Tri-Chapter Food and Energy Economic Survey Results

August 2013

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Purpose

Community food and energy surveys were developed to compile household-level economic data to help with future economic and community planning.

Food Survey

The community food survey was developed to understand various economic and market behavioral trends of the tri-chapter area. The economic data included information about the amounts of money spent on food. Other information included number of trips to stores per month, which stores were shopped at, and the types of produce and other foods purchased. The food surveys were funded by a grant from the Commuity Food Program of the USDA's National Institute of Food and Agriculture.

Energy Survey

The energy survey was developed to understand types, uses, and amounts of energy sources utilized by community households. This data also included the amounts of money spent on energy. Additional data collected included housing types, insulation, and other energy-saving technologies. The energy surveys were funded by a grant from Honor The Earth.

Methodology

Question Development

The development of questions on the surveys used a multi-tiered process. The first part of the process involved identifying key information that was needed. Second, a rough draft of questions was produced and reviewed by Hasbídító members. Third, the surveys were modified from input by the second part of the process and then were released as a pre-survey to community leaders. The community leaders were asked for their input about the surveys and thoughts about the questions. Fourth, the leadership data was integrated into the final surveys.

Survey Data Gathering

Surveys were developed to collect data at the household level. House-to-house visits by survey takers was the collection method utilized. It seemed the most appropriate considering that most households do not have a linked mailing address or phone number. Also, English literacy is a potential issue so having trained surveyors who are

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fluent in Navajo and English allowed for better understanding of the written surveys.

Three surveyors were contracted to drive house to house. These surveyors coordinated areas where they would collect data so that no overlap would occur. The survey forms each had an envelope they were placed in. The surveys were filled out and then placed into the envelope. Some households requested to have the surveys left and then picked up later. The envelopes with the filled out forms were numbered so that they would not be directly linked back to the household. The envelopes with completed surveys were then stored at a central facility and destroyed when all data was entered.

Data Entry

Filled out surveys were entered into a secured online spreadsheet. Only two people had access to the online form: the data enterer and the project coordinator. Some data had to be transformed to fit the data as needed. The method of this data transformation is noted further in this report.

Data Cleaning

After data was entered, it was reviewed. Data that did not fit the correct data type or range of correct answers were deleted.

Selection of Outliers

Identification of outliers was conducted by utilizing the inter-quartile range technique. The first quartile (Q1) and third quartile (Q3) were calculated. The Q1 is the point where the lowest quarter of the data sits. The Q3 is the point past which the top 25% of data values sit. The inter-quartile range (IQR) is calculated by finding the difference of Q1 and Q3. The IQR is multiplied by 1.5 and is then subtracted from Q1 and added to Q3. This gives a minimum acceptable value and a maximum acceptable value. Any values outside this range is then considered an outlier.

The quartiles were calculated using the quartile function in Open Office Calc version 3.3.0

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Results of Food Economic Survey

Total Responses	383	
Albuquerque	107	27.9%
Aztec	1	0.3%
Bernalillo	69	18.0%
Bloomfield	8	2.1%
Counselor	1	0.3%
Cuba	38	9.9%
Farmington	150	39.2%
Lybrook	2	0.5%
Other	7	1.8%

1. In what area do you do most of your food shopping?

This question looked at primary shopping locations of people in the tri-chapter area. The location of shopping preference is dependent on the household's location in the tri-chapter area. Other data will break this down further. The main areas households shop at are the Farmington and the Bernalillo/Albuquerque areas. This question did not specify Rio Rancho as a shopping location and it probably showed up under some Bernalillo and Albuquerque answers while some may have indicated "other" for Rio Rancho. Cuba provided another major location for shopping. It is not as strong as the other areas mentioned before, but it does provide a relatively convenient place to shop that is close for many tri-chapter households.

Total Responses	371	
Albuquerque	65	17.0%
Aztec	2	0.5%
Bernalillo	79	20.6%
Bloomfield	34	8.9%
Counselor	4	1.0%
Cuba	116	30.3%
Farmington	47	12.3%
Lybrook	10	2.6%
Other	14	3.7%

## 2. If you do food shopping in another area usually, where is it?

As a secondary shopping location, Farmington and Bernalillo/Albuquerque dropped for usage as compared to a primary shopping location. Cuba had the biggest increase in secondary usage. This would make sense due to its relatively close proximity to many of the households in the tri-chapter area. Bloomfield also saw an increase as a secondary shopping area.

3. How often do you go food shopping a month (Major Food Purchases)?

This question is meant to gauge how often households go to make their main grocery purchases. Approximately 50% of households make only 1 or 2 trips per month. Another 41.5% make 3 or 4 trips per month. The remaining 8.7% of households make anywhere between 5 to 8 trips per month. The importance of this question is in relation to fuel usage and food freshness.

Food Shopping Trips/Month		
Total Responses	382	
1	71	18.5%
2	119	31.1%
3	89	23.2%
4	70	18.3%
5	14	3.7%
6	11	2.9%
7	2	0.5%
8	6	1.6%
Average Trips	**2.76**	

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Primary & Secondary Shopping Areas
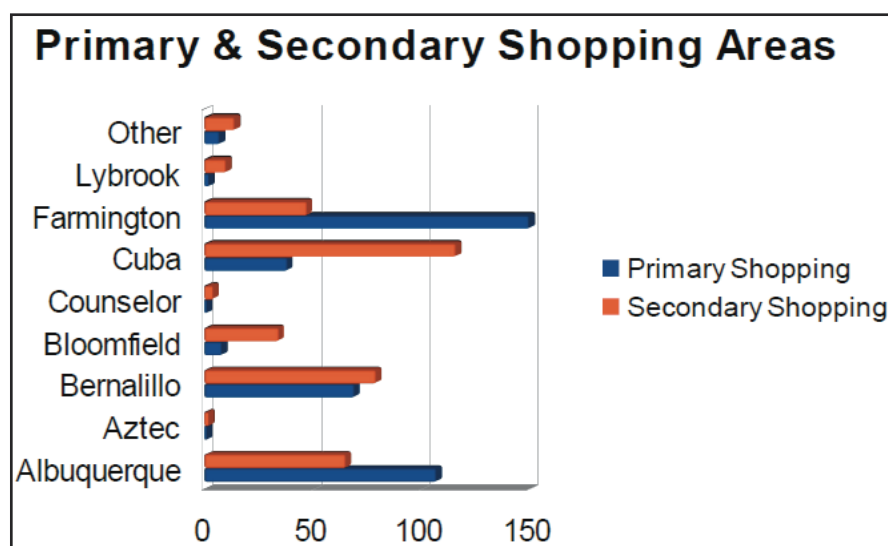
4. What are the top 3 stores you shop at?

This question sought the food shopping behaviors of households in the tri-chapter area. The two main shopping areas are Albuquerque and Farmington. The Albuquerque area includes Albuquerque, Bernalillo, and Rio Rancho. The Farmington area includes Farmington, Bloomfield, and Aztec. Households in Counselor and parts of Ojo Encino utilize the Farmington area more, while Torreon and other parts of Ojo Encino utilize the Albuquerque area more. Cuba, when looked at with other data, is a secondary shopping area that is utilized by many of the chapters probably due to its proximity. The top store that is shopped at whether in the Albuquerque or Farmington areas is Walmart. The next closest listed is Save Way which is in Cuba. However, some answers that list Save Way did not necessarily list a geographic component. Save Way is many times confused with Safeway which is located in both the Albuquerque and Farmington areas. As a result some Save Way answers may have meant Safeway. However, when looking at the location data, the same approximate percentage of households indicate using Cuba for shopping. Since Save Way is the main grocery store in Cuba it is possible that the Save Way result is relatively accurate.

This question is further analyzed on page 14.

Top Ten Stores Shopped At		
Wal Mart	364	39.6%
Save Way	132	14.3%
Farmers	77	8.4%
Albertsons	75	8.2%
Smiths	53	5.8%
Sam's Club	50	5.4%
Blank	24	2.6%
T & T	22	2.4%
Family Dollar	16	1.7%
Lybrook Mercantile	14	1.5%

Area Shopped In:		
ABQ Area	348	36.9%
Farmington Area	287	30.4%
Cuba	133	14.1%
Blank/Other	134	14.2%
Counselor Area	23	2.4%
CP/Gallup/Grants	15	1.6%
Torreon	4	0.4%

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5. Approximately how much does your household spend in total (Money, EBT, Other) on food a month?

Total Food Q.5 Responses	379	
1. Less than $50.00 a month	6	1.60%
2. Between $50.00 and $150.00 a month	48	12.70%
3. Between $150.00 and $300.00 a month	106	28.00%
4. Between $300.00 and $450.00 a month	103	27.20%
5. Between $450.00 and $600.00 a month	70	18.50%
6. Between $600.00 and $750.00 a month	25	6.60%
7. Between $750.00 and $900.00 a month	7	1.80%
8. Between $900.00 and $1050.00 a month	8	2.10%
9. Over $1050.00 a month	6	1.60%

Household spending on groceries is a large part of spending in the tri-chapter area. Trying to gauge the amount of this spending is very useful in understanding the tri-chapter economy better. The average household in the tri-chapter area is estimated to spend about $373 per month on food. This estimate is derived from the information collected asking households to select an approximate range of food spending done over the course of a month. The ranges were relatively narrow but broad enough to ensure that those being surveyed were not giving up to much personal information. To estimate total spending, the middle amount of the range was found and multiplied by the number of households reporting that range.
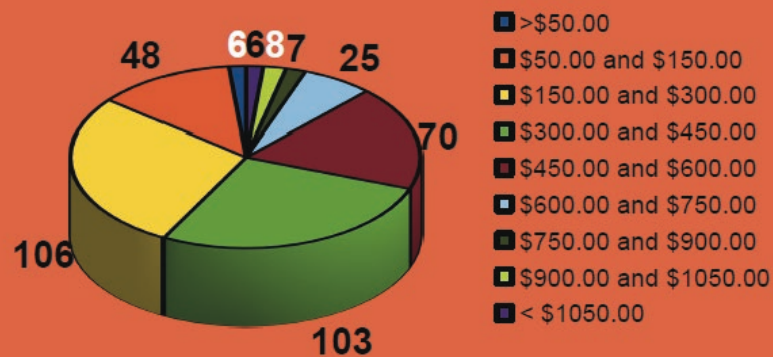
By using these estimates it is possible to estimate the total food expenditures in the tri-chapter area. The latest census indicates about 901 households are in the tri-chapter area. That would equate to $336,000.00 a month being spent on food per month or about $4 million per year.

Monthly Grocery Expenditure

Legend:
- >$50.00
- $50.00 and $150.00
- $150.00 and $300.00
- $300.00 and $450.00
- $450.00 and $600.00
- $600.00 and $750.00
- $750.00 and $900.00
- $900.00 and $1050.00
- < $1050.00

Estimated Household Spend	#	Total $
$50.00	6	$300.00
$100.00	48	$4,800.00
$225.00	106	$23,850.00
$375.00	103	$38,625.00
$525.00	70	$36,750.00
$675.00	25	$16,875.00
$825.00	7	$5,775.00
$975.00	8	$7,800.00
$1,100.00	6	$6,600.00
Total Spending/Month	379	**$141,375.00**

6. On average, about how many people are being regularly fed at your house?

Understanding the numbers of people being fed at households is critical to understanding the

1.5 IQR Outlier			
median	4	Total Records	373
Q1	3	Total Outliers	6
Q3	6	Avg usage w/o	**4.55**
IQR	3		
Inner Fence	4.5		
Inner Min	1		
Inner Max	10.5		

3.0 IQR Outlier			
median	4	Total Records	373
Q1	3	Total Outliers	1
Q3	6	Avg usage w/o	**4.66**
IQR	3		
Outer Fence	9		
Outer Min	0		
Outer Max	15		

per capita spending for food. The two outlier definitions yielded relatively close results. It may be best to utilize the 3.0 outlier method in this case because there are some families which are very large and may be fed at one household. In the 3.0 outlier case, the largest size would be 15. This very large number of people eating at a household is rare, but multiple households eating at one household is probably a usual phenomenon.

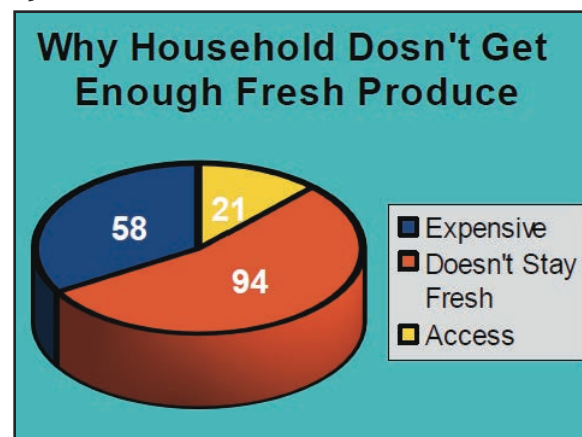Enough Fresh Fruits & Vegetables
Yes 220 / No 165
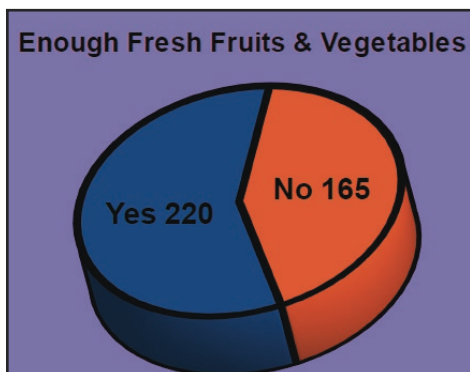
7. Do you feel that you (and the other people in your house) get enough fresh fruits and vegetables?

The majority (57.1%) of households feel that they get enough fresh fruits and vegetables. However, there is a sizable group, 42.9%, that feels they do not. There are still many households that feel they need better access to fresh fruits and vegetables.

8. If NO, why?

For those who answered NO to getting enough fresh fruits and vegatables, there were three main reasons given. The top answer was that it does not stay fresh (54%). The next largest answer was that it is too expensive (33.3%). Then a smaller portion of households felt they don't have enough access to fresh fruits and vegetables (12.1%). All of these answers can help inform programming to help bridge gaps in the way of increased fruit/vegetable consumption.

Why Household Dosn't Get Enough Fresh Produce
58 / 94 / 21 — Expensive, Doesn't Stay Fresh, Access

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9. What types of fresh fruits and vegetables do you buy and consume?

This question asked what types of fresh fruits and vegetables the household buys and consumes. Respondents were free to select and add as many answers as they liked. The list shows the answers that were given and the percentage of households that report consuming them. Potatoes and oranges tied for the number one spot with 94.4% of households responding that they consume these items. The next most popular answer was apples at 92.4%. The fourth spot is held by lettuce at 82.2%. The fifth spot is held by corn at 76.6%. This question indicates what the popularity of various fruits and vegetables are in the tri-chapter area.

Item	Votes	Ranking	%
Potatoes	**323**	**1**	**94.4%**
Oranges	**323**	**1**	**94.4%**
Apples	**316**	**3**	**92.4%**
Lettuce	**281**	**4**	**82.2%**
Corn	**262**	**5**	**76.6%**
Onions	259	6	75.7%
Carrots	220	7	64.3%
Tomatoes	217	8	63.5%
Squash	196	9	57.3%
Pears	157	10	45.9%
Zucchini	153	11	44.7%
Cabbage	135	12	39.5%
Peppers	133	13	38.9%

10. If you could get fresh fruits and vegetables delivered to your local chapter house, would you consider buying more if the price was the same as stores in town?

The vast majority (85.1%) of households responded that they would consider buying competitively priced produce at the chapter house if made available. Reasons for answering NO are detailed in question 11.
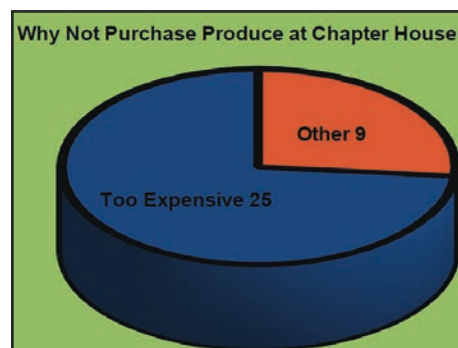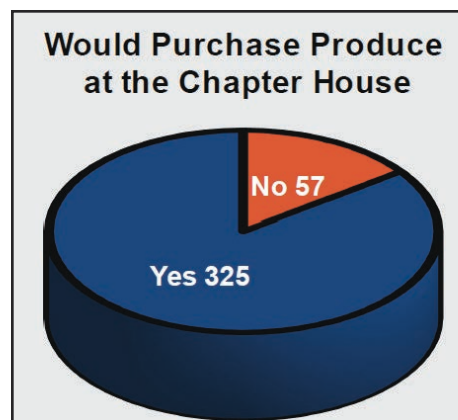
11. If NO, why?

The top answer for why people would not consider purchase fresh fruits and vegetables at the chapter house is because it would be too expensive (69.4%). This was the second highest answer to question 8 which asked why the respondents felt their household did not get adequate access to fresh fruits and vegetables.

12. Do you harvest any "wild" or "Traditional" foods (Pinions, Wild Onions, Rabbit, etc.)

Gathering of wild/traditional foods is still present in the tri-chapter area, with 26.4% of households reporting that they do gather some type of wild/traditional food. Examples were provided in the question to help clarify it. However, it was up to the respondent to interpret what this meant. To gain perspective of what positive respondents meant, question #13 may help to clarify.

Would Purchase Produce at the Chapter House

No 57

Yes 325

Why Not Purchase Produce at Chapter House

Other 9

Too Expensive 25

| Total Food Q.12 Responses	379	
Total Yes	100	26.4%
Total No	279	73.6%

13. If you do harvest any wild or Traditional foods, what are they? (Navajo or English)

The top response to what food items people gathered/used was wild onions. This answer was given by 48.2% of households. The next greatest answer was deer given by 25.5% of households. As a note, elk was named by 15.5% of households. Pi-nons was third highest given answer by 22.7% of households. Corn and Blue Corn Meal were tied for the fourth most given answer each receiving 19.1% of households. See chart on page 12.

Harvest Traditional or Wild Foods

Yes 100
No 279
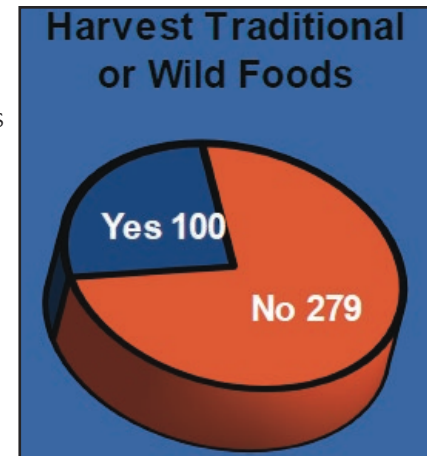
14. Do you usually plant a garden or field?

About one-third of households report planting a garden or field (33.7%).
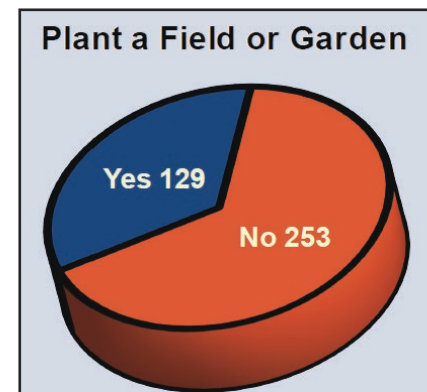
15. If YES, do you eat vegetables or fruits from it?

Of the households that reported planting a garden or field, almost all households (94.6%) eat vegetables or fruits from it.

Plant a Field or Garden
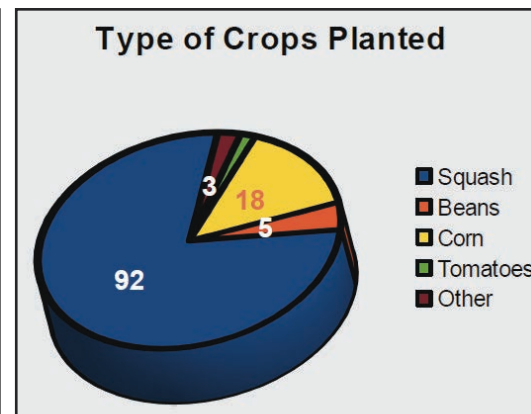
Yes 129
No 253

16. What do you plant?

The top two vegetables that are planted in household gardens or fields are squash (75.4%) and corn (14.8%). Respondents were asked to select only one crop from the list. Most gardens/fields probably contain a variety of crops in them; however, the two mentioned as the top responses are probably the most common and planted in the most abundance.

Total Food Q.16 Responses	120	
1. Squash	92	75.4%
2. Beans	5	4.1%
3. Corn	18	14.8%
4. Tomatoes	2	1.6%
5. Potatoes	0	0.0%
6. Other	3	2.5%

Do You Eat Produce from your Garden

No 7
Yes 122

17. Do you give any of your crop to friends or family?

Most households give some of their crop from their

Give Crops Away

No 25
Yes 104

Type of Crops Planted

3
18
5
92

- Squash
- Beans
- Corn
- Tomatoes
- Other

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field/garden to friends or family (80.6%)

18. Do you sell any of your crop?

A small portion of the households which have a garden/field sell their produce (15.6%). The vast majority of respondents did not indicate that they sell any of their produce. This would mean that the vast majority of household garden/fields are utilized primarily for household consumption (when combined with information from question 15).
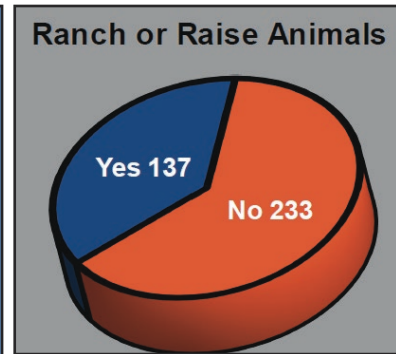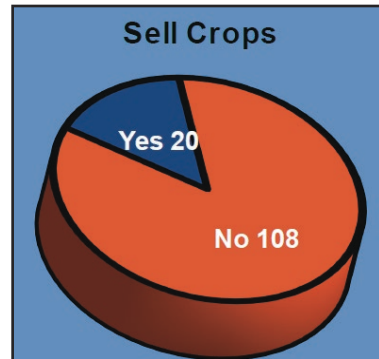
19. Do you do any ranching or animal raising?

A little over one-third of households engage in some type of livestock raising (37%).

20. What types of livestock do you raise?

Respondents were asked to only select one type of livestock that they raise. Presumably, respondents would pick their main livestock. The top response was sheep

Sell Crops

Yes 20

No 108

Ranch or Raise Animals

Yes 137

No 233

Total Households Responded	110 Households with 273 responses	
Unique Listing	# of Responses	Rank
Wild Onions	53	1
Deer	28	2
Pinions	25	3
Blue Corn Meal	21	4
Corn	21	4
Squash	19	6
Elk	17	7
Mutton	15	8
Rabbit	14	9
Navajo Tea	12	10
Wild Parsley	10	11
Wild Carrots	9	12
Watermelon	8	13
Cow Meat	3	14
Prarie Dogs	3	14
Chili	2	16
Pumpkin	2	16
Tomatoes	2	16
Ground Hog	1	19
Peaches	1	19
Pig	1	19
Potatoes	1	19
Sweet Corn	1	19
Sweet Melon	1	19
Tortillas	1	19
Tree Berries	1	19
Wild Berries	1	19

(61.6%). Then three other livestock types were all fairly close in response rates: Cattle (25.6%), Chickens (24.0%), Goats (22.4%).

21. Please circle all that you do with your livestock:

The use of the livestock varies. The question allowed the respondent to select all answers that

Total Household Response	93	
Total Entries	134	
		% of Households
1 Sell it alive	30	32.3%
2 Sell it Butchered	7	7.5%
3 Butcher for my house	43	46.2%
4 Butcher for family out of house	17	18.3%
5 Use for Wool	20	21.5%
6 Use for eggs	14	15.1%
7 Other (Enjoyment/Pets)	3	3.2%

- Burritos
- Navajo Tacos
- Navajo Burgers
- Soda
- Frybread
- Tamales
- Banana Bread
- Nachos
- Steamed Corn
- Gum
- Popsicles
- Meat
- Vegetables
- Fruit
- Salad
- Cookies
- Cake

Sell Any Food

Yes 22

No 345

applied. The top answer was to butcher the animal for home use (46.2%). The next highest answer was to sell the animal alive (32.3%). The third top response was to use the animal for wool(21.5%).

22. Do you sell any food to neighbors or family? (Cookies, Burritos, Bread, Etc.)

A small percentage of households (6.0%) sell food in the area. This represents a portion of the value added food economy which exists in the tri-chapter area.

23. If you do sell any food goods, what do you generally sell?

The respondents were asked to list various types of food that they sell. The above list is a collection of these items that they say they sell.

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Food Survey Question 4 Detailed Analysis

	Counselor	Ojo Encino	Torreon
ABQ Area	5.1%	36.8%	57.8%
Farmington Area	69.4%	30.2%	5.1%
Cuba	9.8%	15.0%	16.2%
Blank/Other	5.1%	16.8%	17.3%
Counselor Area	8.9%	0.6%	0.0%
CP/Gallup/Grants	1.7%	0.6%	2.4%
Torreon	0.0%	0.0%	1.1%

The graph above details the food shopping behavior of each chapter. The percentages in each box indicates the percentage of answers that were given for each area from each chapter. The higher the percentage, the greater pull that chapter has towards that shopping area. For example, the Counselor chapter area is strongly pulled towards the Farmington area for grocery shopping.

The three chapters approximately fall on a north/south line. Counselor is the furthest north, Ojo Encino is in the middle, and Torreon is the furthest south. The Farmington area is the major market to the north and the Albuquerque area is the major market to the south. Cuba is a minor market and it lies between the two major market areas. It would make sense that if an area is closer to one market than another it will tend to shop at the closer market. This seems to be shown in the numbers.

Counselor is strongly pulled towards Farmington and less strongly towards Cuba than the other two chapters. Access routes for Counselor make the time difference of travel to Farmington and Cuba not too different. One might save 30-45 minutes of driving by going to Cuba from Counselor. But, Cuba offers much less retail/entertainment offerings than the Farmington area does. Another interesting fact about Counselor is that it shows a stronger pull towards its own retail outlets (Counselor Trading Post and Lybrook Mercantile) than the other chapters to their own local retailers. This is probably due to the relatively long distance from Counselor (compared to other chapters) to the secondary market of Cuba.

Ojo Encino being in the middle would be expected to be more or less split between Albuquerque and Farmington area markets. The numbers indicate this with 36.8% going towards Albuquerque and 30.2% going towards Farmington. The Albuquerque area is a substantially larger market than the Farmington area, with much more offerings. Ojo might have shown a greater amount of pull towards Albuquerque area; however, there is an area in southern Counselor (or some would call northern Ojo Encino) that many people consider to be Ojo Encino. There is a good chance that this population is the one utilizing the Farmington area as opposed to Albuquerque. The pull for Cuba as a secondary market in Ojo Encino is stronger than in Counselor. For those who do not live in the southern areas of Counselor, access to Cuba can be had relatively

quickly and using primarily paved roads. Since the cost in time and distance are probably equivalent to what northern Counselor residents have to spend to get to their local markets, it would make sense that Cuba should have a strong pull for residents in this area.

Torreon is strongly pulled towards Albuquerque. This makes sense considering its relatively easy access to the Albuquerque area via paved roads. It is also the chapter most strongly pulled towards Cuba. This also makes sense because its population has the easiest and quickest access routes directly to Cuba. Thus utilizing this secondary market is not very costly.

Torreon's shopping behavior is probably very similar to central Ojo Encino's shopping behavior. The two would probably look much more similar if the southern Counselor area would be excluded from the Ojo Encino data set. Thus looking at Torreon is a good approximation of central Ojo's behavior.

Another interesting element is that both Ojo Encino and Torreon had a high rate of blank returns for the areas they shop in (the store was filled out though). Counselor had a relatively low blank rate return. One possible reason for this might be data collection differences. The blank answers could possibly be estimated by using the known percentages and breaking down the blank percentage and adding them to the appropriate area. However, that is for for the discretion of the user to do.

Lastly, it is not possible to estimate actual money flows to the identified markets. The tri-chapter area is estimated to spend about $4 million per year on food or about $373.00 per household per month. As stated before the households by chapter are as follows from the 2010 census: Counselor 281 houses (31%), Ojo Encino 187 houses (21%), and Torreon/Starlake 433 houses (48%). This would mean that the chapters would be estimated to each spend the following amounts annually: Counselor $1,258,000, Ojo Encino $837,000, Torreon $1,938,000. The above shopping behavior information probably indicates some type of proportion of where these monies are spent by each chapter. However, the major market areas probably pull higher amounts of money than their proportions might indicate. Also, it becomes a little more difficult to accurately attribute spending to certain chapters because Counselor and Ojo Encino have overlapping populations which are not indicated in the census numbers or in the survey directly.

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Results of Energy Survey

### 1. What chapter is your home in?

The three main chapters being surveyed was Counselor, Ojo Encino, and Torreon/Starlake. According to 2010 census-data, these three chapters have a total of 901 houses. The chapters were reported as having the following numbers of occupied houses: Counselor 281 houses (31%), Ojo Encino 187 houses (21%), and Torreon/Starlake 433 houses (48%).

Statistically, it seems that Ojo Encino is over-represented in our survey. However, there may be several reasons for that The first is that census boundaries and chapter boundaries do differ. This can cause mistakes in the actual number of houses in each chapter. Next, actual chapter boundaries, although laid out by the Navajo Nation land office, do not necessarily coincide with what community members might consider to be chapter boundaries. Last, people may have put what chapter they were registered in which can be different than the chapter the household might actually be located in.

Since the boundaries are relatively soft it is difficult to assess actual numbers of houses in each chapter without a physical inventory which is spatially contained. However, considering the previously noted issues it would make sense that Ojo Encino would be more heavily represented because of its location between Counselor and Torreon/Starlake and the fact that there is no definitive "no man's land" that exists between these chapters that helps delineate boundaries.

2. Do you feel that you have enough access to energy (electricity, propane, firewood, car gas) where you live?

This question was asked in order to gauge the perception of overall energy security. A large portion of the population, 44.65%, feel that they are lacking access to some type of energy that they need. It could be assumed that the tri-chapter area does have some form of energy insecurity. Other survey questions might detail more specifics about this energy insecurity.

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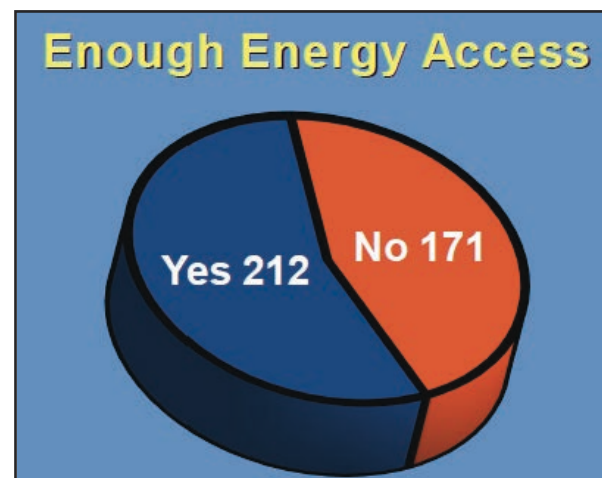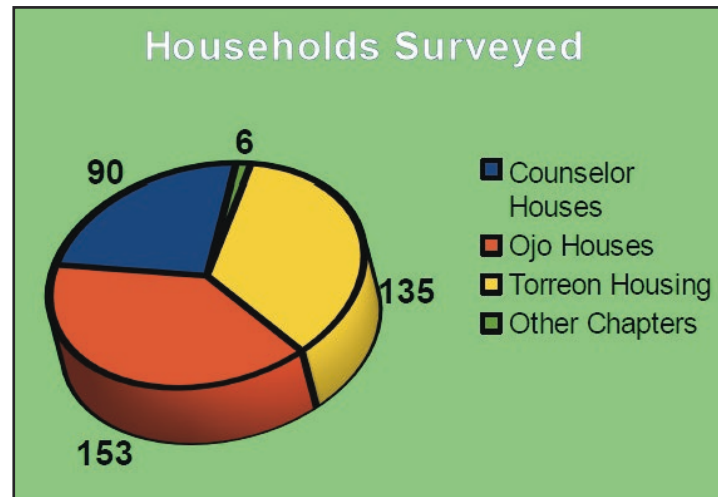
3. Are you able to warm your home enough to be comfortable during the cold times of year?

This is t slightly more specific energy security question. Heating is a major energy user in the area and 28.46% of households feel that they are not able to heat their households enough to feel comfortable.

Although this is a subjective question, it is a good way to gauge the population's ability to access energy for heating needs. The majority of households are sufficiently able to heat their homes, but a large number still need more improvements.

Able to Stay Warm Enough?

No 109

Yes 274
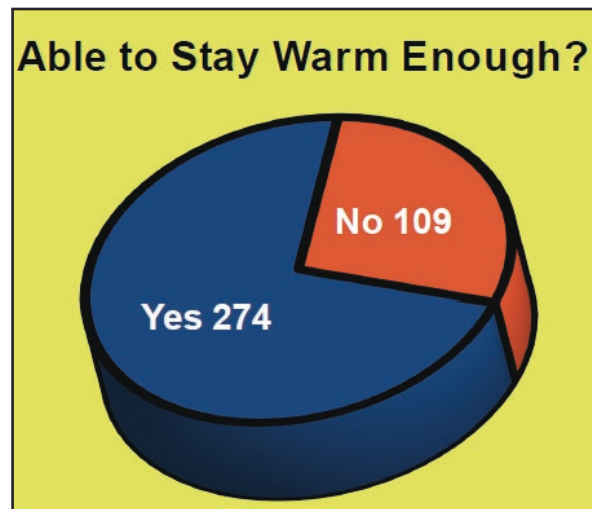
4. About how many gallons of car gas does your household use per MONTH? (Try to estimate for all cars)

The household gas usage values seemed to vary quite a bit. Under a stricter definition of an outlier (1.5* IQR) there were 41 outliers out of 336 values. With the less strict outlier definition (3 * IQR) there were still 25 outliers. Some of the answers received were probably out of the realm of possible answers. However, a large number were large numbers but possible heavy users. Some reason for these larger, potentially realistic numbers, could include a large number of automobile users in a household, car efficiency, very long commutes, and misinterpretation of the question. If a household only put a cash amount it was divided by $3.60 to yield the number of gallons purchased. The $3.60 was estimated to be the gas price in the area, but does not account for differences in fuel prices from major market areas such as Albuquerque and Bernalillo.

1.5 IQR Outlier			
		Total Records	336
Q1	80	Total Outliers	41
Q3	200	Avg usage w/o outliers	**130.2**
IQR	120		
Inner Fence	180		
Inner Min	0		
Inner Max	380		

3.0 IQR Outlier			
		Total Records	336
Q1	80	Total Outliers	25
Q3	200	Avg usage w/o outliers	**146.6**
IQR	120		
Outer Fence	360		
Outer Min	0		

Some households actually contain multiple families. This can lead to situations where there is a large number of vehicles which are used on a consistent basis and would lead to a very large amount of fuel utilized. Next, there may be some differences in types of vehicles used by differing households that might have different fuel economies. Some households might have more trucks while others have compacts, some newer vehicles and some older. Also, some households have members who work at locations very far away from the chapter area (other states). Thus,

Food and Energy Survey Results

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the fuel consumption will be higher because of these very long commutes on the scale of thousands of miles in many circumstances. Lastly, some may have interpreted the question in the sense that it was for one car, not all cars in a household. This would have skewed the data to a smaller value.

5. How many kilowatts of electricity does your household use a MONTH?(Use March OR April)

Most people were not able to identify the number of kilowatt hours that they use in a month. However, another form of an answer that was accepted was the amount of an electric bill. The amount of the bill had ten dollars subtracted from it and then the remaining amount was divided by $.1 (10 cents). This yielded an estimated KWH the bill was for. The subtracted $10.00 was an estimate for service fees that are added to bills by Jemez electric.

Chapter	Total Responses	1.5 Outliers	1.5 Records	Avg KWH/House/Month
Torreon	91	6	85	858.3
Ojo Encino	41	4	37	460.5
Counselor	16	2	14	619.3

1.5 IQR Outlier

		Total Records	150
Q1	255.5	Total Outliers	12
Q3	1263.3	Avg usage w/o outliers	**725.0**
IQR	1007.8		
Inner Fence	1511.6		
Inner Min	0.0		
Inner Max	2774.9		

3.0 IQR Outlier

		Total Records	150
Q1	255.5	Total Outliers	7
Q3	1263.3	Avg usage w/o outliers	**813.1**
IQR	1007.8		
Outer Fence	3023.3		
Outer Min	0.0		
Outer Max	4286.5		

Reported electric usage did have a number of outliers, but the data seemed potentially in line with usage rates in the area. However, usage rates by chapter yielded substantial differences. It is not clear what the reasons are for these differences. However, there are several elements that could play into skewing data.

Sometimes one house can act as a hub for electrical service for other households. This can be done by running extension cables. So a household might have a substantially larger electric usage because it is supplying power for multiple houses and because of the inefficiency of moving power through improperly gauged wires at long distance. It is not known how prevalent this activity is in the area; however, it is not uncommon.

Also, the months requested represent months where some heating is needed. People may use electricity in some households to supplement their heating needs. This might cause a major amount of variation among households.

6. How many cords of wood does your household use a YEAR?

Wood is a primary heating fuel for the tri-chapter area. Results seem to indicate that

Chapter	Total Responses	1.5 Outliars	1.5 Records	Cords of Wood
Counselor	79	4	75	8.7
Ojo Encino	118	8	110	8.5
Torreon	129	3	126	8.8

households are using somewhere between 8.6 cords (1.5 IQR) of wood per year to 9.1 cords (3.0 IQR). The data is fairly consistent between chapters. One potential confusion that people may have faced is the definition of a cord, which was described on the survey. This could have led to people answering larger numbers because their definition of a cord might be smaller than an actual cord.

1.5 IQR Outlier			
		Total Records	345
Q1	40	Total Outliers	46
Q3	100	Avg usage w/o outliers	**66.8**
IQR	60		
Inner Fence	90		
Inner Min	0		
Inner Max	190		

7. How many pounds of propane does your household use per MONTH?

Propane makes up another major energy source for the tri-chapter area. There were a lot of outliers using the 1.5 IQR threshold. Thus it would be advisable to use the 3.0 IQR threshold for this data set. An average household consumption of about 85 pounds is reasonable. An element that can cause a large differences in usage patterns is for water heating. For households that have a hot water heater some use electricity while others use propane. This would represent a big difference in usage.

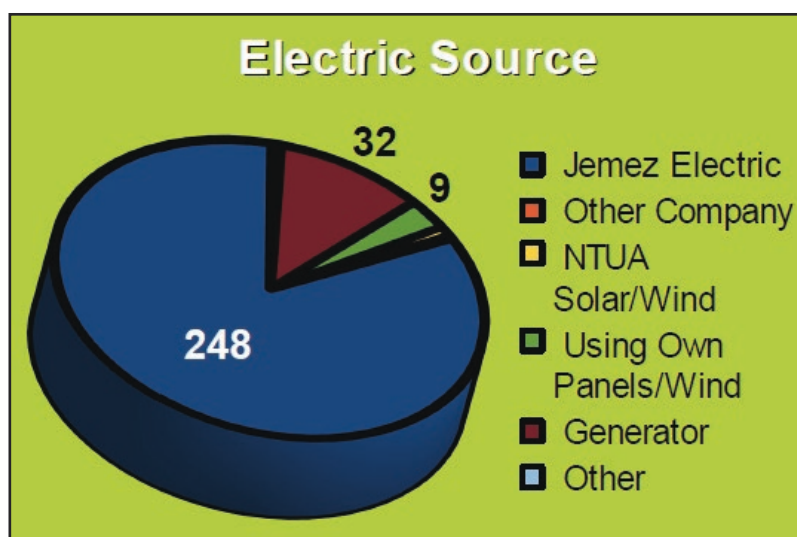| 3.0 IQR Outlier			
		Total Records	337
Q1	40	Total Outliers	7
Q3	100	Avg usage w/o outliers	**85.3**
IQR	60		
Inner Fence	180		
Inner Min	0		
Inner Max	280		

8. Do you have any source of electricity?

There are multiple sources of electricity for people of the tri-chapter area. This question sought to discover how many people have access to some type of electricity. Number indicate that nearly 23% of households do not have access to any electricity. This number could be slightly skewed because respondents might have assumed that gas generators do not count. In any event, it appears that a large number of households do not have electricity access.

Have access to Electric Source
No 88
Yes 295
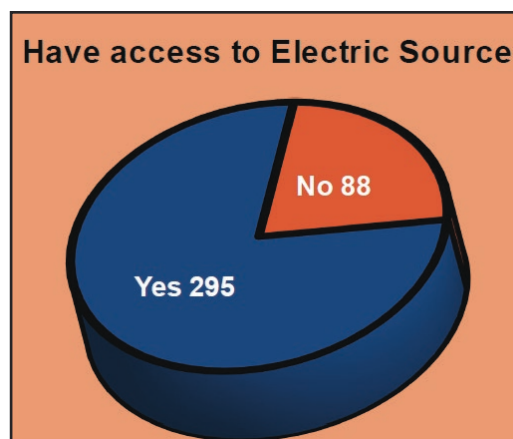
9. If yes, what source do you primarily use?

Over two-thirds of respondents who say that they have electricity use Jemez Electric Coop. The next major group were people


Electric Source
32
9
248
- Jemez Electric
- Other Company
- NTUA Solar/Wind
- Using Own Panels/Wind
- Generator
- Other

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who use a gas generator (slightly over 8%). The next group of electric users have solar panels (about 3%).

10. Is your electricity reliable?

This question was used to gauge the reliability of the electricity people had. The question was not based on what type of electricity was present. This question was asked because reports in the past put electric service from some providers as being unreliable. However, the statistics indicate that this perception has changed. Answers of "no" probably include people who had other energy sources such as gas generators.

Is your electric reliable?

No 57
Yes 240
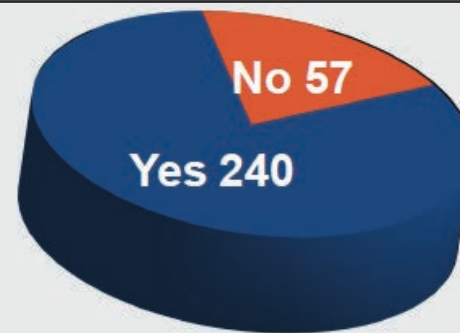
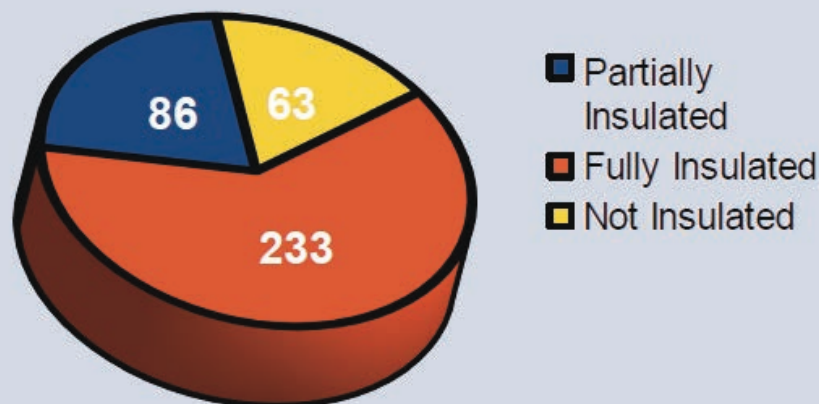## 11. What type of home do you live in?

Dwelling types can vary in the tri-chapter area. The two dominant housing forms are houses (69.5%) and mobile homes (26.1%). Although there was no definition stated in the the survey for each dwelling type, in general a house is considered a square or rectangular structure while a mobile home is a rectangular structure that can be hauled to different locations. Hoghan structures are round or octagonal. An element this question did not consider are mixed housing types. Many times people will add structures on to a mobile home or hoghan to add living space.

The importance for this question is understanding potential energy questions in regard to construction prefer-

Housing Type

1 97
100
266

■ House
■ Mobile Home or Trailor
■ Traditional Hooghan
■ Plywood Hooghan
■ Other

House Insulation

86   63
233

■ Partially Insulated
■ Fully Insulated
■ Not Insulated

Food and Energy Survey Results
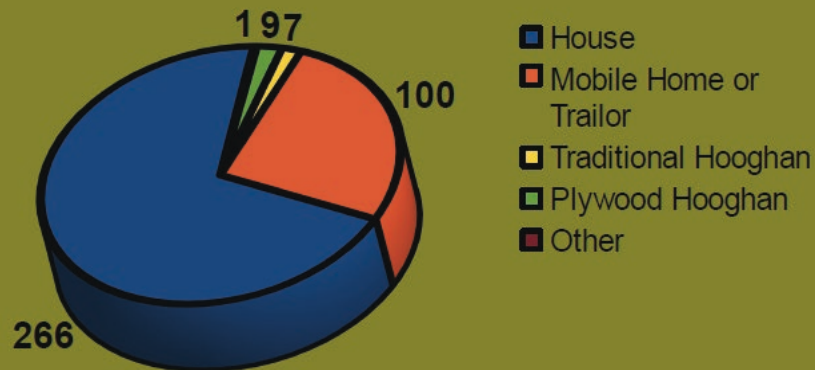
ence and possibly insulation. Mobile homes are usually insulated, although not with high value insulation. Combined with other information, it is possible to see insulation patterns based on structure types.

12. Is your home insulated? (Fiberglass for example)

The type, quality, and amount of insulation for households across the tri-chapter area can vary immensely. This question sought to capture basic information about the insulation of a household. Most households responded to this question (61.0%) claiming to be insulated. This will likely include all mobile homes which have a very low amount of insulation. "Partially insulated" and "Not insulated" homes make up a substantial portion of houses in the tri-chapter area at about 39%. As noted before some houses are built in a piecemeal fashion with some portions being one structure type and others being another. This can lead to differences in insulation status of the structure.

13. About what size is your home in square feet?

The data seems to be relatively similar whether using the 1.5 or 3.0 IQR method. Some households reported having some very small square footage. Although it may be possible for someone to live in a structure with less than 40 square feet, it was assumed that any answer below this was probably a mistake/incorrect answer and was considered an outlier.

The results indicate the average household size being somewhere between 1,050 Ft^2 to 1,075 Ft^2. This would be a double-wide trailer at around 18' x 60' or a square house 30'x35'. If need be, this data can be also corroborated against aerial photography of the area using

1.5 IQR Outlier: Housing Size			
		Total Records	244
Q1	573	Total Outliers	13
Q3	1440	Avg usage w/o	**1050.0854701**
IQR	867		
Inner Fence	1300.5		
Inner Min	40		
Inner Max	2740.5		

3.0 IQR Outlier: Housing Size			
		Total Records	244
Q1	573	Total Outliers	10
Q3	1440	Avg usage w/o	**1075.9156118**
IQR	867		
Outer Fence	2601		
Outer Min	40		
Outer Max	4041		

1.5 IQR Outlier: Windows Per House			
		Total Records	378
Q1	6	Total Outliers	15
Q3	9	Avg usage w/o	**7.16**
IQR	3		
Inner Fence	4.5		
Inner Min	0		
Inner Max	13.5		

3.0 IQR Outlier: Windows Per House			
		Total Records	378
Q1	6	Total Outliers	3
Q3	9	Avg usage w/o	**7.43**
IQR	3		
Outer Fence	9		
Outer Min	0		
Outer Max	18		

simple GIS program to get the approximate footprint of structures.

14. About how many windows does your home have?

Since windows represent a major energy leakage for structures both in the winter and summer times, this question sought to find out how many windows existed in each household. Although detailed information about average window sizes was not captured, it could be possible to do smaller more detailed surveys to capture this information if needed.

All households that responded did so with more than 0 windows. Some households reported large numbers of window; however, it is possible that these cases were real. For analysis, the 1.5 IQR cutoff was (13.5) more than 13 windows as an outlier, and the 3.0 IQR cutoff was at 18 windows. Although there is a discernible effect on the final figure given, it might be wise to go with the higher figure of 7.43 windows per house.

15. Do you winterize your home (Plastic on windows and seal up cracks?)

About 56% of houses do some form of winterization. This still leaves a large percentage of households which do not practice this. The type and quality of winterization was not captured in this question, so actual winterization might be lower than the amount reported. Some may feel they should answer yes (but don't) or only do very minimal amounts of winterizing. Thus these figures could be slightly misleading.
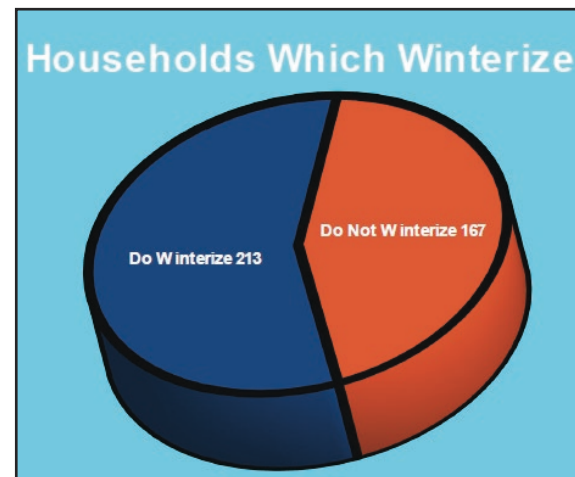
16. Do you use CFL or LED light bulbs? (Swirly bulbs)

A slight majority of households report using CFL or LED bulbs. Due to the relatively high cost of LED bulbs at the time of this survey it can be safe to assume that most of the positive respondents are using CFL bulbs. The question also did not quantify how much of a house uses CFL bulbs. So some positive responses might only use 1 CFL bulb out of many or some negative responses might be due to them only using a few CFL bulbs out of many lights. There was no answer allow for a mix of bulbs which may be the case for some households.

22

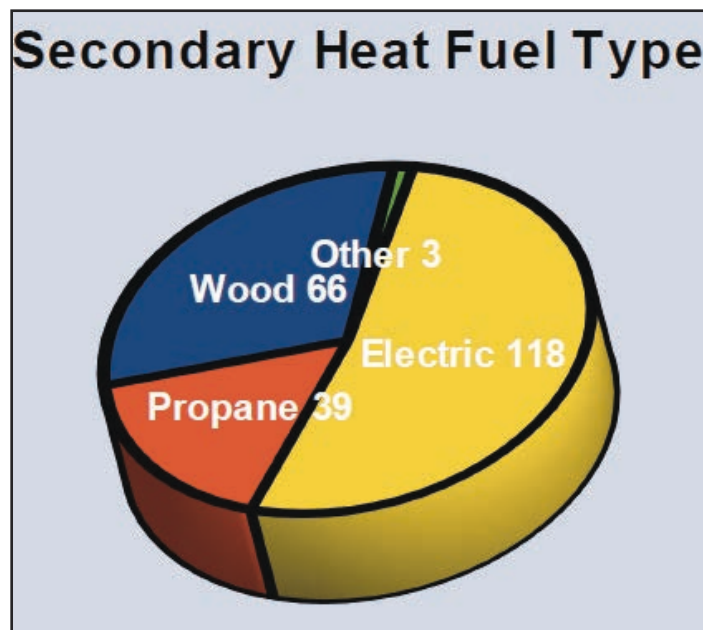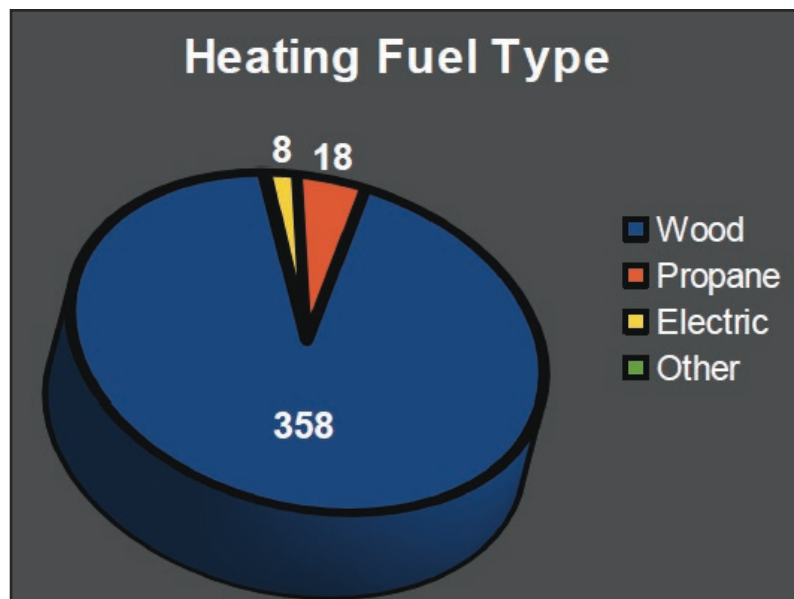**Food and Energy Survey Results**
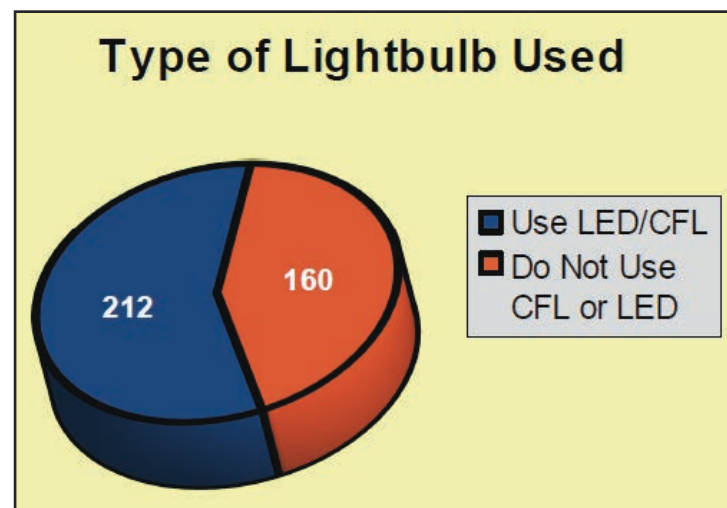
17. What is the main way you heat your home?

The vast majority of houses, 93%, report using wood as a primary fuel source for heating. The other two heat sources that registered were propane (4.7%) and electric (2.1%). This question did not list wood pellets or coal as options. Although wood pellet stoves are generally expensive at this time to purchase up front, many people are becoming interested. Also, coal is generally used along with wood to supplement heating fuel. Recorded wood users may also fall into these two unlisted categories; however, wood being shown as the dominant fuel source would seem reasonable.

18. Do you use another energy source to also heat your home. If so what is it?

About 59% of people responded to using a secondary heat source. The prominent secondary heat source at 52.2% is electric. The next largest group at 29.2% put wood as being their secondary wood source. This might be true for the very small percentage that did not have wood as their primary wood source. However, there is a good chance that some may have misunderstood the question and answered wood twice since it is their main and only source of heating fuel. The third largest group were those who used propane as a backup heat source at 17.3%. Although beyond the data collection of this report, it is possible that many of these propane users might be using inappropriate heaters for indoor/residential settings. Lastly, some (1.3%) indicated "Other" as a secondary fuel source. This might have been a variety of things, but as noted in #17, coal is used by people in the area and it was not listed.

Heating Fuel Type

8 18

Wood
Propane
Electric
Other

358

Secondary Heat Fuel Type

Other 3
Wood 66
Electric 118
Propane 39

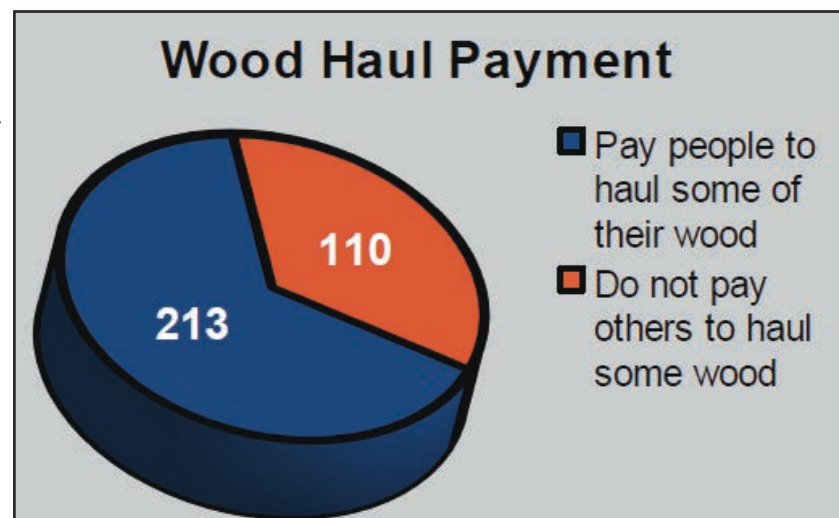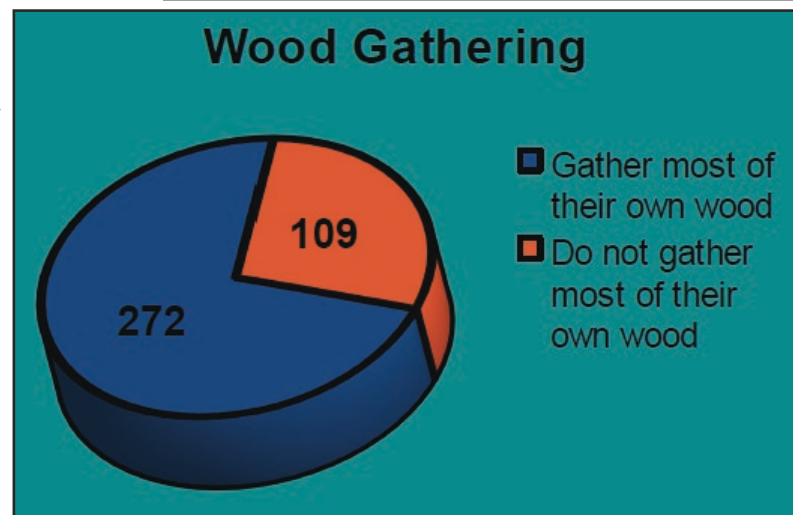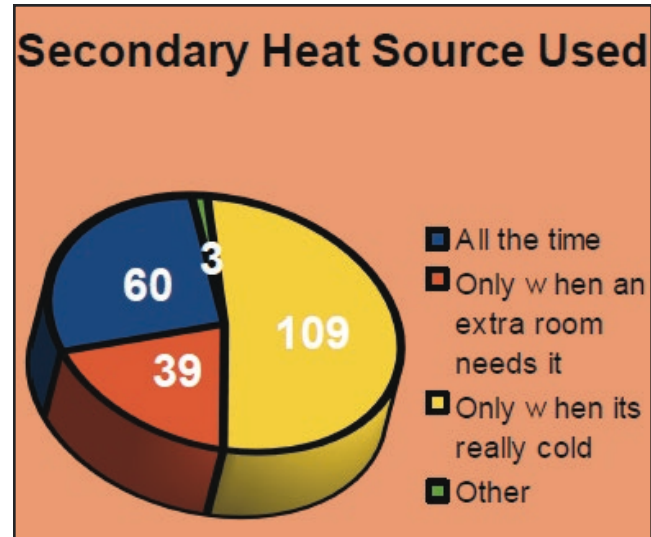**Food and Energy Survey Results**

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19. When do you use this secondary heat source?

This question sought the reason why people use their secondary heat source. Out of 226 people who answer #18, 211 answered question #19. The majority (51.7%) of respondents indicated that they use their secondary heat source only when it is really cold. The next largest group indicated that they use their secondary heat source all of the time. This may include the large group of respondents in question #18 who indicated that they use wood as a secondary heat source. Thus, they would use this fuel source all of the time because it is their primary fuel source. The third largest group (18.5%) use their secondary heat source only when an extra room needs it.

20. If you use any firewood at all for anything, do you mostly gather it yourself?
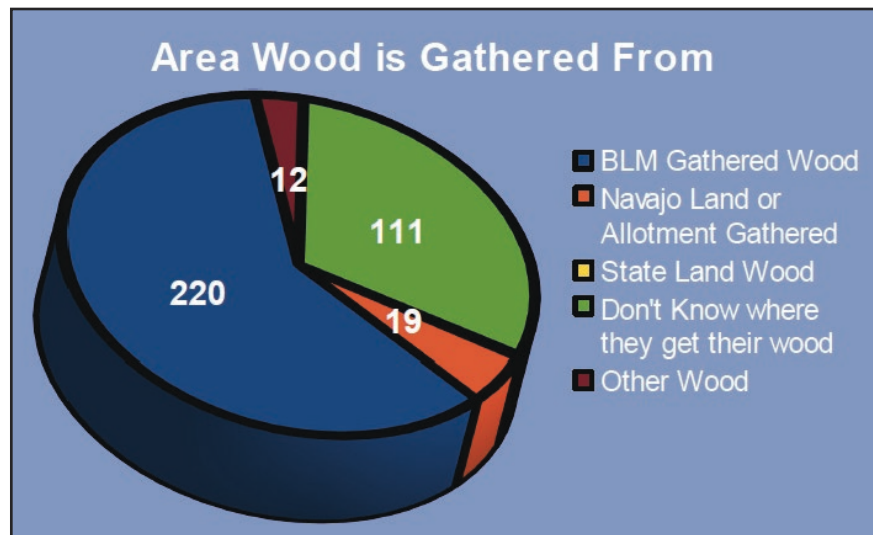
This question starts to look at how people secure the primary heat fuel source of firewood. The vast majority of households (71.4%) gather most of their firewood on their own. The remainder (28.6%) do not gather most of their firewood on their own. Some households both gather and purchase firewood from local vendors. However, it is still common for households to collect most of their own firewood use. This statistic can be useful for economic and fuel wood management.

Secondary Heat Source Used

60 3
109
39

- All the time
- Only when an extra room needs it
- Only when its really cold
- Other

Wood Gathering

109
272

- Gather most of their own wood
- Do not gather most of their own wood

Wood Haul Payment

110
213

- Pay people to haul some of their wood
- Do not pay others to haul some wood

21. If others gather firewood for you, do you purchase the wood?

This statistic looks at firewood collection behavior of households who collect firewood via other people. About two-thirds (65.9%) of households pay people to haul some of their wood. About one-thrid (34.1%) of households do not pay someone to haul wood for them. The intent of the question is to determine whether or not wood gathering is done for economic gain or because it is something being done for the household for free. It is possible some replies to this question could have been misinterpreted, meaning that they do not have anyone collect firewood for them. However, it seems that this question probably is providing reliable information about the economics of firewood collection.

Area Wood is Gathered From

- BLM Gathered Wood
- Navajo Land or Allotment Gathered
- State Land Wood
- Don't Know where they get their wood
- Other Wood

220 / 12 / 111 / 19

22. Where does most of your firewood come from?

This question looked at the source of the firewood that is used by households in the tri-chapter area. The largest group (60.6%) have wood that is gathered on BLM lands. The next largest group (30.6%) don't know where their wood is gathered. The third group (5.2%) report collecting woods from Navajo or Allotment lands. Another 3.3% put "other" and .3% indicated using state land.

The large amount of wood collection from BLM land makes sense for the area. A significan portion of the unknown wood source is probably also BLM. Chances are, a large amount of the unknown wood sources are from wood hauling vendors who work in the area. Usually, no one asks during the transaction where the wood came from.
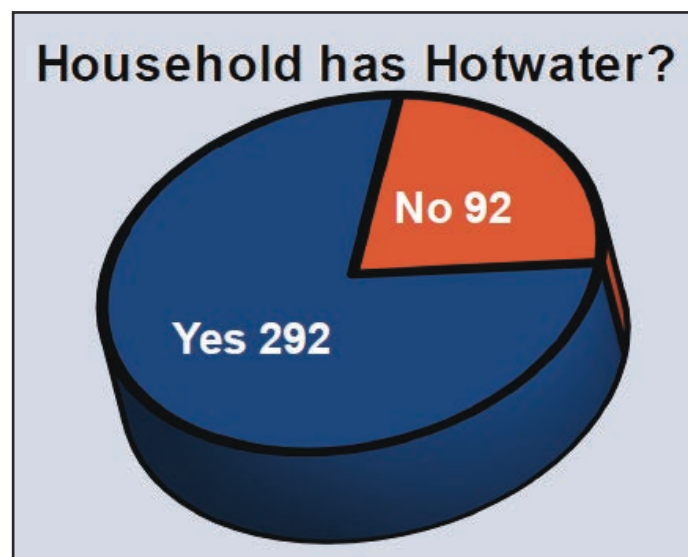
23. Do you use a hot water heater?

Another major energy usage in the area is heating of hot water. About three-quarters (76%) of households use some type of hot

Household has Hotwater?

No 92

Yes 292
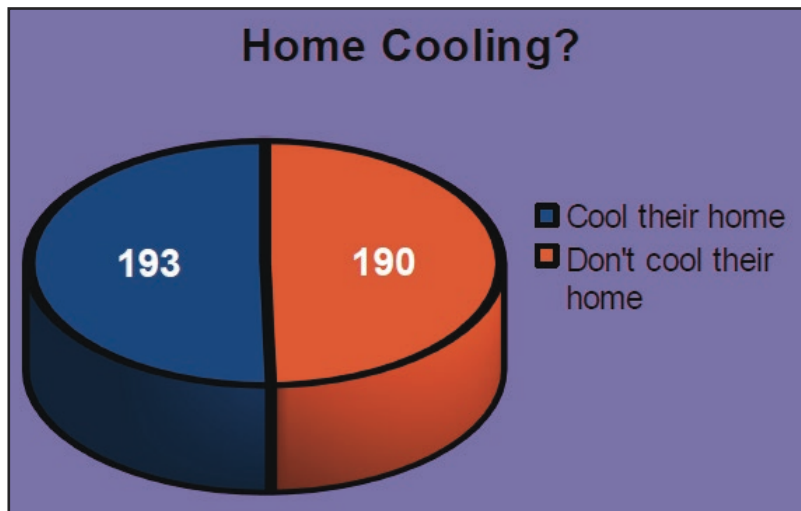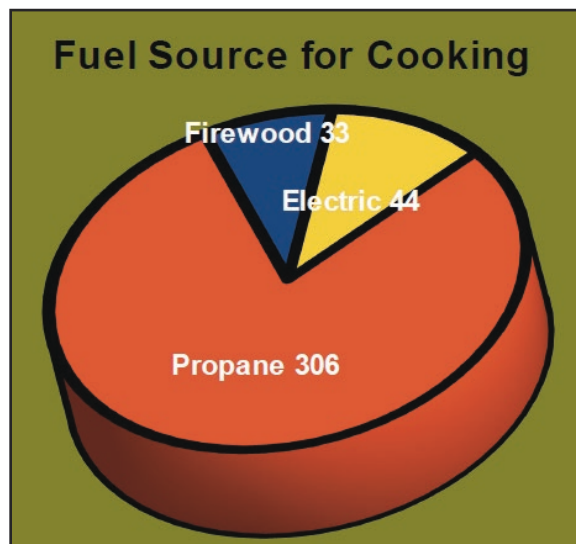
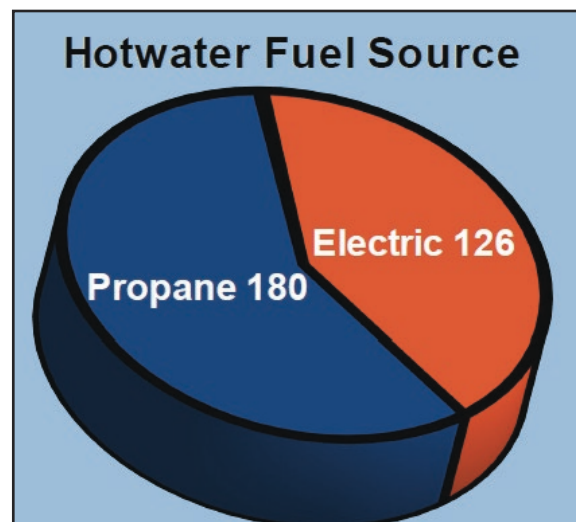**Food and Energy Survey Results**

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water heater. The remaining 24% of households do not report using a hot water heater. These numbers could reflect the number of households who have running water; however, that was probably a question that should have been asked directly.

24. If so, what energy type of energy does hot water heater use?

There was a slightly larger number of people who responded to this question than responded yes to question #23. This discrepancy may be a major issue, but question #23 and this question should yield relatively reliable data. The energy source for hot water is split. The majority (58.63%) use propane as their hot water fuel while the remaining (41.04%) use electricity. Less than one percent (.33%) reported "other." Chances are that as electrification expands and its reliability remains high, people will continue to switch to electricity as a fuel source for hot water. This is probably due to the cost and extra work of hauling 100 lbs-propane tanks once or twice a month for hot water.

25. What is the main type of energy you use for cooking?

The vast majority (79.9%) of people utilize propane for their cooking needs. The next largest group (11.5%) uses electricity for cooking. The last group (8.6%) uses firewood. Even with increasing electrification, propane stills remains the dominant fuel source for cooking. There may be several reasons for this. One, people might keep their stoves much longer than hot water heaters. Two, stoves use the propane more efficiently than hot water heaters and don't require refuel runs as often. Three, people may like cooking on a gas range better than on an electric one.

Hotwater Fuel Source

Electric 126

Propane 180

Fuel Source for Cooking

Firewood 33

Electric 44

Propane 306

Home Cooling?

193   190

☐ Cool their home
☐ Don't cool their home

26. Do you cool your home in the summer?

Home cooling during the summer is almost evenly split. Households who cool (50.4%) versus those who don't (49.6) is about as close of a split as any of the questions have come up with. Some may not have considered fans as a type of cooling technique and may have thought only of evaporative coolers and air conditioners as cooling methods during the summer.
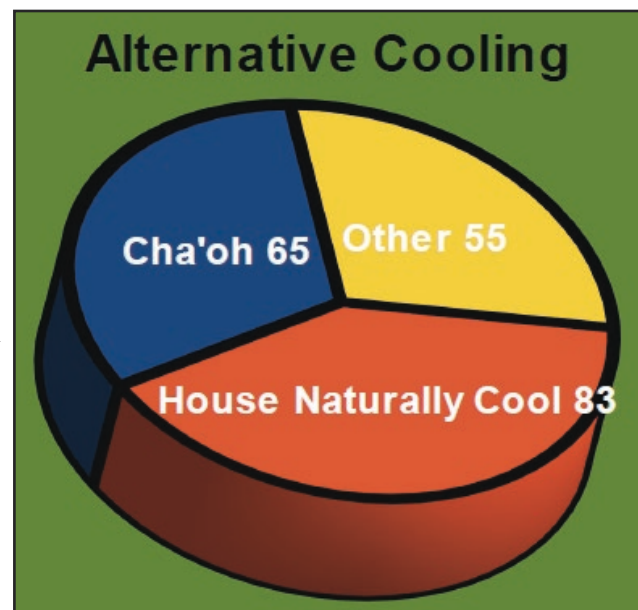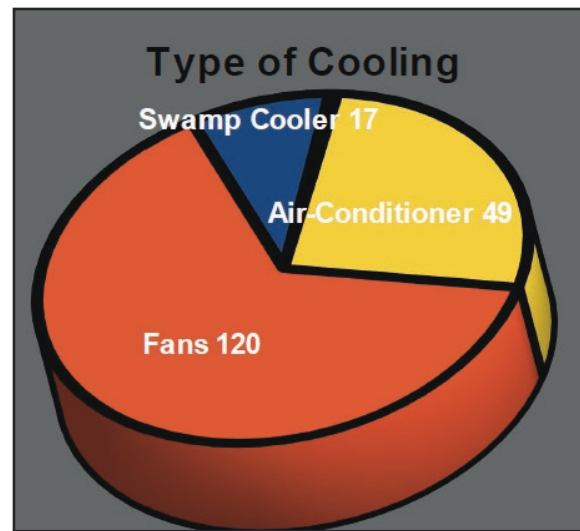
27. If yes, how do you cool your home?

Of those who report cooling their home, almost two-thirds (64.2%) reported using fans for that purpose. The next largest group (26.2%) report using air conditioners and the last major group (9.1%) report using swamp box coolers. It may be possible that swamp box coolers are under-reported in this question because there might have been an issue with defining fans. Some might consider the swamp cooler as a fan, or those who use both fans and swamp coolers might have only reported fans.

28. If no, what do you do to keep cooler during the summer?

More people responded to this question than answered "no" to #26. However, some may have answered even though they cool their house because they use another technique. Many answered (40.9%) that the house stays naturally cool. The next largest group uses a Cha'oh. This is an outdoor shade structure. Finally, 27.1% of people answered "other" for keeping cool.

Type of Cooling

Swamp Cooler 17
Air-Conditioner 49
Fans 120

Alternative Cooling

Cha'oh 65
Other 55
House Naturally Cool 83

Total Estimated Household Expenditures on Food and Energy

By utilizing data collected in the food and energy surveys, we might be able to deduce estimated expenditures on food and energy. The food survey directly asked this question while the energy survey asked for usage statistics.

The largest household expenditures found by this set of surveys are car fuel and food. Car fuel appears to constitute a large portion of the average household's budget in month, about $468.54. This would make sense considering the location of the tri-chapter area and the considerable distance that must be driven to access the major food market areas of Farmington and Albuquerque. Consequently, these are also areas of major employment which may also increase the fuel usage

For electricity there appeared to be a great deal of variation between chapters. Torreon had the highest reported household use rate at about 858 kwh/month, with Ojo Encino being the lowest at 460.5 kwh/month. However, Torreon had the highest number of respondents while the other two chapters were relatively low in esponse rate on the question. Thus using the 1.5 IQR solution is probably a useful average. Costs were estimated by using a rate of $0.10 per kilowatt hour and then adding a $10.00 service charge. The assumption was that the electricty reported was coming from Jemez Electric Co-Op.

Propane usage and costs gets a little tricky on estimating. The question was framed in pounds used. However, temperature differences can change the conversion of pounds to gallons. A conversion rate was selected and should provide a decent estimate of gallons used and purchased.

Finally, firewood appears to be a very inexpensive heating solution for the tri-chapter area. This should be considered in programs that may seek to shift heating fuel sources.

Firewood Analysis

For a person to get a wood permit from the BLM costs approximately $10.00. To haul the firewood from multiple sites back to their house can be anywhere from 50 miles to 100 miles round trip. This means that if the truck utilized achieves about 15 mpg, the total cost of hauling approximately 1 cord of wood is about $25.00. Of course this does not include the time and labor to find, haul, and process the wood, but this is why it is cost effective for people in the area. For a family who hauls their own wood, the total wood cost is about $225.00 per household per season. If the family elects to purchase pre-cut wood from a local Navajo dealer in the community, the price is going to be about $75.00 per cord. The cost for an average household receiving all of their wood this way would be about $650.00 per season.

Generally, households mix buying firewood from local Navajos and gathering their own wood. According to survey results, 71% of households gather most of their own firewood; however,

60% also pay someone to gather some of their wood. Sixty percent of households gather wood from BLM lands. Another 30% of households are not sure what the land status is of the areas they collect from. Chances are that many of these unsure respondents are collecting on BLM lands. From the previous calculations the amount an average household pays for firewood in a season is probably between $225.00 to $650.00 a year.

To estimate an average household cost for wood we can refer back to questions #17, 20, and 21 of the energy survey. The vast majority of households use firewood as a primary heating source. Households who collect most of their own wood is 71.4% vs 28.6% which don't. For households which don't collect most of their own wood, 65.9% pay someone to do it.

The following estimates will be based off of self-collection of cord of wood costing $25.00 and a bought cord of wood costing $75.00 which was the going rate for the 2011-2012 winter season. If households opted to buy their firewood from outside vendors the cost would be substantially higher, but for practical purposes most households probably purchase from local vendors.

Expenditure	Household Usage	Price Per Unit	Estimated Cost	%	Information
Car Fuel	130.15 gallons/month	$3.60 gallon	$468.54 / month	**46.6%**	Energy #4 using 1.5 IQR
Electricity	725 KWH / month	$0.1 KWH	$82.50 / month	**8.2%**	Energy #5 using 1.5 IQR added $10.00 for service fee.
Firewood	8.6 cords / year	$25.00 self collect $75.00 purchased	$28.17 / month $337.98 / year	**2.8%**	Energy #6 using 1.5 IQR estimated cost by using firewood analysis section .
Propane	85.29 pounds	$2.60 / gallon	$54.08 / month	**5.4%**	Energy #7 using 3.0 IQR converted using 4.1 pounds per gallon.
Food			$373.03 / month	**37.1%**	Food #5. See Food #5 for explanation of estimate.
	Estimated Costs:	**Total / month**	**$1,006.32 /month**		
		Total / year	**$12,075.82 / year**		