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# **Mobile Market Participation and Impact: An Analysis of Pascua Yaqui Pueblo and the Old Nogales Highway *Colonia***

## **Final Report**

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## Executive Summary

The Community Food Bank in Tucson, Arizona operates its own grocery store, the Value Foods Store (VFS) that sells food (and other) items at a substantial discount over regular grocery stores. The Food Bank also operates mobile markets in Pima County, Arizona that provide items from the VFS to low income areas with less access to grocery stores. This study uses market basket analysis to assess the impacts of mobile markets on the availability and affordability of food on the outskirts of Tucson, Arizona. The two communities examined in this study were the Old Nogales Highway Colonia and the New Pascua Yaqui Pueblo, 13 and 15 miles south of downtown Tucson.

The U.S. Department of Agriculture's Thrifty Food Plan (TFP) is a market basket of items designed to meet basic nutritional requirements at minimal cost. In the study area, the average cost of purchasing the TFP was lower than the national average. However, at the closest store to the Pascua Yaqui Pueblo, the TFP cost was 17 percent higher than the national average.

The cost of purchasing the TFP was compared with two alternative market baskets. A "Healthier" basket, patterned after a University of California, Davis study, had four times the dietary fiber and one fifth the fat of the TFP (Jetter and Cassady, 2005, 2006). The second basket, used in an Urban and Environmental Policy Institute (UEPI) study in Los Angeles, included more grains, legumes, and fresh fruits and vegetables than the TFP (Vallianatos et al. 2004). It also includes more foods regularly included in Hispanic diets. At the surveyed stores, the Healthier market basket cost an average of 10.6 percent more than the TFP. This is lower than the 18 percent average premium Jetter and Cassady found for Sacramento and Los Angeles. Results were mixed for the UEPI market basket, which, on average cost 2.8 percent more than the TFP, but was less expensive than the TFP for half the stores surveyed.

Whole wheat bread and grain items, ground beef with less than 10 percent fat, and yolk free noodles were more likely to be unavailable at surveyed stores. Jetter and Cassady (2005; 2006) also found that whole wheat bread and grain items and ground beef with less than 10 percent fat were more likely to be unavailable in their survey of California stores.

By substituting mobile market purchases for regular supermarket purchases, a family of four could reduce the cost of purchasing the TFP by 10 percent, the cost of the Healthier basket by 6 percent, and the cost of the UEPI basket by 7 percent. These cost reductions were statistically significant at the 1%-level even with a small sample size. The mobile markets periodically provide free bread as well as discounted grocery items. When free bread is included, mobile market substitution reduces the cost of the TFP 12 percent, the Healthier basket, 9 percent, and the UEPI basket 10 percent.

Our analysis also calculated how much items actually purchased at mobile markets would cost if they had been purchased at local grocery stores. Items sold at the May 2006 mobile markets at the Pascua Yaqui Pueblo would have cost 47-85 percent more if purchased at local supermarkets. In other words, for every dollar spent at the mobile market, patrons saved 47-85 cents, with the size of savings depending on the comparison store. In May 2006, sales averaged \$125.20 per mobile market visit, with total cost savings to the community ranging from \$59-\$107 per visit. If 5 loaves of free white bread and 5 loaves of free whole grain bread are included in the calculation, total community cost reduction per mobile market visit increases to \$75-\$122 per visit. Community cost savings increase proportionally with total sales volume, so cost savings will be greater in months with greater sales or if sales increase in the future.

## Chapter 1. Introduction

### Mobile markets, poverty, and distance to grocery stores

The Community Food Bank in Tucson, Arizona operates its own grocery store, the Value Foods Store (VFS) to serve people who may not qualify for their other food assistance programs. The VFS, open to the general public, sells fresh produce, meats, canned items, pasta, frozen vegetables, entrée items, dairy products, and other food items, as well as personal care and household care items (such as toothpaste, shampoo, conditioner, toilet tissue, baby diapers, paper towels, facial tissue, garbage bags, laundry bleach and soap). Because the Food Bank is a non-profit organization, unlike other grocery stores in Pima County, Arizona, they do not charge the standard 7-percent sales tax on these non-food items. VFS products are purchased from brokers throughout the United States using funds from store sales. It does not sell dented, damaged or salvaged food items. According to the Community Food Bank, prices are 30-70 percent less than local Tucson grocery stores.

The Food Bank also operates mobile markets in Pima County, Arizona. The mobile markets provide items from the VFS to low income areas with less access to grocery stores locally. Here is how the mobile markets work. A Food Bank employee and volunteers load up a large truck with food (and limited personal care and household) items and set up a small market at regular sites, with a tent and tables, and refrigerated items in the truck. The markets are open to the general public, selling products at VFS prices, which are substantially lower than prices at the nearest grocery stores.

Our study focuses on two mobile market sites on the southern outskirts of Tucson. One mobile market is at the Liogue Senior Center on the Pascua Yaqui Tribe in what is known as the New Pascua Yaqui Pueblo. New Pascua Yaqui is located in southwestern Arizona, about 15 miles southwest of downtown Tucson on 1,152 acres of trust land. Many Yaqui Tribal members also live off of the reservation in communities throughout Arizona. These members are concentrated in Yoem Pueblo in Marana, Barrio Libre in South Tucson, and Old Pascua in Tucson.

The other mobile market is set up on the grounds of the Summit View Elementary School. The Summit View site is in the middle of the Old Nogales Highway Colonia. Colonias are federally-designated communities or neighborhoods located within 150 miles of the U.S.-Mexico border that lack basic infrastructure such as adequate water systems, sewer systems, drainage, paved roads, or permanent housing. Most colonias lack formal local government and government services. In the 1990s, Congress enacted legislation requiring U.S. Border States to set aside 10 percent of their Housing and Urban Development (HUD) Community Development Block Grant (CDBG) funds for colonias.

The mobile markets go to each of these two sites on alternating Tuesdays. For example, they may go to one site on the first and third Tuesday and the other on the second and fourth Tuesday of the month.

Both mobile market sites are centrally located within their respective census tracts. Poverty rates in the two census tracts that include the two mobile markets are significantly higher than rates in Pima County as a whole (Table 1.1). At the Summit View site they are nearly double the county average and at the Pascua Yaqui site, they are nearly quadruple. While poverty rates in families with the householder 65 and older at Summit View are relatively low and close to the county average, they are high (36.1 percent) at the Pascua Yaqui site. Poverty rates increase for families with any children and increase more for families with children less than 5 years of age.

**Table 1.1. Poverty rates in mobile market areas and Pima County**

	Pascua Yaqui Census Tract 51	Summit View Census Tract 41.06	Pima County
Percent of families below poverty level			
All families	40.3	19.9	10.5
With related children under 18 years	43.9	28.4	16.4
With related children under 5 years	48.3	33.3	20.6
With householder 65 and older	36.1	4.9	4.7

The mobile market sites were chosen to target areas relatively distant from full-service grocery stores. The closest full-service grocery store from Summit View is 5 miles away, while the next closest is 5.6 miles away. At Pascua Yaqui, the nearest full-service grocery store is 2.7 miles away, while the next closest is 4.25 miles away. By way of comparison, Hatfield and Gunnell (2005) estimated that 90 percent of California’s population lived within 2 miles of the nearest grocery store, while 95 percent of California’s urban population lived within 2 miles of a grocery store.

### **Aims and scope of study**

This study uses market basket analysis to assess the impacts of mobile markets on the availability and affordability of food on the outskirts of Tucson, Arizona. It begins with calculation of a community baseline, estimating the cost of purchasing USDA’s Thrifty Food Plan (TFP) at stores frequented by residents of the Pascua Yaqui Pueblo and the Old Nogales Highway Colonia. Next, it estimates the costs of purchasing two alternative, healthier market baskets. The first is based on a market basket constructed by Jetter and Cassady (2005; 2006) in a study of food costs in Sacramento and Los Angeles, California. They substituted healthier variants of dairy, meat, canned fruit, breads, and grain products into the standard TFP to estimate the additional cost of purchasing a healthier market basket. We followed their substitution scheme as closely as possible and like them, refer to this second market basket as the “healthier basket.” We also estimated the cost of purchasing a market basket that Occidental College’s Urban and Environmental Policy Institute (UEPI) used to examine food costs in a Hispanic neighborhood of Los Angeles (Vallianatos et al. 2004). The UEPI market basket includes more grains, legumes, and fresh fruits and vegetables than the TFP. It also includes more foods regularly included in Hispanic diets (e.g tortillas, salsa) than the TFP. The UEPI basket does not include ready-to-eat cereals, spices, condiments, or frozen items that are in the TFP. Nor does the UEPI basket include certain meat and sugar and sweets items that are in the TFP. The higher number of servings of fruits and vegetables in the UEPI is in line with recent dietary recommendations to increase servings from five to nine a day for at-risk populations. In 2003, the U.S. Department of Health and Human Services and the National Cancer Institute launched a public awareness campaign to encourage African American men to eat nine servings of fruit and vegetables a day to help prevent cancer (U.S. H.H.S).

We next estimated the impact of mobile market participation on the costs of the three market baskets. This was done by substituting lower mobile market prices for local grocery store prices into each of the three market baskets and calculating the cost difference. To our knowledge, this is the first use of market basket analysis to assess the impacts of a nutrition program.

A market basket cost is no more than a price index. It measures the cost of a suite of hypothetical purchases, not the cost of consumers' actual purchases. How much mobile markets reduce actual costs depend on how closely the market baskets match actual expenditures. Particularly for lower income households, this match may not be close. For example, in very low income households, annual expenditures on food at home are less than half of the annual cost of the TFP.

To estimate actual (rather than potential) cost savings from mobile market participation, we took actual sales and price information from the mobile markets. Surveying local stores, we then estimated how much it would cost to purchase the same items at those stores. This directly addresses the question, "if mobile market patrons made their mobile market purchases at other stores, how much extra would they have to spend?"

In addition, mobile market customers were surveyed to collect basic demographic information, information about their food shopping patterns, and attitudes about the mobile market.

The general research questions addressed in the study include:

- Using the Thrifty Food Plan as a metric, what is the cost and availability of basic food items around the study areas?
- What is the additional cost of purchasing a healthier market basket?
- How much could mobile market participation reduce the cost of purchasing different market baskets?
- How much do patrons save by purchasing items at mobile markets instead of local grocery stores?

## Chapter 2. Specific Research Questions

### **How does the cost of purchasing the Thrifty Food Plan in the study area compare with the rest of the United States?**

The U.S. Department of Agriculture's Thrifty Food Plan (TFP) is a market basket of items designed to meet basic nutritional requirements at minimal cost. The TFP lists items needed to provide one week (or two weeks) worth of meals and snacks for a family of four that fulfill basic nutritional requirements. The TFP is based on the 1989 Recommended Dietary Allowances, the *1995 Dietary Guidelines for Americans*, the National Research Council's *Diet and Health* report, and recommendations from the USDA Food Guide Pyramid (Andrews, et al., 2001). Average TFP costs are used to calculate food stamp benefits.

An advantage of using the TFP as a metric of food availability and cost is that it serves as a national standard. USDA reports monthly, national average TFP costs, making it possible to determine whether the cost of the TFP in a local area is above or below that national average. Also, because the TFP has a set number and quantity of items, it makes market basket studies more comparable across study areas. One disadvantage of the TFP is that it may not reflect actual purchases made by households. It is thus a price index, not a measure of consumer expenditures.

### **What is the extra cost of purchasing a healthier market basket?**

The nutritional quality of basic food baskets like the TFP can be enhanced by substituting healthier items. Some examples would be substituting whole grain bread products for ones using white enriched flour, substituting canned fruits packed in juice for fruits packed in heavy syrup, or choosing lower-fat selections of meat or fish.

Whether healthier diets are indeed more expensive remains an open empirical question. Results from a number of European studies are mixed. Cade et al. (1999) compared data the U.K. Women's Cohort Study. They found that women who most closely followed World Health Organization (WHO) dietary recommendations had higher dietary costs. Greater expenditures on fruits and vegetables were the main source of the cost difference. In a study of Danish children, Stender et al. (1993) found that a healthier diet increased dietary cost. They estimated that reducing energy from dietary fat from 35 percent to 25 percent energy from fat increased food costs 10-20 percent. In a study of French adults, Drewnowski et al. (2004) found that substituting more fruit and vegetables into diets were associated with higher food costs. In contrast, using a linear programming model to minimize food costs in Italy, Conforti and D'Amicis (2000) found that a healthier diet did not increase dietary costs.

Drewnowski and Barratt-Fornell reported in 2004, "Missing entirely from the literature on diets and health has been any mention of food prices and diet costs . . . there are virtually no U.S. studies on what it costs to eat a healthy diet (pp. 162). While a bit of an overstatement, the evidence from the United States on the costs of healthier diets is also limited and mixed.

Some interventions studies suggest that healthier diets are not more costly. Mitchell et al. (2000) found that dietary costs for young children on a low-fat diet were not greater. In an evaluation of a family-based obesity treatment program in New York State, Raynor et al. found, "Adopting a lower-energy, nutrition-dense diet did not increase dietary costs over time. Consequently, cost should not be a barrier in the adoption of a healthful diet. (p. 645)." In another U.S. study, Burney and Haughton examined the impacts of participation in the Expanded Food and Nutrition Education Program (EFNEP). They found that program participants were able to reduce their

family food expenditures \$10-\$20 per year while consuming more fruit, vegetables, bread, carbohydrate, iron, vitamin C, and fiber.

Yet, other studies suggest that healthier diets are more expensive. Putnam et al. (2002) reported that – based on 1999 supermarket scanner data – prices of breads and other baked goods were one-third higher for whole grain versions of the same item. Jetter and Cassady (2005; 2006) conducted market basket studies of stores in Sacramento and Los Angeles comparing the TFP with a healthier market basket. This healthier market basket had four times the dietary fiber and one fifth the fat of the TFP. They stated, “No research to date has examined the cost of healthier alternatives to the TFP (pp.39).” They estimated the cost of the healthier market basket ranged from 15-22 percent higher than the TFP, with an average price premium of 18 percent. Neault et al. (2005) conducted a similar exercise, substituting healthier items into the TFP and calculating market basket costs in Boston. They found that the healthier basket cost 23 percent more than the TFP.

The studies cited here vary in terms of whether they are looking at diets of children or adults, whether they are improvements over moderately healthy diets or more pronounced interventions to treat obesity, and whether they are comparing actual expenditures to market baskets (which are price indexes).

Our present study will directly calculate the cost of purchasing the TFP versus two alternative baskets. The first is a Healthier basket based on Jetter and Cassady. The second is a market basket used by the Urban and Environmental Policy Institute (UEPI) of Occidental College. The UEPI basket includes more servings of fruits and vegetables than either the TFP or Jetter and Cassady’s Healthier market basket.

### **Are healthier items available at stores near the study area?**

Jetter and Cassady (2005) found that when healthier items were unavailable, they were “usually in an independent store in a very low- or low-income neighborhood. (p. 2)” There has been a burgeoning social science literature and debate about the existence and policy implications of “food deserts” – low income areas where people do not have access to healthy food items (or to stores carrying those items). While an older literature examined whether the poor pay more for food (see Kaufman et al. for a comprehensive survey), this newer literature focuses not only on prices, but also the availability of healthier items (Cummins et al., 2005; Furey et al., 2001; Guy and Gemma, 2004; Whelan, 2002; Wrigley, 2002a, 2002b; Wrigley et al. 2002, 2003). This study will examine whether there is a general lack of availability of more nutritious or healthy items available at local stores.

### **How much could Mobile Market purchases reduce the cost purchasing the TFP or healthier variants?**

This question will be addressed directly by calculating the costs of purchasing the TFP, Healthier, and UEPI baskets at local grocery stores in the study area, then calculating how much these purchase costs could be reduced by buying items at the mobile markets. The mobile markets do not carry all items in the three market baskets. For example, they do not sell fresh milk. This calculation looks at the potential cost savings of supplementing regular grocery store purchases with purchases from the mobile markets.

**How much do Mobile Market customers save on their actual purchases?**

This question is addressed by calculating how much it would cost to purchase items sold at the mobile markets at local grocery stores. The three market baskets are price indexes, while mobile market sales are actual community expenditures. Measuring cost differences of actual purchases provides a better indicator of how much each mobile market visit saves the community in food costs.

### Chapter 3. The Study Areas

The area of the New Pascua Yaqui Pueblo corresponds most closely to Census Tract 59 for Pima County, Arizona in the 2000 Decennial Census. The area of the Old Nogales Highway (ONH) Colonia corresponds to Census Tract 41.06.

Table 3-1 compares nativity, citizenship and languages spoken with averages for Pima County as a whole. Spanish is the most common language spoken at home in the Pascua Yaqui Pueblo, while nearly 44 percent of the population of the ONH Colonia speaks Spanish at home. In Pima County as a whole, nearly 23 percent of the population speaks Spanish at home. In the colonia, nearly 10 percent of the people are not citizens, slightly higher than the county average. Nearly all of the population in the pueblo was born in the United States.

**Table 3-1. Nativity, citizenship, and language spoken at home**

	Old Nogales Highway Colo- nia	Pascua Yaqui Pueblo	Pima County
	%	%	%
Born in United States	84.3	97.1	88.1
Foreign born, naturalized citizen	5.9	1.4	4.7
Foreign born, not a citizen	9.8	1.4	7.2
Speak only English	53.4	31.0	72.5
Spanish	43.8	64.0	22.8
Native North American languages	1.1	4.0	0.8

Source: 2000 Decennial Census

Median incomes in both study areas are substantially lower than for the county as a whole (Table 3-2). Median family income in the pueblo is less than half that of the county, while in the colonia it is 26 percent less than the county's. The difference in per capita income is more pronounced, with annual per capita income less than \$6,000 in the pueblo. Median earnings for full-time workers are also lower than the county median. In the colonia, median earnings are greater for female than male workers. This differs from the pueblo and the county as a whole.

**Table 3-2. Median income**

	Old Nogales Highway Colo- nia	Pascua Yaqui Pueblo	Pima County
Median family income	\$32,900	\$21,293	\$44,446
Per capita income	\$10,033	\$5,921	\$19,785
Median earnings, Male full-time, year-round workers	\$18,544	\$21,439	\$32,156
Median Earnings, Female full-time, year-round workers	\$21,204	\$18,715	\$24,959

Source: 2000 Decennial Census

Table 3-3 considers housing characteristics as well as access to and use of vehicles. Over two thirds of the housing structures in the colonia are mobile homes. While lack of complete kitchen facilities does not appear significant, there is a more significant share of the housing units without phone service, 6.5 percent in the colonia and 10.1 percent in the pueblo.

Given that the closest full-service grocery store is more than a five mile round trip from the pueblo and ten miles from the colonia and given that bus services is quite limited in the area, access to a vehicle is critical for food shopping. In the pueblo, about one in six housing units in the pueblo do not have an available vehicle and 44 percent have only one available vehicle. In the colonia only 4 percent of housing units are without a vehicle, while 32 percent have one available vehicle. More than 80 percent of workers drive to work from the pueblo, while over 94 percent drive to work from the colonia. For households with one vehicle this limits the availability of vehicles to go food shopping. Table 3-3 also shows a greater reliance on car pooling in the study areas than in the county as a whole.

	Old Nogales Highway Colonia	Pascua Yaqui Pueblo	Pima County
	%	%	%
Mobile homes as a percent of all housing units	67.8	0.3	12.8
% of housing units lacking complete kitchen facilities	0	0.7	0.7
% of housing units with no telephone service	6.5	10.1	2.7
Vehicles available, none	4.1	16.8	9
Vehicles available, one	32	44	40.1
Percent of workers who commute by car, truck or van	94.5	80.6	88.5
Drove alone	71.8	61.4	73.8
Carpooled	22.6	19.2	14.7

## Chapter 4. Methods

### Basic approach

First, in-person interviews of mobile market patrons at the Pascua Yaqui and Summit View sites were conducted. Basic information was collected for patron attitudes about the mobile market and about their regular food shopping patterns. Interviews were carried out in either English or Spanish. From these interviews, we obtained a list of the grocery stores where mobile market patrons regularly shopped. Not surprisingly these matched the closest full-service grocery to their neighborhoods.

Next, these stores were surveyed to calculate the cost of purchasing the Thrifty Food Plan (TFP) the Healthier market basket (patterned after Jetter and Cassady), and the Urban and Environmental Policy Institute (UEPI) market basket. Stores and mobile markets were surveyed in the same week to account for seasonal volatility in food prices. The costs of the three base market baskets (TFP, Healthier, and UEPI) were calculated first. Next, we substituted prices of items that were (a) available at the mobile market in that week and (b) at a lower price than at the chosen stores. This measures the maximum potential reduction in the cost of the market basket through substituting mobile market purchases for regular store purchases.

The mobile market – supermarket comparison was also made to ask, how much more expensive would mobile market purchases have been if they were made at local grocery stores. To address these questions, the Pascua Yaqui mobile market was surveyed twice in May, 2006. The prices, quantities, weight and sizes of all items sold were recorded. In this case, the actual mobile market purchases formed the market basket. Local grocery stores were then surveyed in the same week as the mobile market to calculate the cost of purchasing all the items that were sold at the mobile market at those stores.

### Store selection

Stores were chosen based on survey responses. The market basket surveys were confined to large supermarkets. Although many convenience stores are located closer to the neighborhoods surrounding the mobile market sites, respondents named large stores as the primary place they shopped. The closest store to the Pascua Yaqui mobile market was 2.7 miles away and the next closest, 4.25 miles away. The closest store to the Summit View mobile market was 5.01 miles away and the next closest, 5.61 miles away.

### Market survey design and data collection

Items used to calculate the TFP come from the version of the TFP published in Appendix A of the *USDA Community Food Security Assessment Toolkit* (Cohen, 2002). This is a one-week version of the TFP for a family of four with two small children. The list of items is in Box 3-C, Appendix C: Food Store Survey Instrument and Materials of the report: <http://www.ers.usda.gov/publications/efan02013/efan02013appc.pdf>.

After conducting a pilot survey, we made two changes to the survey published in the *Toolkit*. First, we rearranged the survey template to group items based on how they are found in the store, rather than by food group (as in the *Toolkit*). For example, frozen fish and frozen vegetables were grouped together with items found in the freezer section of stores, rather than grouping frozen and fresh vegetables together and grouping frozen fish with fresh fish and meats. Because data had to be collected for three market baskets, it took about four person-hours per store to complete, check

(and if necessary, correct) the surveys. Second, imitation vanilla was substituted for real vanilla in the TFP and Healthier market baskets because real vanilla was significantly more expensive.

The Healthier market basket was patterned after Jetter and Cassady (2005; 2006). The healthier market basket is constructed by substituting healthier variants of items into the standard TFP. For example, whole grain bread is substituted for enriched white bread and (lower fat) skinless chicken is substituted for chicken with skin. Jetter and Cassady (2006) note, “By making the described substitutions, the healthier market basket has four times the amount of fiber and one fifth the grams of total fat than the TFP market basket (p. 39).” Table 4-1 shows the items substituted to create our Healthier market basket. For whole wheat breads, care was taken to select breads that actually had higher fiber content than white bread. Stores carry a number of “brown” breads with little or no extra fiber.

**Table 4-1. Substitutions made to Thrifty Food Plan to construct Healthier basket**

<i>Thrifty Food Plan</i>	<i>Healthier Substitute</i>
Enriched White Bread	100% Whole Grain Bread
Canned Peaches (heavy syrup)	Canned Peaches (light syrup or juice)
Canned Pears (heavy syrup)	Canned Pears (light syrup or juice)
Cottage Cheese	Cottage Cheese (low fat)
Chicken (with skin)	Chicken (skinless)
Vegetable oil	Canola oil
Corn flakes	Bran flakes
Whole egg noodles	Yokeless egg noodles
White flour	Whole wheat flour
Frozen French fries	Potatoes
Frozen fish (breaded)	Frozen fish (unbreaded)
Ground meat	Ground meat (<10% fat)
1% and whole milk	1% and nonfat milk
White rice	Brown rice
Salad dressing	Salad dressing (low fat)
Enriched spaghetti	Whole wheat spaghetti
Margarine Bagels	“Healthy” spread
English muffins	Whole wheat English muffins
Bagels	Whole wheat bagels
Hamburger buns	High fiber hamburger buns

We deviated from Jetter and Cassady in two respects. First, we used the one-week TFP from the USDA Toolkit, while they used a two-week version of the TFP. Second, we did not substitute albacore tuna as a healthier variant of light chunk tuna. Light chunk tuna has 20% more cholesterol than albacore tuna, but it also has half the fat of albacore, so its superiority seemed uncertain.

The UEPI market basket was taken from Vallianatos et al. (2004). It is available in the appendix: [http://departments.oxy.edu/uepi/cfj/publications/thinking\\_outside\\_the\\_big\\_box.pdf](http://departments.oxy.edu/uepi/cfj/publications/thinking_outside_the_big_box.pdf). The UEPI basket includes more grains, legumes, and fresh fruits and vegetables than the TFP, but does not include

ready-to-eat cereals, spices, condiments, or frozen items in the TFP. Nor does the UEPI basket include certain meat and sugar and sweets items that are in the TFP (Vallianatos et al.).

The lowest price available per unit for each item was recorded in the survey. When store membership discounts were available, these were included. Also in-store sales prices on the day of the survey were included. Discounts from coupons were not included. The quantity or sizes of items were chosen to match those of the TFP in the USDA *Toolkit* or the UEPI basket. Item sizes were matched to those in the base market baskets even if there were discounts for bulk purchases. If an item was missing in a store, following convention of previous market basket studies, average prices from other stores were used as substitutes (Andrews et al., Kaufman et al.). Also, it was recorded when items were unavailable in particular stores.

Prices from the mobile markets were taken in the same week as for grocery stores. Item prices were converted to the same units as the store market baskets. For example, if the TFP included a 15.25 ounce can of fruit, while the mobile market had the same item in a 16 ounce can. The base mobile market price was multiplied by  $15.25/16$ . For the calculation of the impact of mobile market substitution on the cost of the three market baskets, surveys were conducted in late winter and late spring.

The next phase of surveys, calculated how much more expensive mobile market purchases would be if purchased at local stores. Items sold, quantities, prices and total expenditures were calculated at the Pascua Yaqui mobile market in the first and third weeks of May 2006. Next the prices and total cost of purchasing these same items at three local stores were recorded over the same period. If items sold at the mobile market were not available at a local store, average prices from the other stores were used as substitutes.

### **Data analysis**

Our very small sample size precluded a number of possible statistical tests of the data. However, some of the differences in prices were large enough to be statistically significant using paired t-tests, even with few degrees of freedom.

## Chapter 5. Results

### Characteristics of mobile market survey respondents

All survey respondents at the Pascua Yaqui market were 55 years old or older (Table 5-1). This is not surprising considering the market operates just outside the tribal senior center. The mobile market at Summit View Elementary school targets families with younger children and 5 of 9 respondents were younger than 45. Median household size of Pascua Yaqui respondents was 2, with a median of 0 children. Median household size of Summit View respondents was 4, with a median of 2 children. One respondent at Summit view participates in WIC and another participates in both WIC and receives food stamps.

**Table 5-1. Age distribution of mobile market survey respondents**

Age	Pascua Yaqui	Summit View
< 25	0	0
25-34	0	4
35-44	0	1
45-54	0	1
55-64	4	1
>64	4	2
Total	8	9

Most respondents were not working for pay outside the home. Five of 8 Pascua Yaqui respondents identified themselves as retired, while 7 Summit View respondents identified themselves as homemakers. The markets operate on alternating Tuesdays from 9:00 a.m. to 1 p.m., which would be a constraint for potential patrons with full time jobs.

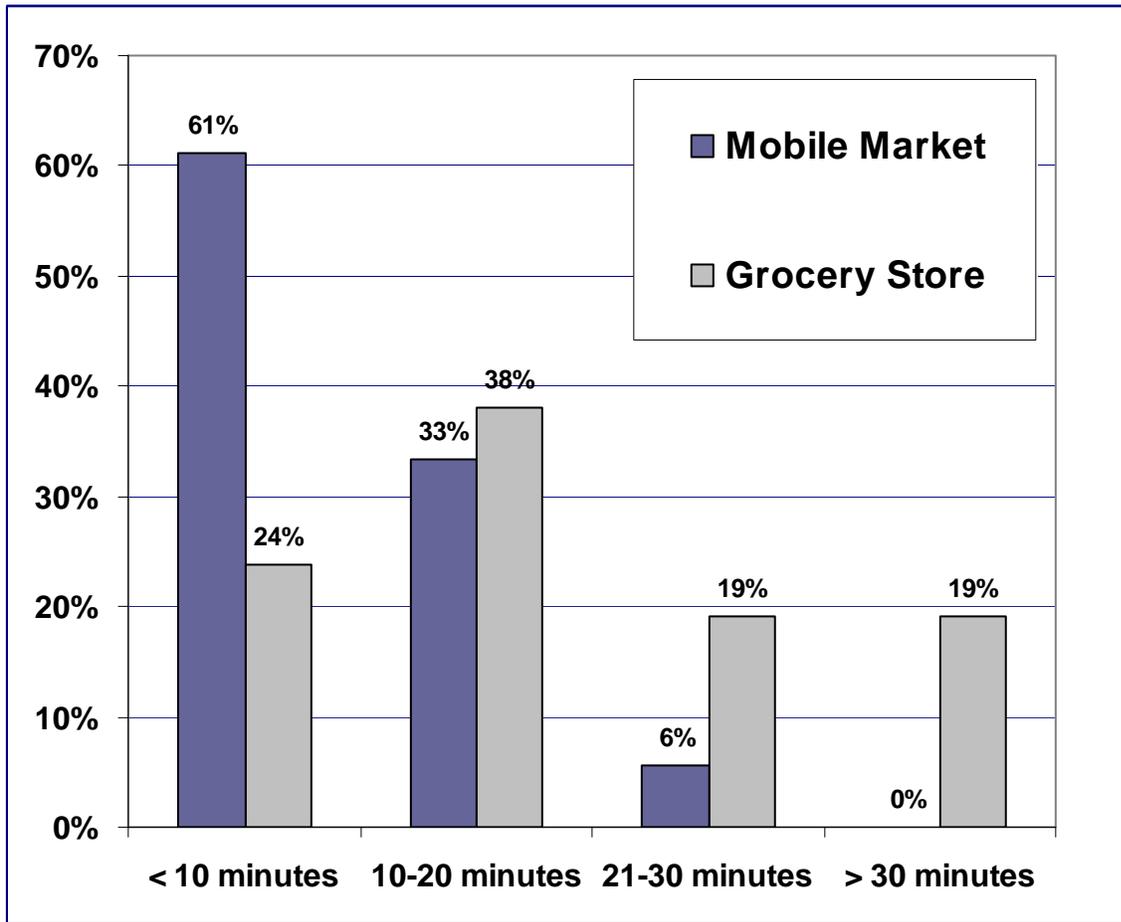
**Table 5-2. Occupations of mobile market survey respondents**

Retired	Pascua Yaqui	Summit View
Retired	5	0
Homemaker	0	7
Other	0	1
No response	3	1
Total	8	9

### Travel time to stores

More than 60 percent of mobile market patrons surveyed said that their travel time to the mobile market was less than 10 minutes, while 24 percent of patrons said that they traveled less than 10 minutes to their local grocery store (Figure 5-1). Travel time to the mobile market was less than 20 minutes for 94 percent of mobile market respondents. In contrast, 19 percent said that average one-way travel time to grocery stores was 21-30 minutes and 19 percent said that average travel time was >30 minutes.

**Figure 5-1. Average travel times to the mobile market are lower than average travel times to the grocery store**



18 responses for mobile market times; 21 responses for grocery store times

### **Mobile market expenditures**

Survey respondents were asked about their average expenditures per mobile market visit. Averaging over all responses, this came to \$8.03 per visit. When respondents gave a range of spending (for example \$10-\$15) we selected the midpoint value (\$12.50). This \$8.03 figure is consistent with mobile market sales log data, which records total sales (including food stamp sales) and number of customers.

According to *Consumer Expenditures in 2004* published by the Bureau of Labor Statistics, average annual expenditures per consumer unit were \$2,044 for the lowest quintile of income (poorest 20%). This amounts to \$39.31 per week. For the second lowest quintile, average annual expenditures for food at home were \$2,659, or \$51.13 per week. So, expenditures of \$8.03 per customer unit at the mobile market are equivalent to about 20 percent of weekly expenditures on food at home by the poorest quintile of the U.S. population and about 16 percent for the next poorest quintile. Mobile markets visit sites twice a month, so average mobile market expenditures are equivalent to about 10 percent of the national average of monthly expenditures on food at home by the poorest 20 percent of customer units.

## How does the cost of purchasing the Thrifty Food Plan in the study area compare with the rest of the United States?

Six stores were surveyed, three in January and three in May. Averaged across three stores in each month the cost of purchasing the TFP was 3 cents less than the national average in January, but \$10 less in May (Table 5-3). The store prices included discounts for in-store sales at the time of the survey and discounts from use of supermarket chain discount cards. Store prices do not include coupon discounts. Most store prices in the study area were lower than the national average. At Store 2, however, the closest store to the Pascua Yaqui Pueblo, the TFP cost was 17 percent higher than the national average.

**Table 5-3. Cost of purchasing the Thrifty Food Plan at six stores in the study area compared to the monthly average U.S. cost**

<i>January</i>				
Store 1	Store 2	Store 3	3-Store Average	U.S. Average
\$97.33	\$ 121.27	\$91.51	\$103.37	\$ 103.40
<i>May</i>				
Store 4	Store 5	Store 6	3-Store Average	U.S. Average
\$90.12	\$ 100.08	\$86.50	\$92.23	\$ 102.40

Somewhat surprising (at least to us) was the large difference in prices between stores. Store 2's prices were 33% higher than Store 3's in the same survey period. Store 5's prices were 16% higher than Store 6's in the same survey period.

## What is the extra cost of purchasing a healthier market basket?

For all six stores, the Healthier market basket was more expensive than the TFP (Table 5-4). Even with a small sample size, the difference was significant at the 1-percent level using a paired t-test. The six-store average cost difference was \$10.33, for an average price premium of 10 percent. This is lower than the 18 percent average premium Jetter and Cassidy (2005; 2006) found for Sacramento and Los Angeles. Again, there is a considerable cost difference across stores, with the Healthier basket cost ranging from \$99.13 to \$140.24.

**Table 5-4. Average cost of Thrifty Food Plan and healthier market baskets**

	Store 1	Store 2	Store 3	Store 4	Store 5	Store 6	6-Store Average
TFP	\$97.33	\$121.27	\$91.51	\$90.12	\$100.08	\$86.50	\$97.80
Healthier Basket	\$100.98	\$140.24	\$103.26	\$99.13	\$105.35	\$99.84	\$108.13
Cost Difference	\$3.65	\$18.97	\$11.75	\$9.01	\$5.27	\$13.34	\$10.33
Percent Difference	3.8%	15.6%	12.8%	10.0%	5.3%	15.4%	10.6%
TFP	\$97.33	\$121.27	\$91.51	\$90.12	\$100.08	\$86.50	\$97.80
UEPI Basket	\$91.48	\$118.50	\$91.11	\$91.36	\$115.45	\$95.61	\$100.58
Cost Difference	\$(5.86)	\$(2.78)	\$(0.40)	\$1.24	\$15.37	\$9.11	\$2.78
Percent Difference	-6.0%	-2.3%	-0.4%	1.4%	15.4%	10.5%	2.8%

Results were mixed for the UEPI market basket (Table 5-4). For three stores the UEPI basket cost less than the TFP. The UEPI basket includes more grains, legumes, and fresh fruits and vegetables than the TFP, but does not include ready-to-eat cereals, spices, condiments, or frozen items in the TFP. Nor does the UEPI basket include certain meat and sugar and sweets items that are in the TFP (Vallianatos et al.).

**Are healthier items available at stores near the study area?**

Table 5-5 lists items that were not available at one or more stores at the time of the surveys. Whole wheat bread and grain items, ground beef with < 10% fat, and yolk free noodles were more likely to be unavailable. Jetter and Cassady (2005; 2006) also found that whole wheat bread and grain items and ground beef with < 10% were more likely to be unavailable in their survey of California stores.

**Table 5-5. Items unavailable in stores at time of survey**

- fish, unbreaded frozen filets
- French bread
- fish, fresh
- ground beef < 10% fat (2)
- hamburger buns, high fiber
- pearl barley (2)
- pears, canned in light syrup
- whole wheat bagels (2)
- whole wheat flour
- whole wheat English muffins
- whole wheat spaghetti
- yolk free noodles (2)

(2) means item unavailable at two of the six surveyed stores.

**Table 5-6. Item availability and healthier market basket cost**

Store	Cost of Healthier Basket	Number of Unavailable Items
4	\$99.13	2
6	\$99.84	8
1	\$100.98	0
3	\$103.26	6
5	\$105.35	0
2	\$140.24	0

Table 5-6 shows the relationship between the cost of the Healthier market basket and the number of items that were unavailable at given stores. Our sample size is too small to be able to say anything definitive, but the two stores with the lowest market basket cost have the most items unavailable, while the two most expensive stores had no unavailable items. Jetter and Cassady

(2006) found nearly all items “that were never available were recorded for stores located in very low- or low- income neighborhoods (p. 41).” On average, Healthy basket prices were about 11 percent lower at these stores than in stores in other neighborhoods. A question for future research (and a testable hypothesis) is whether consumers face a trade-off between low cost and availability of healthier items.

**How much could Mobile Market purchases reduce the cost purchasing the TFP or healthier variants?**

Table 5-7 shows the reduction in the cost of purchasing the three market baskets by substituting mobile market purchases (wherever possible) for regular grocery store purchases. For example, if someone purchased the TFP shopping solely at Store 1, the cost would be \$9.49 higher than if they purchased items from both Store 1 and the mobile market, purchasing from the place with the lowest price. This provides an estimate of the potential for mobile market purchases to reduce the cost of purchasing a given market basket. Substituting mobile market purchases for regular grocery store purchases reduces the cost of buying the TFP by an average of \$9.42 (10 percent), reduces the cost of the Healthier basket \$6.62 (6 percent), and reduces the cost of the UEPI basket \$7.63 (7 percent).

**Table 5-7. Potential cost savings by substituting mobile market purchases in market baskets**

	Store 1	Store 2	Store 3	Store 4	Store 5	Store 6	6-store Average
<i>Baseline cost savings</i>							
Cost savings with mobile market substitution (\$)							
TFP	\$9.49	\$15.26	\$4.63	\$8.79	\$9.35	\$9.01	\$9.42
UC-Davis Healthier	\$7.69	\$11.47	\$2.49	\$9.14	\$0.78	\$8.13	\$6.62
OC-UEPI Basket	\$6.15	\$14.64	\$4.77	\$5.10	\$12.27	\$2.88	\$7.63
Cost savings with mobile market substitution (%)							
TFP	10%	13%	5%	10%	9%	10%	10%
UC-Davis Healthier	8%	8%	2%	9%	1%	8%	6%
OC-UEPI Basket	7%	12%	5%	6%	11%	3%	7%
<i>Cost savings including free bread</i>							
Cost savings with mobile market substitution (\$)							
TFP	\$12.46	\$17.75	\$7.61	\$10.97	\$12.34	\$11.79	\$12.15
UC-Davis Healthier	\$11.69	\$14.47	\$6.47	\$11.98	\$4.76	\$12.11	\$10.25
OC-UEPI Basket	\$9.12	\$17.13	\$7.75	\$7.28	\$15.26	\$5.66	\$10.37
Cost savings with mobile market substitution (%)							
TFP	13%	15%	8%	12%	12%	14%	12%
UC-Davis Healthier	12%	10%	5%	12%	5%	12%	9%
OC-UEPI Basket	10%	14%	8%	8%	13%	6%	10%

Why does mobile market substitution have less of an impact on the healthier market baskets? The reason is that the mobile markets carry more items that are in the TFP than items that are in the other two baskets. For example, the TFP has canned fruit in heavy syrup, while the UC-Davis Healthier basket has canned fruit in light syrup or juice. If the mobile market only carried fruit in heavy syrup in the reference period, it would reduce the cost of the TFP, but not the Healthier basket.

Periodically, the mobile market receives free bread that it provides free to patrons. Table 5-7 also shows how providing free bread increases the potential cost savings from mobile market participation. If one includes free bread, substituting mobile market purchases reduces market basket costs 9-12 percent. Given that mobile markets visit sites every other week, the monthly reduction in market basket costs would range between \$20 and \$25 per month.

The difference between the base market basket costs and the costs with mobile market substitution were significantly different, even with a sample size of only 6 observations. Paired t-tests were used to test the null hypothesis that mobile market substitution does not reduce the average cost of a market basket. This hypothesis was rejected at the 1 percent level for all three market baskets. The t-statistic for the test of difference in means was 6.79 (5 d.f.) for the TFP, 3.94 (5 d.f.) for the Healthier basket, and 3.99 (5 d.f.) for the UEPI basket.

### **How does the cost of items actually purchased at mobile markets compare to the cost of purchasing the same bundle of items at local supermarkets?**

The first (numerical) column of Table 5-8 shows actual expenditures at the Pascua Yaqui mobile market in May, 2006. In early May the sales volume (\$167.70) was higher than in late May (\$82.69). To the right of these numbers are the costs of purchasing the same bundle of items at three local supermarkets. For each item, the lowest cost version of the same (or closest) quantity or weight was chosen for comparison. When quantities or weights at stores differed from the mobile market, prices were scaled to capture the cost of purchasing the same amount as the mobile market. For example, if a 16 ounce can of vegetables sold for \$0.50 at the mobile market, while a 15 ounce can sold for \$0.75 at the supermarket, then the supermarket price would be adjusted by  $16/15 \times \$0.75 = \$0.80$ . Supermarket costs were also adjusted upward to account for the 7-percent sales tax on non-food items (such as laundry soap or baby wipes) in Pima County, Arizona. Because the Tucson Community Food Bank is a non-profit organization, mobile markets are not required to charge a sales tax for these items.

Table 5-8 reports cost differences in a number of ways. “Difference from Mobile Market Cost” is just the dollar difference in cost. It represents how much more mobile market purchases would have cost if purchased at local supermarkets. This row provides a rough measure of how much money each mobile market visit saves a community. This cost savings will vary by store and mobile market sales volume. For the mobile market visit with lower volume sales, the total community savings ranged from \$40.44 to \$69.71 with an average of \$54.43. For the higher sales volume visit, community savings ranged from \$75.65 to \$143.68, with an average of \$99.01. Averaged over all stores for the month, community cost savings were \$76.72 per visit. In May, market had a total of 46 customers, so savings averaged about \$3.34 per customer.

Cost savings can be broken down into savings by different food groups. At the May 2006 Pascua Yaqui mobile markets, meats accounted for 17 percent of the monthly savings, cheeses 16 percent, fresh fruits and vegetables 11 percent, instant potatoes 7 percent, canned fruits and vegetables 3 percent. Energy dense items such as cake mix, frosting pudding, cookie mix, fig bars, jams, and jellies accounted for 15 percent of the cost savings.

**Table 5-8. Cost comparison of items sold at mobile market with local stores  
Pascua Yaqui site, May 2006**

	Mobile Market	Store 4	Store 5	Store 6	Average
<i>Higher Volume Sales</i>					
Cost of Items Sold	\$167.70	\$243.35	\$311.38	\$245.41	\$266.71
Difference from Mobile Market Cost		\$75.65	\$143.68	\$77.71	\$99.01
Store Cost as a Percent of Mobile Market Cost		145%	186%	146%	159%
Mobile Market Percent Discount from Store Cost		31%	46%	32%	36%
Community Cost Reduction per Dollar of Mobile Market Sales		\$0.45	\$0.86	\$0.46	\$0.59
<i>Lower Volume Sales</i>					
Cost of Items Sold	82.69	\$135.83	\$152.40	\$123.13	\$137.12
Difference from Mobile Market Cost		\$53.14	\$69.71	\$40.44	\$54.43
Store Cost as a Percent of Mobile Market Cost		164%	184%	149%	166%
Mobile Market Percent Discount from Store Cost		39%	46%	33%	39%
Community Cost Reduction per Dollar of Mobile Market Sales		\$0.64	\$0.84	\$0.49	\$0.66
<i>Combined Sales for Month</i>					
Cost of Items Sold	\$250.39	\$379.18	\$463.78	\$368.53	\$403.83
Difference from Mobile Market Cost		\$128.79	\$213.39	\$118.14	\$153.44
Store Cost as a Percent of Mobile Market Cost		151%	185%	147%	161%
Mobile Market Percent Discount from Store Cost		34%	46%	32%	37%
Community Cost Reduction per Dollar of Mobile Market Sales		\$0.51	\$0.85	\$0.47	\$0.61

The next row of Table 5-8, “Store Cost as a Percent of Mobile Market Cost” simply reports this extra cost as a percent of initial mobile market purchase costs. It shows that the cost of items actually sold at mobile markets would cost 47 to 85 percent more at local supermarkets. The row “Mobile Market Percent Discount from Store Cost” reports how much lower (in percentage terms) mobile market prices are relative to supermarket prices. Combined for May 2006, mobile market purchase costs were 32-46 percent less than the three supermarket prices.

**Table 5-9. Cost comparison of items sold at mobile market with local stores (including 10 loaves of free bread; five enriched white, five whole grain)**

	Mobile Market	Store 4	Store 5	Store 6	Average
<i>Higher Volume Sales</i>					
Cost of Items Sold	\$167.70	\$254.25	\$326.33	\$259.31	\$279.96
Difference from Mobile Market Cost		\$86.55	\$158.63	\$91.61	\$112.26
Store Cost as a Percent of Mobile Market Cost		152%	195%	155%	167%
Mobile Market Percent Discount from Store Cost		34%	49%	35%	40%
Community Cost Reduction per Dollar of Mobile Market Sales		\$0.52	\$0.95	\$0.55	\$0.67
<i>Lower Volume Sales</i>					
Cost of Items Sold	\$82.69	\$146.73	\$167.35	\$137.03	\$150.37
Difference from Mobile Market Cost		\$64.04	\$84.66	\$54.34	\$67.68
Store Cost as a Percent of Mobile Market Cost		177%	202%	166%	182%
Mobile Market Percent Discount from Store Cost		44%	51%	40%	45%
Community Cost Reduction per Dollar of Mobile Market Sales		\$0.77	\$1.02	\$0.66	\$0.82
<i>Combined Sales</i>					
Cost of Items Sold	\$250.39	\$400.98	\$493.68	\$396.33	\$430.33
Difference from Mobile Market Cost		\$150.59	\$243.29	\$145.94	\$179.94
Store Cost as a Percent of Mobile Market Cost		160%	197%	158%	172%
Mobile Market Percent Discount from Store Cost		38%	49%	37%	41%
Community Cost Reduction per Dollar of Mobile Market Sales		\$0.60	\$0.97	\$0.58	\$0.72

The row “Community Cost Reduction per Dollar of Mobile Market Sales” represents how much each dollar spent at the mobile market reduces the community cost of purchasing items. For example, if a good sold for \$1.00 at the mobile market, but for \$1.80 at a local store, then the cost reduction would be \$0.80 per dollar of mobile market sales. Combined sales at the Pascua Yaqui mobile market were \$250.39 in May, 2006. Averaged across the three stores, for every dollar in mobile market sales, the cost to the community of purchasing items fell \$0.61. This indicator can be used to examine how total community benefits might increase with an increase in sales volume.

Table 5-9 shows the impact of including just 10 loaves of bread (5 enriched white and 5 whole grain loaves) in the cost comparison. The community cost reduction per dollar of mobile market sales increases to \$0.72 per dollar of sales, while average community cost reduction per mobile market visit increases to \$89.97 per visit for the month.

## Chapter 6. Discussion

In the study area, mobile markets offer significant discounts over regular grocery store prices. By participating in mobile markets in the study area a family of four could reduce the cost of purchasing the Thrifty Food Plan an average of 12 percent. The cost of purchasing healthier alternative market baskets could be reduced 9-10 percent (when free bread is also offered). Looking at actual purchases rather than hypothetical market baskets, the price discounts are larger. If all the items sold at two mobile markets at the Pascua Yaqui Pueblo in May 2006 were purchased at local grocery stores, they would have cost 47 to 85 percent more. On average, the community saved 61 cents for every dollar spent at the mobile markets.

The absolute dollar gains to mobile market participation are limited by overall sales volume. Survey respondents said that they spent an average of \$8 per visit to the mobile market. This spending estimate per customer is consistent with mobile market sales records. Gross sales per mobile market visit are typically less than \$200. So, even though percentage savings are large, the absolute dollar savings are limited. In May 2006, sales averaged \$125.20 per mobile market visit, with total cost savings to the community ranging from \$59-\$107 per visit. If 5 loaves of free white bread and 5 loaves of free whole grain bread are included in the calculation, total community cost reduction per mobile market visit increases to \$75-\$122 per visit. Community cost savings increase proportionally with total sales volume, so cost savings will be greater in months with greater sales, if free bread is also provided, and if sales increase in the future.

There was some evidence that households face a trade-off between grocery prices and availability of healthier items at stores. Stores with the lowest market basket costs had the most unavailable items, while the two most expensive stores had no unavailable items. Our sample size is too small to determine whether there is a systematic pattern. Future research will examine this question more specifically using a larger sample of stores.

There are three other issues that arose in the middle of this study that we hope to address in future research. The first is the impact of mobile markets on the number of trips people make to regular grocery stores. Given that trips from the study areas to grocery stores are 5 to 12 miles round trip, any savings in number of trips would translate into reduced spending on gasoline.

The second issue is the use of store membership discount cards. The major stores that mobile market patrons said they visit offer membership discount cards. In calculating market basket prices the lowest price available was selected. This was often the price with the membership discount. This raises a series of questions. First, do people in the communities served by the mobile markets use membership discount cards? If not, this means that our estimates of the cost savings from mobile markets are understated. Second, if people are not using discount cards, why aren't they using them? Are they unaware of how to apply or the savings possible? What barriers or constraints do they face? Third, how large are the savings from these cards and what is the cost (in terms of extra grocery prices) of not using them?

Finally, we wish to obtain more information about local purchases at convenience stores. Prices at convenience or other small stores are often significantly higher than at supermarkets (Kaufman et al.). Also the selection of healthier items is more limited. Based on a limited number of interview responses, mobile market customers did not report relying much on convenience stores for products such as milk, bread, or juice that might be included in our market baskets. Yet, convenience stores regularly stock these items, so someone in the neighborhoods must be buying them. Future research will examine local convenience store purchases and how the mobile markets affect such purchases.

## Chapter 7. Postscript – Stakeholder Response

This final section reports briefly on stakeholder responses to report findings. A preliminary presentation was made at the Tucson Community Food Bank in April, 2006. The question, “How does the cost of items actually purchased at mobile markets compare to the cost of purchasing the same bundle of items at local supermarkets?” was first raised by Food Bank staff at this meeting. They pointed out to us that market baskets do not measure what households actually purchase. This inspired our subsequent analysis that lead to findings reported in Tables 5-8 and 5-9.

Results were also presented to nutrition educators, Cooperative Extension staff and other interested parties at a meeting organized by Pima County Cooperative Extension in September, 2006. Participants were interested in identifying which healthier items were not more expensive than higher fat or lower fiber items. Our preliminary analysis suggests that lower fat dairy products and salad dressing were not more expensive. Future research will examine whether this remains true using a larger, more valid sample size. Nutrition educators indicated that it would be useful to identify ways of increasing fiber consumption and reducing fat consumption at no additional consumer cost. Future research will break down results to identify which items in the healthier market baskets account for the greatest share of added costs and which items can be substituted at little or no cost.

Some officials of the Pascua Yaqui Tribe were interested in the possibility of estimating the cost of purchasing a market basket designed for diabetics. This was beyond the scope of the current project – it would require assistance from nutritionists. However, this is an interesting question, well worth exploring in a future research project.

Finally, peer response to the final report presentation in Washington, DC dealt with the issue of “scaling up” mobile market operations. Here, discussion focused on local barriers to participation in mobile markets and possible ways to expand sales. These included:

- Having more regular times of visits;
- Switching visit times to before or after normal working hours;
- Greater local publicity about the markets in the communities they serve;
- Possible coordination with local grocery stores to get them to begin local food deliveries; grocery stores have more expertise in marketing and distribution and may be able to deliver a comparable service at lower cost;
- Providing transportation to local grocery stores, vouchers for food purchases at local stores, or both as a substitute for operating the market directly.

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