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HOME ENERGY COSTS AND THE ELDERLY

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ABSTRACT

This research identifies demographic characteristics and structural features significantly related to low or high home-energy consumption for two elderly groups. The first elderly group is part of a western regional home energy study, W-159, conducted in 1983. The demographic characteristics of the first group show that as a whole they are more highly educated, have higher incomes, and have a larger proportion of males and home owners than is usual for their age. Because this group is above average in various demographic characteristics, a companion study was conducted in 1986 focusing on elderly individuals who have lower incomes, a greater proportion of females and renters, and have less education.

There are significant differences in the factors in energy costs for the two groups. The 1986 groups of lower income, less educated elderly individuals are primarily renters and spend an average of 40 cents more per square foot for energy than does the 1983 group of elderly individuals with greater incomes, education, and home ownership. Of all housing structural variables studied, and for both groups, the presence of ceiling insulation has the greatest impact on energy consumption.

The more energy efficient the elderly person perceives his/her home to be, the greater the number of energy-saving features present. This indicates that home-energy efficiency perception is generally accurate as it relates to energy-saving features present. Low-income, less educated elderly renters are identified as being most in need of energy information and resources to make energy improvements. Recommendations are made for energy educators, especially those working with elderly individuals, and for public policy makers.

PURPOSE OF THE STUDY

Little is known about the factors affecting the energy costs of elderly individuals or the energy efficiency of their homes. This study is designed to compare the energy costs of two different elderly groups and to increase the understanding of energy costs for elderly people's homes.

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In 1983, a study of elderly Idaho–Utah residents was conducted to explore factors related to elderly individuals' home–energy costs. These elderly residents are a subset of respondents from a western region project, W–159. Because the elderly respondents are of higher incomes and education levels than is usual for their age group (over 60) and because the lower income, less educated elderly in the 1983 group have higher home–energy costs than those elderly individuals with higher incomes, a companion study was done in 1986 targeting lower income, less educated elderly in Utah and Idaho. This was done to discover if the differences in education and income would affect energy costs. Examining the factors affecting elderly individuals' energy costs will be helpful in designing programs that promote energy efficiency and reduce overall energy costs in the homes of the elderly.

INTRODUCTION

Since the 1973 oil embargo, the higher costs of energy have altered the lifestyles of many Americans. Elderly individuals are among those hardest hit by these rising costs. Some older people are being forced to divert dollars previously spent on other necessities in order to pay home energy costs (Energy Conservation Digest, 1983).

Studies have been conducted concerning home energy conservation for those who are poor (Dillman, Rosa, and Dillman, 1983) and those who rent (Counihan and Nemtzom, 1981), but little research has been conducted that examines energy–conservation patterns of elderly residents. Previous studies of home–energy conservation generally include only a small, if any, percentage of respondents over age 65. According to Goldstein (1982), inadequate attention is being given to elderly individuals' problems with rising energy costs. Studying the energy actions and perceptions of elderly consumers is important in order to provide them with the most effective assistance.

Older citizens are usually at lower income levels due to retirement, which often limits their participation in conservation. Yergin (1980) notes that 76 percent of those individuals who feel their homes can be made more energy efficient by taking conservation measures do not take such measures because they cannot afford them. Seventy percent of those who have participated in energy–audit programs give lack of money as an important reason for their failure to participate (Junk, Junk, and Jones, 1987).

Factors Affecting Home Energy Costs

One step that individuals can take now to help achieve energy efficiency in their homes is to add energy–saving structural features. It is now possible to identify potential factors important in determining the rate of energy use (Junk et al., 1987). These factors include both the structural components of the dwelling and the demographic variables. Structural measures most often taken by elderly consumers to conserve energy include double–paned or storm windows, weatherstripping, caulking, and storm doors (Brandt and Guthrie, 1984). Factors most often reported in the literature that contribute to lower home–energy costs for elderly individuals are:

1. living in a newer home
2. living in a multi–family structure
3. higher education levels
4. being "young–old" (60–74)
5. higher income levels
6. only one person living in the residence

7. being female
8. being a home owner
9. presence of four or more inches or ceiling insulation
10. presence of insulation in outside walls
11. presence of weatherstripping/caulking
12. presence of storm/double-paned windows
13. presence of storm doors
14. presence of a wood-burning stove
15. presence of a clock set-back thermostat

Age of the Dwelling

Over half of elderly Americans live in dwellings constructed before 1939 (Cooper, 1981). In terms of energy usage, one study finds that homes 40 or more years old consume energy at twice the mean consumption rate (Junk et al., 1987). Many older dwellings have no insulation and have numerous structural defects. Respondents living in older homes often indicate that their homes need many energy improvements, but that there is not enough financial assistance to make the repairs (Junk et al., 1987). Research is needed to determine the effect of the age and the type of dwelling on energy conservation by elderly consumers (Brandt and Guthrie, 1984).

Type of Residence

Fifty-eight percent of the respondents in the study by Makela, Chatelain, Dillman, Dillman and Tripple (1982) live in single-family detached homes. Single family homes generally use energy less efficiently than do multiple-family structures.

Education Level

Formal education is a factor in energy consumption (Junk, Jones, and Kessel, 1984; Macey, 1982; Yergin, 1980). Individuals with higher levels of education are more likely to take conservation measures. A study by Junk et al. (1987) finds that increasing levels of education result in significantly lower home energy consumption levels. Individuals with less than an 8th grade education spend almost twice as much per square foot for energy as those with a graduate degree.

Age of Respondent

Little research has been done concerning the effect of age of inhabitant on home energy costs. Van Raaij and Verhallen (1983) state that research is needed to discover the relation between conservation behavior and chronological age. The age of the respondent may be related to the age of the dwelling. Brandt and Guthrie (1984) report differences among sub-groups of elderly consumers. Their findings conclude that persons aged 60-74 may respond differently than those 75 and older. Participation in conservation is lower the older the participant (Brandt and Guthrie, 1984, Junk et al., 1984).

Income

Low-income elderly people suffer more from high energy prices than do others (U.S. Senate Special Committee on Aging, 1977). Those at lower income levels are also less likely to invest in conservation measures (Dillman et al., 1983; Junk et al., 1987; Macey, 1982; Stern, 1984). There is wide variation in resources held by elderly Americans. For elderly individuals who have lower

incomes, investment in conservation measures may not be economically feasible. According to Junk et al. (1987), respondents having an income of less than $10,000 a year consume energy at a much higher rate than do elderly consumers having higher incomes.

Living Alone Or With Others and Sex of the Respondents

More than one-third of all elderly individuals live alone (U.S. Bureau of the Census, 1978). Many elderly persons living alone also may not be physically capable of taking conservation measures. This is particularly true because the majority of elderly individuals living alone are female. With this age group, traditional roles meant that males usually undertook the structural maintenance of the home. Elderly females may have no one who is able to assist them in the installation of energy-efficient features or to encourage them to learn about or participate in conservation programs.

Housing Tenure

Whether individuals own or rent their dwellings plays an important part in implementation of conservation measures. Home owners are much more likely to implement conservation measures than are renters (Counihan and Nemtzom, 1981; Junk et al., 1984). Renters spend an average of 30 cents more per square foot for energy than do home owners (Junk et al., 1987).

Structural Variables

Newman and Day (1975) report that adding insulation can result in considerable energy savings. They also report that poor households may not add insulation or buy storm windows because they are not home owners. Their study finds that only two-fifths of poor families' homes have insulation. Installing storm windows may take up to ten years to pay for themselves unless an individual lives in a very cold climate (Lindamood and Hanna, 1979; Newman and Day, 1975). An elderly individual, regardless of income, may not want to make an investment that may not pay for itself for such a long period of time.

OBJECTIVES OF THE STUDY

Three major objectives were selected based on the purpose of the study.

1. To compare significant factors in energy costs for two different groups of elderly people: Structural features of the residence, and demographic characteristics of respondents in the two groups are compared to discover which characteristics are significantly related to which features. The significance of structural features and demographic characteristics in low or high energy costs are examined.

2. To discover if perceived energy efficiency of the home and the actual number of energy-saving features are significantly related: This relationship is examined to discover if low-income elderly people have the highly energy-efficient homes that they have indicated (Junk et al., 1984). Studying this relationship may help confirm that those who feel their homes are extremely energy efficient actually do have greater numbers of energy-saving features than those who do not perceive their homes as efficient.

3. To develop recommendations for effective energy-information programs for targeted elderly groups: Based on demographic characteristics, groups of elderly consumers may require different emphasis in energy information. After the factors affecting home-energy costs are identified, the knowledge will assist public policy makers, Cooperative Extension personnel, and other information agencies in planning informational and assistance programs for the elderly population.

METHODS

Data Collection

The data for this study were obtained using questionnaires. The 1983 instrument was developed by the W-159 technical committee for a western region project concerning housing and energy. The first questionnaire was designed using the Dillman Total Design Method (Dillman, 1978) and was mailed to respondents. The second questionnaire was a shortened variation of the 1983 W-159 instrument, using questions that focused on demographic characteristics, structural features, and energy costs. It was hand distributed in 1986 to elderly participants and collected directly from them at various low-income program sites. Responses from 622 people 60-years-of-age and older were used in the combined study.

Group One - 1983 Idaho and Utah Elderly

This group was composed of elderly individuals (age 60 and over) who were living in Idaho and Utah. The elderly subset used in this study was part of a larger sample of all age groups obtained by a regional study entitled "Energy Directions: A Western Perspective". The sample from which the subset of elderly individuals was obtained was composed of 1664 Idaho and Utah residents sampled from phone books, with a response rate of approximately 68 percent. The subset was composed of those 441 respondents who were 60-years-of-age and older.

Group Two - 1986 Idaho and Utah Elderly

The Utah contingent of the 1986 elderly groups surveyed was composed of people living in Salt Lake County who were participants in one of the following programs:

1. Retired Senior Volunteer Program (RSVP)
2. Senior companion program
3. Senior employment program
4. Senior transportation program
5. Westside senior center participants

RSVP is composed of people aged-60-and-over who are willing to volunteer their talents and time to others. People with all levels of education, experience, skills and professions are represented by RSVP.

Elderly individuals who participate in the Westside senior center, the senior employment program, and the senior companion program are predominantly females with incomes at 125 percent or less of the poverty level. The Salt Lake County senior transportation program has no income restriction for participation.

In 1986, primarily low-income program participants were sampled, so that a higher percentage of the respondents would have lower income and education

than was obtained through the 1983 phone book sampling. The Idaho contingent of the 1986 group included those who participated in the following programs:

1. RSVP members in Lewiston, Idaho
2. Lewiston senior center participants

One hundred eighty-one questionnaires from the 1986 low-income, less educated group were used in this study. The response rate from the seven programs ranged from 39-86 percent. A comparison of the demographic characteristics (including sex, living alone or with others, education, income, and age) of the samples from the two groups is shown in Table 1.

Table 1. Comparison of demographic characteristics of the two samples

	Utah-Idaho 1983 n=441	Utah-Idaho 1986 n=181
Male	69%	30%
Female	31%	70%
Live alone	9%	53%
Education level	trade school	high school graduate
Mean income	$1450/month	$580/month
Low-income	29%	64%
Average age	66 years	69 years

Analysis of Data

Statistical analysis was conducted using the CROSSTABS procedure of the Statistical Package for the Social Sciences (SPSS Inc., 1986). The dependent variable in the crosstabulations was energy cost per square foot of residence. This was determined by dividing the yearly total home-energy costs by the midpoint of the square footage category of the home. The respondents from the two groups were further separated into two groups--low-energy users ($1.00 or less/sq. ft) and high-energy users (more than $1.00/sq.ft.). One dollar was determined as the division of the two groups because it split the 1986 sample at the 50th percentile for energy costs.

The independent variables were categorized into two or three groupings for crosstabulations. For the seven conservation measures, the respondents were separated into those who had the measure and those who did not. Age was separated into "young old" (60-74 yrs.) and "old-old" (75 years and older).

Chi square and gamma statistics were obtained in conjunction with crosstabulation tables. Chi square was used as in indication of the significance of the relationships. An alpha level of 0.05 was considered significant. Gamma was used as a measure of association for each relationship and to show the direction of the relationship. , A gamma of 0.25 or more was considered to indicate a relationship of some strength. The number of cases in each table differed since

not all respondents answered all questions.

FINDINGS

Energy Per Square Foot of Residence

The lower income, less educated, 1986 group spends $0.40 more per square foot for energy and has significantly fewer energy-savings features in its homes than does the 1983 group, as shown in Table 2. The lower income group also pays a higher percentage of its income for energy. The 1983 respondents tend to live in larger, generally single-family dwellings.

Table 2. A Comparison of factors in energy use for the two groups

	Utah-Idaho 1983 n=441	Utah-Idaho 1986 n=181
Energy use/sq.ft	$0.71/sq.ft	$1.11/sq.ft
Percentage of income for energy use	7%	14%
Age of the home	32 years	34 years
Single-family home	88%	47%
Home size	1377 sq. ft	975 sq. ft
Mean number of conservation measures	4	2

Relation of Structural Features and Demographic Characteristics to Energy Cost

Table 3 lists the chi square and gamma values for each crosstabulation of demographic and housing structural variables with energy costs. Some variables are not significantly related to energy costs.

In both 1983 and 1986, the presence of a wood stove is not related to energy costs. The sex of the individual and whether the individual is "young old" or "old old" is not related to energy costs in either year. In 1986, none of the demographic variables is significantly related to energy costs.

Column percentages for structural features that are significantly related to energy costs are shown in Table 4. As was expected from previous research findings (Guthrie and Brandt, 1983; Makela et al., 1982), those respondents who have an energy-saving measure in their dwellings paid less per square foot for energy than those who do not have the measure in both 1983 and 1986. For the more highly educated, higher income group, six of the nine structural variables are significantly related to energy costs. These variables include: a) ceiling insulation, b) weatherstripping/caulking, c) storm/double-paned windows, d) the type of residence (single/multi-family), e) clock set-back thermostats, and f) the age of the home. Four of the nine structural variables are also significant for the 1986 group including ceiling and wall insulation, storm doors, and the type of

residence.

Table 3. Relations of independent variables to energy costs
Dependent variable = Home-energy cost group (low, high)

Independent Variable	d.f.	1986 Population n	Chi Square	Gamma	1983 Population n	Chi Square	Gamma
Ceiling insulation	1	115	2.964	0.37+	257	5.828*	0.46+
Outside wall insulation	1	115	3.826*	0.39+	253	0.093	0.09
Weatherstrip/ caulk	1	114	0.379	0.15	255	4.013*	0.42+
Storm/double windows	1	115	0.014	0.06	260	6.642**	0.45+
Storm doors	1	116	1.288	0.25+	257	0.657	0.18
Wood stove	1	115	0.050	-0.06	244	0.024	-0.07
Clock setback thermostat	1	113	0.030	0.08	251	1.070	0.38+
Age of the home	2	104	1.189	0.12	265	3.895	0.27+
Type of residence	1	116	4.130*	0.44+	275	0.651	-0.32+
Live alone or with others	1	116	0.034	0.04	250	0.489	-0.30+
Age of the respondent	1	109	0.029	-0.04	276	0.843	0.22
Income	2	112	0.445	-0.10	251	4.215	-0.29+
Education	2	114	2.937	0.07	267	6.301	-0.31+
Sex of respondent	1	115	0.069	-0.09	274	0.509	0.17

* denotes statistical significance at the 0.05 level
** denotes statistical significance at the 0.01 level
+ denotes an association of some strength

Participants in the 1983 group who have ceiling insulation, weatherstripping/caulking, storm/double-paned windows, a clock set-back thermostat, a newer home, and are living with others have lower energy costs.

The type of structure of the home is significantly related to energy costs for both groups, but the direction of the relation is not the same. For the 1983 group, those respondents living in multi-family dwellings have lower energy costs than those respondents living in single-family dwellings. In 1986, those respondents living in single-family dwellings have lower energy costs than do respondents who are multi-family dwellers.

Column percentages for demographic characteristics that are significantly related to energy costs are shown in Table 5. The demographic variables in this study include age, gender, income, living alone or with others, and education. Demographic characteristics are not related to energy costs for the 1986 group. That group includes less educated, lower income, primarily females living alone. Three of the five demographic variables, however, are significantly related to energy costs for the 1983 group. For the 1983 group, those older individuals who live alone, have lower levels of education or have lower levels of income are more likely to be in the higher energy-cost group.

Table 4. The relation of energy costs to structural features

1983 POPULATION

Energy cost	Ceiling Insulation*+		Weatherstrip/ Caulk*+		Storm Windows**+		Type of Residence+	
	Have	Do not Have	Have	Do not Have	Have	Do not Have	Single	Multi
$0.03-$1.00 sq. ft	88%	72%	87%	73%	89%	76%	84%	91%
More than $1.00/sq.ft	12%	28%	13%	27%	11%	24%	16%	9%
	n=257		n=255		n=260		n=275	

1983 POPULATION

Energy cost	Set-back Thermostat +		Age of the home		
	Have	Do not have	<19 yrs	19-36 yrs	>36 yrs
$0.03-$1.00/sq.ft	93%	85%	89%	87%	79%
More than $1.00/sq.ft.	7%	15%	11%	13%	21%
	n=251		n=265		

1986 POPULATION

Energy cost	Ceiling Insulation+		Wall Insulation*+		Storm Doors +		Type of Residence*+	
	Have	Do not Have	Have	Do not Have	Have	Do not Have	Single	Multi
$0.34- $1.00/sq.ft.	56%	37%	60%	40%	55%	43%	55%	32%
More than $1.00/sq.ft	44%	63%	40%	60%	45%	57%	45%	68%
	n=115		n=115		n=116		n=116	

* denotes statistical significance at the 0.05 level
**denotes statistical significance at the 0.01 level
+ denotes an association of some significance

Table 5. The relationship of energy costs to demographic characteristics

1983 POPULATION								
	Living Conditions +		Income +			Education		
Energy cost	Alone	With others	<$10,000	$10,000-$19,999	>$19,999	0-11yrs	12yrs	>12yrs
$0.34-1.00/sq.ft.	56%	37%	79%	85%	90%	75%	87%	89%
More than $1.00/sq.ft.	44%	63%	21%	15%	10%	25%	13%	11%
	n=115		n=251		n=267			

Because there may be little educational difference between a high school graduate and someone who has had some trade school, energy costs may be more related to the income, sex, and structure type than to the level of education received.

Age is divided into two groups in this study. Being "young old" or "old old" has no significant effect on any of the relationships observed. A previous study (Junk et al., 1984) also finds that age is not related to the rate of energy consumption per square foot.

Relationship of Demographic Characteristics to Structural Features

To better understand how demographic characteristics affect the presence of structural features, each characteristic is crosstabulated with each feature for both the 1983 and the 1986 groups. Table 6 shows the chi square values and levels of significance for the relations.

Tenure is the demographic characteristic most significantly related to structural features. This may occur because renters are less likely to have energy-saving features in their dwellings than are home owners. Only 18 percent of the 1983 multi-family dwellers are renters. Single- or multi-family structure type is only related to the presence of weatherstripping in 1983. In 1986, 63 percent of multi-family dwellers are renters. Those living in multi-family structures in 1986 are significantly less likely to have structural energy-saving features, with the exceptions of wood stoves and clock set-back thermostats. These relations support the importance of housing tenure in the presence or absence of structural energy-saving features in a dwelling.

For both groups, the age of the individual, whether "young old" or "old old", is not significantly related to the presence of any of the energy-saving features. Higher education levels of both groups are significantly related to the presence of ceiling insulation, but are not significantly related to the presence of other structural energy-saving features. This study finds that higher income is related to the presence of wall insulation, storm windows, and having a wood stove in the home in 1983. In 1986, however, only the presence of weatherstripping in the home is related to income.

In both 1983 and 1986, older homes (40 years old or more) are much less likely to have wall insulation and storm doors than are newer homes. For the

1983 group, older homes are also less likely to have weatherstripping and storm windows.

The sex of the respondent is not significantly related to any energy-saving feature in 1983. In 1986, gender is related only to having a wood stove, with males being more likely to have a wood stove in their dwellings.

Perceived Efficiency of the Home

The second objective of this study is to discover if the number of energy-saving features in the home is significantly related to the perceived energy of the home. The results are shown in Table 7.

Perceived efficiency of the home and the total number of energy-saving features on the home are significantly related in both 1983 and 1986. As the number of energy-conservation measures in the home increases, the home is perceived by the inhabitants as being more energy efficient. This indicates that elderly individuals are accurate in the perception of the energy efficiency of their homes. Further studies could determine whether elderly individuals are motivated to make their homes more energy efficient.

DISCUSSION

Of the two sets of factors examined in this study, the structural factors are often more significant than are the demographic factors. This is true for both of the groups studied. Tienda and Aborampah (1981) also find structural characteristics more important than demographic factors in predicting energy-consumption level. The significance of the demographic and structural variables in this study indicate three primary considerations for energy educators working with older audiences, particularly those educators working with low-income elderly audiences. These considerations are:

1. Information programs should focus on less educated, lower-income elderly individuals living in dwellings 40 or more years old because such individuals are consuming energy at a much higher rate than those individuals with more income and higher education living in newer homes. However, elderly individuals with higher levels of education are more likely to participate in new learning experiences than are those individuals with less than a high school education (Heisel, Darkenwald, and Anderson, 1981). Consequently, less-educated elderly individuals need encouragement to participate. Low-income individuals can be targeted by conducting energy-information programs at senior centers or through existing low-income senior programs.

   Programs for low-income elderly individuals should include information on weatherization assistance programs available to them. For example, the Department of Energy Weatherization Assistance Program is a federally-funded program providing up to $1,600 per household to weatherize homes. Priority is given to elderly individuals and to the handicapped. The program can include the addition of insulation, weatherstripping, and storm windows at no cost to the participant.

   Because there may be a waiting list of up to a year in some states for the weatherization program, information about the Low

TABLE 6
THE RELATIONS OF DEMOGRAPHIC CHARACTERISTICS
TO STRUCTURAL FEATURES

1983 SAMPLE

DEMOGRAPHIC CHARACTERISTICS

STRUCTURAL FEATURES	Age of Person	Single vs Multi-Family	Education Level	Age of Home	Income	Gender	Tenure
Ceiling Insulation	0.38	0.16	7.41*	1.17	2.00	0.23	11.7**
Wall Insulation	0.73	1.07	4.51	19.8**	5.24*	0.05	4.00*
Weather-Stripping	2.02	4.19*	0.09	11.6**	0.85	1.05	13.9**
Storm Windows	2.76	2.18	1.11	6.82*	6.68**	1.26	8.04**
Storm Doors	1.74	2.33	0.57	11.1**	0.00	0.03	3.03
Wood Stove	0.64	2.69	4.50	0.05	6.47**	0.23	2.24
Set-Back Thermostat	2.99	0.59	0.44	0.59	0.14	0.07	0.00

1986 SAMPLE
DEMOGRAPHIC CHARACTERISTICS

STRUCTURAL FEATURES	Age of Person	Single vs Multi-Family	Education Level	Age of Home	Income	Gender	Tenure
Ceiling Insulation	1.02	19.1**	5.82*	5.35	3.24	0.43	16.2**
Wall Insulation	2.40	7.27**	1.00	12.8**	2.09	0.00	6.48**
Weather-Stripping	2.14	16.7**	3.59	2.79	19.7**	1.24	16.2**
Storm Windows	4.31	12.1**	0.28	0.76	0.59	0.30	4.87*
Storm Doors	3.96	8.98**	0.29	6.66*	0.21	0.01	5.88*
Wood Stove	2.84	2.58	2.17	0.55	1.93	6.08**	1.02
Set-Back Thermostat	4.24	1.44	4.89	0.86	0.75	0.32	0.00

*Denotes Chi Square significance at the 0.05 level
**Denotes Chi Square significance at the 0.01 level

Table 7. Total number of energy-saving features and perceived efficiency

1983 Sample

	Number of Features		
	2 or less features	3-4 features	5-7 features
Not efficient	70%	48%	21%
Somewhat efficient	17%	34%	39%
Efficient	13%	18%	40%
	100%	100%	100%

n=331 X^2 p<0.01 gamma>0.51

1986 Sample

Total number of features	Number of Features 2 or less features	3-4 features	5-7 features
Not efficient	43%	16%	14%
Somewhat efficient	21%	48%	35%
Efficient	36%	36%	51%
	100%	100%	100%

n=154 X^2 p<0.01 gamma>0.28

Income Energy Assistance Program should also be provided. This program is administered by the Department of Social Services in each state. Participants can receive a check of up to $750 per year payable to their fuel supplier. The funding is obtained from yearly excise taxes on fuel companies.

2. Energy information programs should emphasize conservation measures that will have the most immediate benefit for elderly individuals. For example, information concerning measures with short pay-back periods will be most accepted. Installing ceiling insulation will result in the greatest reduction in energy costs. This insulation may be included as part of the weatherization assistance program. Fifty-eight percent of the respondents in the 1986 group would have qualified for an assistance program.

Because having a wood stove is not significant in elderly individuals' energy costs, providing extensive information about such stoves does not appear to be an effective way to help elderly people with energy costs. Having a wood stove is the

only structural feature related to sex.

3. In the 1986 group, respondents living in multi-family structures are primarily renters. Their energy costs are higher than the energy costs for single-family dwellers. The 1983 multi-family dwellers are primarily owners and are paying less for energy than are those individuals residing in single-family homes. Elderly renters in both single-family and multi-family dwellings need to be provided with information and resources to improve the energy efficiency of their dwelling and to assist in energy costs.

4. Further resources are needed to improve the energy efficiency and structural features of the homes of the elderly. Public policy makers need to provide increased funding for the Department of Energy Weatherization Assistance Program to reduce the length of time elderly individuals spend on waiting lists for participation in the programs.

Further study with low-income elderly will indicate whether the relationships to costs found in this study are unique to the western region states sampled or exist for other low-income elderly individuals throughout the United States.

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