chronic disease among two Apache tribes in east-central Arizona, by increasing the availability of healthy food options and by promoting healthier food choices and cooking methods. Guided by Social Cognitive Theory (SCT),^{10,11} the intervention focuses on changing the broader environment by directly influencing the availability of healthier food options and by increasing general awareness of these options through store promotions and mass media. Increasing exposure to the intervention, particularly to the hands-on, in-person components, is anticipated to lead to increases in knowledge and skills, then to self-efficacy, and then to the intention to purchase and select, prepare, and consume healthier foods (lower in fat, lower in sugar, and higher in fiber).

This paper looks at data collected in 2003 as part of the baseline evaluation for the Apache Healthy Stores program in 270 American Indian households. The paper describes: (1) patterns of food purchasing and preparation; (2) determinants (sociodemographic) of psychosocial factors relating to food choice; and (3) determinants of food purchasing and preparation methods.

METHODS

The study was implemented on two reservations in eastern Arizona with resident populations of approximately 12 500 and 9,000. Poverty is high on both reservations with an unemployment rate of approximately 20%.^{12,13} On each reservation there are 1 or 2 large food stores, as well as several small convenience stores.

Description of the customer impact questionnaire (CIQ) instrument

Three questionnaires, the Customer Impact Questionnaire (CIQ), a Quantitative Food Frequency Questionnaire, and the Store Evaluation Form, were developed to collect pre- and post- data to demonstrate program impact. Data from baseline measures of the CIQ will be the focus of this paper. The CIQ went through several versions, was reviewed by staff and all co-investigators, and was piloted with 15 adult Apache women on the two reservations. Several of the women were reinterviewed to assess face validity.

The CIQ first focused on sociodemographic characteristics (birth date, sex, marital status, and education level). A "food getting frequency" recorded the number of times over the past 30 days that the respondent "got" various food items. The terminology "food getting" and "got" were used to include food items obtained without monetary exchange (eg, foods obtained through the United States Department of Agriculture's commodity food programs or received as a gift). Over 40 different foods were included, most of which were foods to be promoted by the intervention, or their less healthful alternatives, selected on the basis of formative research.¹⁴ The "food getting frequency" also detailed the

number of times prepared foods had been purchased in the past 30 days. The CIQ addressed food preparation methods by asking respondents how they typically prepared several types of meat and vegetables.

The next section of the CIQ addressed food-related self-efficacy, intentions, and knowledge. The self-efficacy section asked the respondent to describe his or her confidence in making healthy food selections, using preparation methods promoted by the intervention, and using food labels to make healthy choices when selecting foods. The food intentions section addressed the respondent's intention to purchase, consume, and prepare foods promoted by the intervention. The food-related knowledge section asked questions that related to nutrition information provided by the intervention. A section on household socioeconomic status assessed employment; receipt of federal assistance in the form of WIC, food stamps, or commodity foods; ownership of material goods; and annual household income.

Sampling strategy

A list of all houses on the two reservations was developed using housing maps and tribal lists. Houses were numbered and then randomly selected ($n = 300$). Each data collector was provided with a list of 50 to 75 sampled households. When identifying whom to interview, the data collectors asked for the main food preparer and shopper in the household. If the main food preparer and shopper was not available after 4 visits, the questionnaire was conducted with another household member familiar with food shopping and preparation. To complete the questionnaire, this person must have lived in the household for the past 30 days and be 18 years or older.

Selection and training of data collectors

Local Apache women were trained to administer the CIQ in order to facilitate culturally appropriate communication and to ensure that respondents, who were primarily American Indian women, felt comfortable. Furthermore, for those respondents who preferred to speak the local language, the data collectors could administer the questionnaire in Apache.

Human subjects approval for this study was given by the Johns Hopkins Bloomberg School of Public Health Committee on Human Research. Both participating tribes approved the study. Signed consent was obtained from all respondents.

Data Analysis

Scale construction. A series of scores and scales was developed to measure the main psychosocial and behavioral constructs in the conceptual framework, based on SCT and

the Theory of Planned Behavior (TPB).¹⁵ All scales were assessed for internal reliability using Cronbach's alpha.

Food knowledge (behavioral capability, SCT) is the sum of scores for 9 multiple-choice questions that asked respondents to identify a food lowest in fat, highest in fiber, or lowest in total calories, or the cooking method that would result in the least the amount of fat in the final prepared food. Scores ranged from 0 to 9, with a mean of 5.3 (SD = 2.1, Cronbach's alpha = .61).

Label-reading knowledge (behavioral capability, SCT) is the sum of scores for 8 questions asking respondents to interpret two food labels (eg, How many servings are in this food?). Scores ranged from 0 to 8, with a mean of 3.9 (SD = 2.4, alpha = .80).

The **food self-efficacy scale** (SCT) is based on 13 statements about healthy food purchasing, preparation, and consumption. Respondents were asked how much they agreed or disagreed (on a 5-point Likert scale) with statements regarding their confidence in doing a certain behavior (eg, the next time I purchase a soda, I can choose diet rather than a regular soda). Scale scores ranged from 25 to 65, with a mean of 46.1 (SD = 6.4, alpha = .81).

The **food intentions** (TPB) scale is based on the respondent hypothesizing his or her food-related behaviors in the future using a forced choice (eg, If you had to fry eggs, what would you use to fry them? Cooking spray, vegetable oil, shortening/butter/lard). A higher score was given for the choice that reflected the lowest fat or lowest sugar choice. Scale scores for these 14 questions ranged from 2 to 24, with a mean of 13.8 (SD = 4.8, alpha = .73).

Healthy food purchasing frequency is an additive scale that includes over 40 different foods (and food groups) that were promoted as part of the AHS program (eg, baked chips, low-fat milk, high-fiber cereals, specified fruits and vegetables). Respondents were asked to recall the number of times they had purchased each food in the previous 30 days. The final score ranged from 5 to 256, with a mean of 57.3 (SD = 30.6, alpha = .87).

The **healthy food preparation** score evaluates the healthfulness of cooking methods used. Respondents provided their first, second, and third most common method of preparing seven foods (ground beef, chicken, pork, fish, venison, potatoes, eggs). Methods of food preparation were weighted in the following manner: Deep-fried: -1, Pan-fried: -1, Boiled, crock pot: 0, Other method: 0 (rarely reported), Fried in its own fat (usually drained): +1, Cooking spray: +1, Microwaved, baked or broiled: +1 and Drain and rinse ground meat: +2. A total score was calculated by summing the scores for each food weighted at 60% (first method), 30% (second method), and 10% (third method). For example, if eggs were usually cooked pan-fried, second most commonly boiled, and third most commonly cooked with cooking spray, the score for eggs would be $(.60 \times -1) + (.30 \times 0) + (.1 \times 1) = -.5$ as the overall healthiness of preparation for eggs. The scores for all seven foods were then summed. Food preparation scores for respondents

ranged from -7 to 4, with a mean of -0.1 (SD = 1.8, alpha = .50).

Pre-prepared food purchasing is the total number of times respondents reported buying prepared food at a local tailgater/vendor, from the deli section of food stores, or from fast food restaurants in the past 30 days. Scores ranged from 0 to 55, with a mean of 9.3 (SD = 8.8, alpha = .61).

Material style of life (MSL) (environment, SCT) is an additive scale developed as a proxy for socioeconomic status (SES). Respondents were asked to list the number of 8 household items they owned in working condition (eg, TV, VCR, home computer, car/truck). Respondents could own more than one of each item. The MSL scale ranged from 0 to 28, with a mean of 9.5 (SD = 5.2, alpha = .82).

Ethnic identification summed scores for 6 questions. Respondents were asked how much they agreed (on a 5-point Likert scale) with statements (eg, I speak Apache well; I know a lot about Apache culture). Scale scores ranged from 8 to 30, with a mean of 23.3 (SD = 3.7, alpha = .77).

Multivariate linear regressions were conducted to examine the determinants of psychosocial variables (food self-efficacy, intentions, and knowledge) and food-related behaviors (healthy food purchasing, healthy cooking, and prepared food purchasing). Independent variables that had a $P < .05$ were considered significant and were included in the models. Sociodemographic variables (age, MSL, years of education, ethnic identity) were included in all models to control for these factors. Owing to strong inter-correlations among psychosocial variables (Pearson correlation coefficients ranging from 0.26 to 0.61, $P < .0001$), and as the inclusion of multiple psychosocial variables did not add significantly to the overall predictability of the regression equation, only the strongest psychosocial predictor was included in regressions predicting healthy food behaviors.

RESULTS

General description of the study sample

The majority of the respondents were female (95%), with a mean age of 42 years. Most of the respondents were not married (60%). Level of schooling varied in the sample, with a mean of 10.9 years. The majority of the sample was unemployed (63%), and most households (70%) had at least one member on some form of food assistance. Household incomes were low (29% < \$15 000).

Patterns of food getting, preparation methods, and use of prepared foods

In general, higher-fat/higher-sugar foods were purchased 2 to 3 times more frequently in the past 30 days than their healthier alternatives. For example, respondents reported getting bologna 2.0 times vs. lite bologna 0.3 times, Spam

Table 1. Main methods of food preparation for seven key foods in the past 30 days, row % (n = 270)

Food	Deep-fried	Pan-fried	Fried in own fat	Drained and rinsed	Cooking spray	Microwave, baked or broiled	Open flame, grilled	Boiled, crock pot	Not prepared
Ground beef	1	9	78	3	2	3	1	3	1
Chicken	5	27	2	0	1	36	0	17	10
Pork	2	39	8	0	2	22	3	5	18
Fish	2	9	0	0	0	4	2	5	78
Venison	1	9	0	0	0	5	2	6	76
Potato	3	68	2	0	1	13	0	10	2
Egg	1	65	1	0	5	0	0	26	2

2.1 times vs Spam lite 0.6 times, potato chips 3.4 times vs. baked chips 0.2 and pretzels 0.5, whole milk 1.1 times vs. 1% or skim milk 0.4 times, regular soda 4.3 times vs. diet soda 2.3 times, other sweetened drinks 2.4 times vs. water 4.4 times, sugary cereals 1.9 times vs. low sugar cereals 2.0 times and high fiber cereals 1.3 times in the past 30 days.

Table 1 presents information on the most common form of preparation for seven foods. The most common method of cooking most of these foods was pan-frying, followed by microwaving/baking/broiling, and then boiling/crock pot. Ground beef was usually fried in its own fat, and was usually drained. The drain and rinse method was very infrequently used to prepare ground beef. Cooking spray use was rarely reported. Use of pre-prepared foods was relatively high. On average, respondents purchased food from local vendors 3.4 times, from store delis 2.4 times, and from fast food restaurants 3.4 times in the past 30 days.

Determinants of food-related psychosocial factors

Table 2 presents the results of regression analyses examining the determinants of food-related psychosocial variables.

With the exception of the food intentions scale, we were able to account for a relatively small amount of the variability in the scores, ranging from 8% to 16%. Higher MSL and more years of schooling were associated with increased food knowledge. MSL, years of school, and younger age of the respondent were also predictors of ability to read food labels accurately. Greater food self-efficacy scale scores were associated with higher food knowledge scores, but with none of the sociodemographic variables. Ethnic identification did not predict any of the psychosocial variables. The regression analysis predicting food intentions accounted for 43% of the variability, the most of all 3 models. Higher food intentions scores were associated with older age, and more years of education; however, the strongest predictor in the model was food self-efficacy.

Determinants of food-related behavioral outcomes

Table 3 presents the results of regression analyses examining the determinants of food-related behavioral outcomes. Because of strong intercorrelations among food knowledge, food self-efficacy, and food intentions, we used only the

Table 2. Determinants of psychosocial factors relating to food choice among American Indians (n = 270)

Variable	Food knowledge scale 0.109		Food label reading score 0.156		Food Self-efficacy scale 0.080		Food Intentions scale	
	Standardized		Standardized		Standardized		Standardized	
	beta	P-value <	beta	P-value <	beta	P-value <	beta	P-value <
Age	...	NS	-.254	.0001	...	NS	.221	.0001
Years of school	.125	.0429	.180	.0028	...	NS	.124	.0152
Material Style of Life Scale (MSL)	.274	.0001	.161	.0064	...	NS	...	NS
Ethnic identification	...	NS	...	NS	...	NS	...	NS
Food knowledge	*	*	*	*	.251	.0001	*	*
Food self-efficacy	*	*	*	*	*	*	.594	.0001

P, significance; N.S., not significant.

*Variable was not entered into multivariate linear regression equation because of high intercorrelations.

Table 3. Determinants of healthy food purchasing and preparation methods among American Indians (n = 270)

Variable	Healthy foods purchasing frequency score 0.124		Healthiness of cooking methods score 0.145		Preprepared food score 0.114	
	Standardized		Standardized		Standardized	
	beta	P-value <	beta	P-value <	beta	P-value <
Age	...	NS	...	NS	-.234	.0007
Years of school	...	NS	...	NS	...	NS
MSL	.191	.0023	...	NS	.158	.0106
Ethnic identification	.176	.0074	...	NS	...	NS
Healthy foods are expensive	...	NS	*	*	*	*
Food intentions	.217	.0006	.330	.0001	-.151	.0157

*Variable not entered into multiple linear regression

strongest predictor of the psychosocial variables in the models. Food intentions was selected, because it was the strongest predictor in all of the models. The regression equations were able to account for a relatively small amount of the variability, ranging from 11% to 15%.

The food intentions score was the strongest predictor of healthy food behaviors. Respondents with higher food intentions scores were more likely to purchase healthy foods with greater frequency, cook their foods using healthier methods, and they were less likely to purchase pre-prepared foods. Frequency of getting healthy foods was also associated with greater MSL and stronger ethnic identification scores. Food intentions were the only significant predictor of healthiness of cooking method scores. In addition to lower food intentions scores, younger age and greater MSL were associated with more frequent purchasing of pre-prepared foods.

DISCUSSION AND CONCLUSIONS

This paper adds to the limited literature on food preparation and purchasing patterns among American Indians. We found that higher-fat, higher-sugar and pre-prepared foods were commonly purchased, although there was some purchasing of healthier alternatives by respondents. Cooking methods that add or have little impact on the fat content of foods were more commonly employed than methods that reduce the amount of fat. Other studies of American Indians have had similar findings.^{16,17}

These food acquisition and use behaviors were highly associated with food use intentions. In turn, food intentions scores were most strongly predicted by food self-efficacy. The only significant predictor of food self-efficacy was food knowledge. These findings support the utility of SCT and its key constructs for understanding food-related behavior; they are significant in that these relationships have recently come under question.¹⁸ These findings are especially important considering the relative lack of power of sociodemographic variables in predicting food behaviors. Although socioeconomic status (using MSL as a proxy) was a significant predictor in several of the models, it was overshadowed

by the psychosocial constructs used. The study presented here has several limitations. Data were collected only on the household food shopper and preparer (usually an adult female) and so are not representative of all individuals on the two reservations. The food behavior indicators (healthy food purchasing, healthy cooking, and pre-prepared food scores) are indicators of frequency and do not account for portion size, quantity, or other factors that influence overall dietary quality. On the other hand, the food behavior data were relatively easy to collect and are relevant indicators for this setting. Finally, household composition was not assessed and would likely contribute to food purchasing patterns.

Models for predicting healthy food intentions, purchasing, and preparation scores accounted for a small amount of the variance. We were able to predict 43% of the variability in food intentions, comparable to other studies.^{19,20} Our models predicting food purchasing and preparation patterns, which included intentions, accounted for 11% to 15% of the variance. The relatively low predictability of the models may be caused in part by the absence of key variables. In TPB, the relationship between behavioral intention and actual behaviors is seen to be moderated by perceived behavioral control,¹⁵ which was not assessed in this study. Formative work in this setting supports the notion that people see limitations in their ability to purchase or prepare healthy foods, particularly economic limitations.¹⁴ We chose to use self-efficacy instead of perceived behavioral control because of more frequent use and application in studies of diet and dietary change.

IMPLICATIONS FOR RESEARCH AND PRACTICE

These findings suggest strategies to improve diet in American Indian populations. High-fat cooking methods and food acquisition patterns that involve many pre-prepared foods indicate the need for programs that provide guidance in food preparation and tasting of new foods, in a culturally sensitive framework. The USDA Expanded Food and Nu-

trition Education Program (EFNEP), has used this model for 35 years showing not only dietary change, but also cost-effectiveness.²¹ Food preparation and tasting strategies have been found to be effective in changing dietary behaviors.²²

The work presented here has methodological implications. The food preparation score was relatively simple to assess and may be applied, with modification, to other settings. Future analyses will tie these data on food purchasing and preparation to dietary intake by individuals, using a quantitative food frequency instrument developed for this population. In conclusion, selected psychosocial constructs were good predictors of food use behaviors on two American Indian reservations. Future intervention trials should consider use of both these psychosocial constructs and the operationalized food use behavior scores for program evaluation, and also to guide appropriate intervention strategies.

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