ENERGY CONSERVATION: A STUDY OF ENERGY KNOWLEDGE AND BEHAVIOR OF HOUSEHOLDS IN A LIMITED-INCOME NEIGHBORHOOD

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ENERGY CONSERVATION: A STUDY OF ENERGY KNOWLEDGE AND BEHAVIOR OF HOUSEHOLDS IN A LIMITED-INCOME NEIGHBORHOOD

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PREFACE

The energy-related characteristics of a low-income neighborhood were examined. The main objective of the study was to research how low-income households were coping with the energy problem. This data is needed to determine the immediate household energy needs of households with limited resources and to more effectively develop and implement local energy policies.

Residents of this neighborhood were actively conserving energy--mainly as a hedge against high bills. Respondents also exhibited relatively high levels of energy knowledge and conserving behavior. Though not tested in this study, it appears that the extraneous variable of rurality may have influenced energy knowledge and behavior. A significant relationship was found between energy knowledge and belief in the energy crisis. No significant relationships were found between energy knowledge and behavior, or between energy behavior and a belief in the energy crisis.

This study is dedicated to those who believe an education is an important step towards fulfilling the American dream, and especially, to those who help others achieve this noble goal.

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CHAPTER I

INTRODUCTION

The energy crisis affected the life-styles of American families as few international situations have. The impact was similar to that of a world war--in that it generated a climate of shortages, uncertainties, and suspicion.

The country experienced an unprecedented technological and industrial growth during the 1950s and 1960s. Energy usage was encouraged and even rewarded. America's unsatiable appetite for energy made the country the largest producer, consumer, and importer of energy.

The 1973 Arab oil embargo, the 1978 Iranian Revolution, and the formation of the Organization of Petroleum Exporting Countries (OPEC) shook the world with the threatened loss of major petroleum supplies. Americans finally realized their dependence on imported fuel.

The shortage of imported oil strained domestic energy supplies. Compounding the energy problem in the United States were slow economic growth, high inflation, and a growing interest in the environment. During the 1970s, Americans used 33 percent of the world's energy, while composing only 6 percent of the world's population (Rocks & Runyon, 1972). Per capita energy consumption in the United

States rose from 180 million BTUs in 1925 to 350 BTUs in 1973, while the average per capita for the world was 55 million BTUs in 1973 (Ford Foundation, 1974). During the 1970s, one-third of the energy consumed in the United States was used by Americans in their homes and cars (Millstein, 1977). The residential sector, alone, consumed almost one-fifth of the total energy used in the country (Yergin, 1981). Additional sums of energy were needed to build the dwellings and their contents.

> In general, the family is a high-energy-use system, dependent on large amounts of physical energy and processed material to maintain current levels of consumption and diverse styles of living (Paolucci & Hogan, 1973, p.13).

Through prosperous times, Americans developed an energy-intensive life-style. Homes became more mechanized than ever before as Americans consumed as much energy as they could afford. Regressive utility rate structures, that declined in price as consumption increased, spurred the use of labor-saving appliances and the building of larger homes. Cars expanded to disproportional lengths; all-electric homes, and central cooling and heating became the vogue. From 1951 to 1971 the use of electricity more than tripled (Montgomery, 1973). In the early 1970s, homes consumed one-third of the total electricity used in the country. As personal comfort became the prime motive of energy use, consumers gave little regard to the amount of energy used or the efficiency of the machines. The public was under the misconception that energy supplies were inexhaustible or infinite resources. Hutton (1982) noted that consumers made matters worse by developing attitudes and life-styles "that reflected a lack of concern with energy efficiency" (p. 27). Literature indicates that the public expects technological advancements and innovations to improve the energy situation (Stobaugh & Yergin, 1981). Hutton (1982) noted that most energy programs have emphasized technological solutions.

> Only recently has it been recognized that conservation can have an integral role in the war on energy, both as a short-run measure and as a long-run policy in the form of a new conservation ethic for the consuming public (p. 28).

Conservation measures can dramatically reduce energy requirements. Conservation may be the cheapest, safest, and most productive energy alternative available in large amounts. Yergin (1981) suggested that the nation could use 30 percent to 40 percent less energy through an effective conservation program. Portland, Ore., has one of the strictest building codes in the country, which requires that all structures be insulated. Portland authorities predicted that this building code together with other conservation measures will save 35 percent of the energy that the city will need by 1995 (Naisbitt, 1984).

The international energy situation has improved recently through the weakening of OPEC, the strengthening of the dollar, and the decreased demand for energy through conservation. Yet, energy conservation continues to be a timely and vital issue. The recent increase of production of Arab oil is only a temporary supply, since fossil fuels are a finite resource that cannot be replaced. The Middle East is too politically volatile to be a reliable source of petroleum. Conservation can buy time to research new energy supplies, such as synthetic fuels, to develop energy efficient technology, and to locate new sources of domestic fuels. Despite the present energy glut, energy prices continue to increase. Conservation measures may provide some financial relief to families by decreasing the amount of energy required to maintain the home, thus reducing the utility bill.

The demand for energy by the residential sector continues to increase. From 1970 to 1979 the number of households increased by 22 percent while the population grew by only 7.7 percent (HUD, 1980). An estimated increase in population of 40 million in the United States by the year 2000 will use the expected gain in energy supplies just for housing and transportation (Hayes, 1979).

As large consumers of energy, families can make a substantial impact on national energy supplies through conservation without much change in personal life-style. An estimated 25 percent of energy costs can be saved by households just by using low-cost weatherization methods, such as operating appliances more efficiently and changing energy consumption behavior (Boles & Jackson, 1982). Conservation can also decrease energy loss and improve personal comfort (Williams, Braun, & Lauener, 1981).

Conservation may be the only measure available to low-income households as a means to combat rising utility costs. Previous studies suggest that low-income families may not possess the resources needed to effectively cope with the energy problem (Cunningham & Lopreato, 1977).

Limited-income residents are generally ethnic, elderly, or a single-female head of household (HUD, 1980). The later two groups are rising in number as longevity and divorce rates increase. Limited-income households often live in substandard houses that are inefficient users of energy (Yergin, 1982). Yet, these residents are generally low-energy users and spend a greater percentage of their income on energy than middle-income households (Community Services, 1980).

While the energy problem has had detrimental financial affects on limited-income households, not much is known about their energy practices or their level of energy knowledge. Low-income families do not tend to participate in mail energy surveys, which are used extensively to develop baseline data. Consequenty, surveys are biased toward middle- and upper-income households (Cunningham & Lopreato, 1977). Since demographics have not shown a relation to self-reported energy consumption (Hummel, Levitt, & Loomis, 1978), no assumptions about limited-income households can be derived from studies of middle-income families. A concerted research effort needs to be directed toward limited-income households to fill the apparent lack.

The low-income household has limited resources to cope with the energy problem. Managing energy costs could make the difference between living in relative comfort or living in substandard conditions (Murray, 1972). As inflation causes a gradual decline in real income of persons living on fixed incomes (Business Week, 1978), many elderly and disabled persons cannot afford to maintan healthful temperatures in their homes as utility and housing costs increase (Boles & Jackson, 1982; HUD, 1980).

According to a recent report by U.S. News & World Report (Taylor, 1984), energy programs that assist low-income households include cash gifts contributed by more prosperous customers when paying their own utility bills, laws that prohibit utilities from shutting off service to the poor, and free utility services that provide the minimum amount of energy necessary for survival. Local, state, and federal agencies, such as the the Low-income Home Energy Assistance Program, help the poor pay their energy bills Other public agencies, such as the Cooperative Extension develop energy education programs or help implement local energy programs. With recent cutbacks in funding available for social programs at all levels of government, energy programs must be developed and implemented as efficiently as possible. Studies such as this one can help determine specific energy needs of an area (i.g., education programs, financial or physical assistance to weatherize the home), thus making the best use of scarce public funds.

Purpose of the Study

The purpose of this study is to examine how low-income households are coping with the energy problem, especially rising energy costs. The major objective of this study is to examine the energy knowledge and behavior of residents in a low-income neighborhood. Specific objectives will be:

1. To identify energy conserving behavior
2. To determine the level of energy knowledge
3. To investigate motives for conserving
4. To identify sources of energy information
5. To record the acceptability of public policies affecting energy conservation
6. To test the relationship between energy knowledge and energy behavior
7. To test the relationship between belief in the energy crisis and energy knowledge
8. To test the relationship between belief in the energy crisis and energy behavior

Assumptions

For this research study it is assumed that:

1. The sample is representative of the neighborhood from which it was drawn.
2. Subjects will report self-perceived energy behavior and not give what they consider to be socially acceptable responses.

3. Subjects will have at least a limited knowledge of energy characteristics in order to identify structural deficiencies that are energy wasters or energy consumption behaviors that are energy efficient.

Limitations

The following is a listing of acknowledged limitations of this study:

1. As an instrument, surveys of descriptive research have exhibited a weak link between attitudes and behavior (Shippee, 1980). A stronger relationship between attitudes and behavior has emerged when actual, rather than self-perceived, levels of consumption have been recorded, according to Shippee. Actual energy consumption patterns of subjects will not be monitored during this study.

2. Different culture groups have different standards of housing (Morris & Winter, 1975). This cultural factor is not taken into account for this study.

3. As a method of collecting data, interviewing does not allow for anonymity. Respondents may not answer candidly and may also pick up nonverbal cues from the interviewer.

Definition of Terms

The following is a list of terms used in this study:

Housing unit--single-family detached residence

Household--consists of all people who occupy a dwelling, related or otherwise

Structural deficiencies--physical flaws in the housing unit that allow for large amounts of air infiltration

Low-income neighborhood--an area identified by the "Neighborhood Statistics Program" of Stillwater, Okla., as having a high level of poverty, high unemployment, a low level of education, and a large percentage of elderly persons

Poverty level--the federal government's weighted average poverty thresholds of 1979 of $7,412 for a family of four

Energy conservation--process of utilizing energy as efficiently as possible through behavioral efforts or technological fixes

Weatherization--process of plugging up air leaks by caulking windows, installing storm windows and doors, and weather stripping, or any other method that controls drafts

Motives--the need or desire that causes a person to try to conserve household energy

BTU--a unit to measure quantities of energy sources, such as natural gas; heat necessary to raise the temperature of one pound of water one degree Fahrenheit.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Literature indicates that the energy shortage is a complex, permanent problem. To fully appreciate the relationships among household energy use, the ability to pay utility bills, and the impact of energy conservation--the energy resources available to households must be examined. Both the financial and environmental costs of consuming finite energy resources to maintain current living standards must also be considered.

United States Energy Profile

As the largest user of energy, the United States has a great impact on the international energy system. The country's energy policy influences the rest of the world directly and as a model (Stobaugh & Yergin, 1981).

In the early 1970s, production of domestic oil and gas peaked, while energy demand continued to increase. This deficiency was relieved by inexpensive foreign oil. As American demand for oil imports increased, so did the price of oil worldwide. By 1979, half the oil consumed by

Americans was imported (Stobaugh & Yergin, 1981).

After decades of frenzied energy consumption, experts warned that the world's fossil fuels were being quickly depleted. Experts predicted that if consumption continued at the rate of use of the early 1970s, natural gas and domestic oil would be seriously depleted by the year 2000 and that coal supplies would last only another 200 years (Hubbert, 1974; Montgomery, 1973).

Of the four conventional sources of domestic energy--oil, natural gas, coal, and nuclear power--coal holds the most promise for the future. Hayes' (1979) analyzation of energy sources in the United States concluded that coal, despite its environmental hazards, is the only fuel available in quantities large enough to maintain a slow energy growth. For the past 40 years, gross national product and energy have grown 3 percent to 3.5 percent yearly. Hayes predicted that the nation will not be able to maintain a 1 percent energy growth in the 1990s.

Hayes noted that forecasts of nuclear power use for the future have declined because of public opposition, rising construction costs, decreasing electrical energy growth rate, and a uranium supply shortage. Naisbitt (1984) suggested that the nuclear industry failed primarily because nuclear power plants were too expensive to build. Solar power will not be used extensively by the year 2000, since it is an expensive energy source that is available only part of the time. Maidique (1981) predicted that only

20 percent of the energy needs of the year 2000 can be met with solar power. Hayes (1979) noted that energy from hydropower can increase only a small amount since all the best locations have been used. Other energy souroes--wind, tide, ocean thermal, and geothermal--will not provide any substantial amounts of energy in the near future.

Concern for the environment also affected the supply of and use of energy. Environmental advocates slowed the development of new oil territories, resisted the production of oil from shale rock, brought the nuclear industry to a stalemate, and saddled the coal industry with mandatory installation of scrubbers, strict controls of strip mining, and reclamation of land mined.

Hayes (1979) noted that consumers have unrealistic attitudes about the energy situation.

> Americans at large continue to cling to the naive idea that we can have all the oil and gas we will ever need at 1970 prices without digging coal or building nuclear plants. This attitude slows down or stops planning for the inevitable--a less energy-intensive U.S. society (p. 233).

The public's reactions to nuclear power and coal may be an indication that they are ready to support cleaner and safer forms of energy that have fewer risks to the environment (Bupp, 1981). After analyzing years of energy trends, Naisbitt (1984) concluded that the country no longer considers nuclear power the solution to the energy problem. The new emphasis is on a diversity of energy sources "varying geographically--all of this of course, instructed by longer-term considerations" (p.97).

Stobaugh and Yergin (1981) suggested that to maintain economic growth with a zero energy growth, the country must "master energy efficiency" and rely on domestic energy sources instead of imports. Dillman, Tremblay, and Dillman (1977) contended that constantly changing political and climatic conditions influence the energy supply and demand. The researchers suggested that the only course left "is to curtail use of our energy to insure adequate supplies for the future" (p.2).

Conservation as a Resource

Yergin (1981) suggested that conventional sources of energy may not increase enough in production in the future to reduce the nation's dependence on imported oil. Conservation can do more to solve the energy problem than any other conventional energy source. Yergin also suggested that energy conservation and energy efficiency should be considered untapped energy sources. A serious national commitment could save 30 percent to 40 percent in energy, the equivalent of oil imported in the early 1980s. A decrease in energy use by the United States would benefit the environment and decrease demand on world energy resources, perhaps even relieving international tension over energy supplies.

As an alternative energy source, conservation is proving to be the energy source for the short and middle term. Yergin noted that conservation compares favorably in terms of payback, ease of recovery, disruption, and environmental effects.

Any source of energy will be better utilized if the structure has been insulated and weatherized. Through conservation, energy savings can be achieved with little or no investment. Yergin indicated that small fixes can add up large energy savings. An aggressive use of retrofit measures--ceiling insulation, storm windows and doors, caulking, weather stripping, furnace adjustments, plugging up air infiltration flows--could cut energy requirements by half more cheaply than any other energy source.

Using data from the U.S. Department of Energy, Boles and Jackson (1982) estimated that low-cost/no-cost measures could save between 15 percent and 25 percent of heating and cooling bills. Low-cost/no-cost measures make use of behavioral and structural efforts that require no large investments or sacrifice in life-style. Behavioral measures include defrosting freezers more frequently, regulating thermostats, and using proper cooking methods. Structural measures include ways to remedy air infiltration which accounts for 50 percent of cooling or heating loss in the home (Dole, 1975).

Impact of Housing on the Energy Supply

Housing devours large sums of energy. Residences use 20 percent of all the energy consumed in the United States

(Montgomery, 1973; Yergin, 1981).

Studies have noted that the structure of the dwelling and the energy behavior of household members determine how efficiently, or wastefully energy is utilized. Dillman et al. (1977) indicated that the structure of the typical American house--single-family detached dwelling--is a tremendous energy waster. More than a third of all residences were built before 1940 when there were few or no standards for insulation. Thirty percent of these homes are completely uninsulated (Godwin, 1976). Even through the 1960s, buildings and houses were built without much consideration to energy efficiency (Yergin, 1981). Since the building stock changes slowly, many of these homes and buildings are currently occupied. Yergin indicated that the trend toward energy conscious design is being reinforced by changing building codes and loan requirements which stress energy efficiency. As regulations stiffen, the building stock will become more energy efficient.

Slight differences in the breakdown of household energy use is reported by studies and surveys. Generally, it is agreed that major users in descending order of energy requirements are space heating, space cooling, heating water, and refrigeration and food freezing (Dole, 1975; Yergin, 1981). Seventy-five percent of household energy is used to heat and cool space, and to heat water (Morrison and Gladhart, 1976; Stanford Research Institute, 1972).

The trend for convenience in modern society encouraged the increased use of energy-intensive household appliances. A third of residential energy use is consumed by major home appliances. Yergin (1981) and Dole (1975) noted that standard setting and efficiency labeling can save energy without affecting the way people live.

A recent increase in housing units is increasing the demand for energy. Between 1970 and 1980, the growth rate for housing rose while the growth rate for the population declined (U.S. Census, 1980). More housing units in relation to total population existed for the first time in the history of the United States. In 1980 there were 80 million occupied units, demonstrating an increase of 20 million units since 1970. The 1980 U.S. Census reported that fewer people comprised a household than ten years ago. Household members dropped from 3.1 persons to 2.7 persons in 1980. With fewer people per household, greater quantities of energy will be required to adequately maintain all households. Morrison and Gladhart (1976) noted that large families use less energy per person than smaller families.

Families will pay more for fossil fuels in all forms (Morrison and Gladhart, 1976). The average residential electric bill climbed 7.9 percent in 1984, nearly twice as fast as the inflation rate of 4 percent (U.S. News, 1985). Energy use per household has dropped slightly, but the decline in use is not enough to offset the rise in costs. Many households are hard pressed to meet their rising energy bills (Dillman et al., 1977).

Low-income Household Profile

Sixty percent of a sample of Michigan residents perceived rising household energy prices as a "great problem" (Morrison, Deith, & Zuiches, 1977). While high-income households may have been able to absorb increases in energy prices with few changes in life-style, low- and middle-income households are spending a growing percentage of their income on transportation and home heating costs (Claxton, Ritchie, & McDougall, 1983).

Boles and Jackson (1982) reported that the poorest one-tenth of the population spent an estimated 34 percent of its gross income on energy. Energy bills often deplete half the income of some low-income and elderly households. Millions of low-income families must choose between paying energy bills or paying for other necessities such as housing, food, medicine, and transportation (Boles & Jackson, 1982; National Consumer, 1984). As inflation increases the costs of essential services, older adults experience a continual decline in their real income. The elderly, who use less household energy than any other age group, spend a greater proportion of their income on energy (Commissioner, 1977). The elderly often have health problems which require the use of more heat in the winter and more cooling in the summer (Boles & Jackson, 1982).

While studies confirm that low-income households are minimal users of energy, the poor and the elderly are the least able to afford measures that could make their homes more energy efficient (Community Services, 1980; Tyler et al., 1982; Yergin, 1981). Fifty-six percent of the dwellings of low-income families were not insulated, and 60 percent lacked storm windows. The average low-income household in 1975 used 55.4 percent less electricity and 24.1 percent less natural gas than the average middle-income household (Community Services, 1980).

Morris and Winter (1975), who examined the socio-demographic characteristics indirecty affecting housing satisfaction, noted that age and income may influence the quality of housing. Retired people have limited resources to maintain the home, which usually results in serious deterioration, and consequently, decreases the quality of housing. Likewise, low-income families have limited funds for maintenance and weatherization.

After a 10-year period when the number of people living in poverty decreased, a slight increase was experienced in 1970 because of the recession (Rainwater, 1972). Numerous recessions during the 1970s and 1980s have reaped a new kind of poor in the country--people who were laid off from jobs and are unemployed for the first time in their lives. HUD (1980) reported a 40 percent growth of single-parent families, a 40 percent increase in divorces, and an increase in the number of elderly couples maintaining their own households. Minorities, female-headed households, and large households are more likely than not to be poorly housed.

Minority- or female-headed households may spend more than 25 percent of their incomes for adequate, uncrowded housing (HUD, 1980).

Since low-income families cannot secure a down payment to buy a home, they are more likely to be renters than higher income families (HUD, 1980; Morris and Winter, 1975). Rental dwellings within the budgets of low-income households are often lacking in quality and are sometimes substandard. Serious structural deficiencies or structural boundaries make it difficult, if not impossible, to conserve household energy (Bole & Jackson, 1982). Often, families hesitate to spend money on a structure they do not own (Tyler et al., 1982; Williams et al., 1981).

Methods of Energy Research

Before the oil embargo, not much research was conducted on the societal effects of energy. Cottrell's (1955) pioneering work on energy research noted that changes in the amount of energy available are likely to result in changes in values. These changes are also based on the knowledge of the physical limits of the energy situation.

Most research and governmental support has been directed toward discovering technological solutions to the energy crisis. Yet, the quickest and safest solution to the energy problem may be energy conservation in the home (Dole, 1975; Yergin, 1981).

The use of energy in the home is based on a complex pattern of life-style--family goals, attitudes, and beliefs; structural needs--type and size of dwelling, size of the household, and number and type of appliances, and economic forces--availability and prices of energy sources, incentives to conserve, inflation, and prices relative to other essential services and goods.

Previous consumer energy studies generally included five major components: knowledge of energy, attitudes toward energy, energy consumption patterns or energy behavior, delivery and quality of energy information sources, opinions toward public policies affecting energy use, and incentives to conserve. Energy assistance programs available to the community are included in energy studies of low-income households.

Consumer energy research is generally divided into understanding what consumers are thinking and doing about energy conservation, and examining the impact of energy conservation and policies on individuals and families (Claxton, Ritchie, and McDougall, 1983).

Three research methods used in energy behavior studies are the survey approach, field-applied approach and laboratory approach. The survey approach includes a descriptive record of beliefs and attitudes about energy (Nietzel & Winett, 1977), as well as the study of the relationship between attitudes about energy and actual usage, as in a study by Seligman (1980). The field-applied approach studies procedures that are likely to be successful in reducing energy usage, such as feedback of energy consumption (Seaver & Paterson, 1976) and rebates (Winett, Kagel, Battalio, & Winkler, 1978; Winett & Nietzel, 1975). The laboratory approach uses games and experimental analogues to simulate energy use.

Descriptive information can provide behavioral scientists with baseline data for assessing measures that might affect energy usage. Dillman et al., (1977) suggested that researchers continuously monitor people's willingness to accept particular energy policies. Surveys must be representative of all regions of the United States, since energy sources, costs, and alternatives for conservation are likely to differ (Dole, 1975). Energy surveys can assist policy makers in assessing and implementing energy programs. Policies which are most acceptable to the public are likely to be implemented with little resistance. Shippee (1981) suggested that reactions to new energy technology be studied to ease the flow of transition of the innovation.

> When potential behavioral, attitudinal, and perceptual responses to technological innovations are not assessed, the solutions often prove unsuccessful (p. 297).

Household Energy Conservation Research

Representative of major consumer energy survey research is the 1977 study by Cunningham and Lopreato. Data from 2,403 respondents was collected from five communities in three states through mail questionnaire. The sample was biased toward middle-age, white males with higher than average education and income.

The researchers attempted to study the respondents' attitudes toward energy. The analysis included breakdowns by socio-demographic factors of age, sex, race, income, and education. Subjects differing in energy beliefs were further examined in six social-psychological variables. Also analyzed were energy information behavior of respondents, and their reactions to public policies and incentives to conserve energy. Twenty-six items relating to energy conservation were analyzed to identify subjects as "energy-conserving" or "less energy-conserving".

Included in the major findings by the Cunningham and Lopreato study were the lack of relationships between age, sex, race, and income to a belief in the energy problem. Results revealed a reluctance by subjects to complain to public or private officials about energy problems. Respondents showed a willingness to make efforts to conserve energy, provided that expenses and negative effects on life-style were minimal.

Subjects classified as more energy-conserving in the Cunningham and Lopreato study had lower incomes, were less educated and more likely to be a minority than less-conserving respondents. Middle-income subjects were the most responsive to economic incentives to conserve energy and were most likely to use less energy in response to energy price increases than low- or high-income consumers. Middle-income subjects showed the most interest in guaranteed loan programs and were willing to wait longer for payback of home improvements.

Dole (1975) analyzed the household energy use of nine regional sectors of the United States, taking into account climatic differences and local fuel supplies. Results of the study showed that over half of residential energy used for air conditioning was consumed in the West South Central and South Atlantic regions. The West South Central region, which included Texas, Louisiana, Oklahoma, and Arkansas, was dominated by gas for a fuel source.

The average residential structure in the West South Central region had the poorest thermal integrity, ability to retain heat, of all regions. Houses in cold climates were better insulated on the average than those in mild climates.

Dole noted that space heating was the largest end use of energy in each of the regions. Space heating accounted for only 36 percent of the energy used in residences of the West South Central region; whereas, it accounted for 63 percent of household usage in New England. There were no differences reported by Dole in the way people in the nine regions used energy for cooking, refrigeration, or lighting. For the other household energy uses, regional differences in energy consumption levels were small, and none accounted for more than 10 percent of the total in any region.

A review of literature suggests that families do not make conscious decisions about energy consumption, but use enough energy to support the life-style activities they have chosen. In a five-year longitudinal study, Morrison and Gladhart (1976) researched the energy decision-making practices of 160 urban and 57 rural families. Data was collected through self-administered questionnaires and personal interviews. The researchers attempted to study patterns of energy use and attitudes, food consumption, transportation, housing conditions, financial expenditures and resources, and the family's ability to interact with others and to adjust to change.

Analyzation of preliminary data in the Morrison and Gladhart study showed certain family characteristics to be related to energy consumption. Family income was the best indirect predictor of residential energy consumption. Income and energy use were found to have a positive relationship, as was the size of the family. Families with children used more household energy than families without children. Larger families used more total energy than smaller familes, but larger families used less energy per person. Full-time homemaker used 8 percent more energy than homemakers working full time outside the home and 6 percent more energy than homemakers working part time outside the home.

Morrison and Gladhart found that housing structure and the number of household appliances owned related directly to energy consumption patterns. Single-family homes used more energy than multifamily dwellings or mobile homes. Belief in the energy problem did not decrease energy consumption. Consumers who believed that energy resources were finite were more likely to practice energy conservation. This "eco-consciousness" was related to education level and occupation. Belief in the energy problem was found to be strongly related to income and education.

Urban and rural families did not differ much in the total residential energy used, but differed sharply in their acceptance of public policies that would benefit only one residential group.

Low-income Household Energy Research

Mail surveys are generally biased toward high-income whites (Cunningham & Lopreato, 1977), and tend to have a slight bias against those who are older, less educated and economically deprived (Goudy, 1978). Surveys and questionnaires administered through personal interviews have proven to be a successful method of collecting data in studies involving low-income households.

Boles and Jackson (1982) used an experimental design to research the impact of an energy education program on energy consumption habits of low-income residents. The sample consisted of 26 single, nondisabled, white women aged 62 years or older. All subjects were living in the same apartment building. Respondents were matched to either a control group or an experimental group according to the results of an energy knowledge test and actual electrical use for December 1980. Surveys which were conducted before placement recorded attitudes toward energy conservation, energy consumption, energy conservation behavior, and demographics.

The treatment group of the Boles and Jackson study received an energy education program detailing 17 low-cost/no-cost conservation techniques. These conservation measures were personalized for the study subjects, taking into account appliance possession, life-style, energy and income behaviors, apartment management policy, and structural characteristics of the apartments. The researchers demonstrated methods to efficiently use energy in the apartment. Posters and handouts were used to emphasize the techniques.

The education program of the Boles and Jackson study was successful in improving attitudes and increasing energy knowledge of subjects but was not effective in reducing electrical use. The respondents were already minimal users of energy and further reductions were nearly impossible. The subjects were also structure locked in the apartment building and could not make structural changes to make the dwelling more energy efficient.

Previous research has shown that low-income households may not implement energy efficient measures in their homes because they do not know how to install or cannot afford the measures. A low-cost/no-cost energy education program similar to the Boles and Jackson (1982) study was conducted by Williams, Braun, and Lauener (1981). This energy project used a network of private and public organizations to help implement the program. Eight paraprofessionals delivered the program to 788 low-income families in Choctaw County, Okla., through group meetings and personal visits at home. Structural modification and conserving behavior were taught with the aid of demonstration materials.

Surveys were used to collect data on household characteristics, knowledge of energy, structural practices, and behavorial practices. Additional data was collected and analyzed to help explain the reasons subjects either adopted or did not adopt the energy conserving measures.

The treatments had a positive effect in changing knowledge, and structural and behavioral conditions of subjects. Energy knowledge of subjects increased, and nearly everyone in the study implemented a low-cost/no-cost measure to improve the energy efficiency of their home following the demonstration program.

A review of literature indicates there is a lack of information describing the energy consumption behavior of urban low-income families who rent their dwellings, especially those who do not reside in public housing. Tyler et al., (1982) examined the energy-related characteristics of urban, low-income tenants. Paraprofessionals interviewed 216 households in an established black neighborhood in Roanoke, Va. Socio-demographic information, characteristics of the dwelling units, and patterns of household energy consumption were recorded.

Analyzation of data in the study by Tyler et al. found no relationship between the condition of the dwelling, the presence of senior citizens, or the fuel used for the main heating system to the indoor temperature. Contrary to previous studies, the elderly did not tend to maintain higher temperatures in their home. Older subjects were more likely to live in houses that were in sounder condition than younger residents were.

The findings revealed that the landlords had done little to weatherize these units. Tenants had to install low-cost/no-cost structural modifications or change energy consuming behaviors in order to conserve energy.

Conclusion

The majority of subjects surveyed by Cunningham and Lopreato (1977) agreed that the country has an energy problem and that not enough was being done by public or private sectors to solve it. New energy sources discovered in the near future will most likely not add substantially to the world's energy supply. Conservation may be a viable solution to the energy problem. Since 20 percent of the total energy used in the United States is consumed by residents, a reduction in household energy use can have a major impact on the country's pool of energy.

The family, a large user of energy, provides an environment for the development of attitudes, values, goals and skills, and is an important decision-making ecosystem in the energy problem (Paolucci & Hogan, 1973). Studies of family energy use, and attitudes toward energy conservation can provide necessary baseline data essential to analyze the energy needs of families. Little is known about energy-related characteristics of low-income households, which is needed to develop and implement effective energy programs.

Previous research suggests that energy policies must be matched to the needs of households, the environment, and the economy. Energy policies that run contrary to individual or regional needs are often rejected by the public.

CHAPTER III

METHODS AND PROCEDURES

Introduction

The purpose of this project was to study how low income households are coping with the energy problem--specifically rising energy costs. Data was recorded and analyzed to identify the level of energy knowledge and behavior of households, and to identify attitudes and opinions on issues regarding the energy situation and conservation.

Description of the Sample

The population studied was a geographically distinct low-income neighborhood in Stillwater, Okla. Oklahoma State University is located in Stillwater, an urban area with a population of 38,268. While the city is classified as urban by the U.S. Census Bureau, Stillwater has deep roots in rural traditions through the backgrounds of its residents and through the agricultural and extension programs provided by Oklahoma State University.

The selection of the neighborhood for this study was based on socio-demographic and housing information provided by the "Neighborhood Statistics Program" compiled by the

Planning Division, Community Development Department of the City of Stillwater. The neighborhood report was based on data from the 1980 U.S. Census.

The neighborhood chosen was characterized by low levels of education and income, and a high level of poverty. This area had a substantial percentage of elderly persons, and women who were separated, widowed, or divorced.

The breakdown of the neighborhood according to the "Neighborhood Statistics Program" is as follows: median age, 23.6; persons 65 or more years old, 9 percent; persons 15 or older separated, widowed, or divorced, 15.5 percent; persons completing high school, 67.3 percent; college graduates, 21.7 percent; average annual income per family, $13,344; per capita annual income, $4,423; families below poverty level, 17.5 percent; and persons below poverty level 3.9 percent (Table I). More than half of the residents were enrolled in school, with a majority attending college. The influence of college students lowered income and age medians, and raised the levels of poverty and education. This neighborhood also had the lowest level of high school and college graduates in the city.

The neighborhood has 1,685 single-family detached units. The neighborhood also has the city's oldest houses, and the lowest average of persons per household, 1.9. The area has the highest percentage, 2.1, of occupied units lacking complete plumbing, which could be used as evidence of substandard housing structures.

TABLE I

SOCIOECONOMIC DATA FOR STUDY NEIGHBORHOOD AND THE CITY OF STILLWATER

Demographic Characteristic	Neighborhood[a]	City[b]
Population	6,238	38,268
Median age	23.6	22.2
65 or older	9.0%	6.8%
15 or older separated, widowed, or divorced	15.5%	5.4%
High school graduates	67.3%	83.6%
College graduates	21.7%	86.1%
Average annual income per family	$13,344	$19,479
Per capita annual income	$4,423	$5,517
Families below poverty level	17.5%	9.9%
Persons below poverty level	55.5%	20.7%
Persons per household	1.9	2.3

[a] Based on "Neighborhood Statistics Report"

[b] Based on 1980 U.S. Census

Only single-family detached units were selected for the study. Both year-round renters and home owners were included in the study. Because of the transient nature of college students, they were eliminated from the sample. Prior research suggests that the more transient the residents are, the less likely they will possess the propensity to make home improvements.

Method of Collecting Data

A purposeful, cluster technique was used to draw a sample of 50 households from a city map of Stillwater that was divided into major neighborhood sections. The northernmost part of the neighborhood was excluded to eliminate the downtown business area and blocks with a high concentration of college students. Street blocks were randomly drawn by blindly stabbing the neighborhood map. The blocks were divided into clusters of approximately 10 houses, which represents the average number of houses in each block in this area. Houses within clusters were assigned a number. Two houses from each cluster were drawn at random to be surveyed. After three failed attempts to make contact or immediately following a refusal, another house was drawn for the sample. Following two completed interviews per block or after all possible samples for a specific block were exhausted, another block was drawn. The sampling procedure was adhered to until 50 interviews were obtained. Following the sampling method, 176 households were drawn from 26 city blocks. The breakdown of households drawn was as follows: college students, immediate refusals, 49; household heads not present, 55; and completed interviews, 50.

The study instrument, a survey, was administered through personal interview. Participation by respondents drawn in the sample was sought solely by unannounced personal home visits. After explaining the nature of the study and its significance, a request was made for the respondent to participate in the study. The household head or heads were interviewed during a three-week period in September 1985. Interviews lasted from 15 minutes to an hour, with older respondents taking the most time to express their views.

Instrument Development

The instrument used for the project was a questionnaire that consisted of 31 items designed to obtain data pertinent to:

1. Personal information
2. Structural condition of the house
3. Energy knowledge of residents
4. Belief in energy crisis, cause, and effects
5. Energy conservation practices
6. Sources of information and motives to save energy
7. Opinion on public policies affecting energy use

Components of the instrument were developed from previously conducted energy studies. The energy knowledge test was drawn from Weber and Strebe's (1983) "A Feasibility Study of Integrated Home Energy Management Systems", and "Energy Education for Limited Income Families: The Choctaw Project" (Williams, Braun, & Lauener, 1981). Highly technical items were edited or omitted to compensate for the educational level of the sample for this study. Questions to gauge opinions on public policy were also obtained from the Weber and Strebe (1983) management study questionnaire. Items were chosen to represent policies that could affect households both directly--through financial costs--and indirectly--through energy standards. Questions dealing with sources of energy information and motives to conserve were derived from the Cunningham & Lopreato (1977) study, "Energy Use and Conservation Incentives: A Study of the Southwestern United States", and the Williams, Braun, & Lauener (1981) project questionnaire. Items included financial, physical, structural, and environmental motives, as well as an open category. Behavioral aspects of the survey were also drawn from the Choctaw project (Williams et al., 1981) and the Boles and Jackson (1982) energy conservation education project. Both behavorial and structural low-cost/no-cost conservation measures were itemized to judge energy behavior based on their low financial investment and availability.

Socioeconomic information was kept to a minimum in the study questionnaire, since studies show that low-income residents are hesitant to reveal demographic items (Tyler et al., 1982). Low-income residents are often suspicious that personal information they provide will be used to determine or deduct any public assistance they receive. Instead of attempting to analyze incomplete data usually applied to determine study eligibility requirements--income, education, and number of people in household--it was assumed that all households residing in the neighborhood had limited incomes.

Personal interviews were chosen as the approach to conduct the study since previous studies show it to be the most successful method of gathering information from low income households (Tyler et al., 1982; Williams et al., 1981). Mail surveys are biased toward educated, higher income whites (Cunningham & Lopreato, 1977; Goudy, 1978).

Analysis of Data

Information from the interview questionnaire was coded and prepared for computer analysis. In the preliminary analysis of the data, frequency distributions were tabulated for all items. Frequencies and means were used to describe the characteristics of the sample and opinions to public policies.

Scores were derived for the energy knowledge test and for the conserving behavior of respondents. Spearman's rank order correlation was used to examine the degree to which the rank scores of energy knowledge and energy conserving behavior were linearly related. These variables were analyzed through Spearman's rank order correlation because they were quantitative and continuous in nature and were in the form of ranks. Chi-square was used to test the strength of the relationships between energy knowledge and energy behavior to a belief in the energy crisis. This statistical method was used because the variables were qualitative and between-subjects in nature.

CHAPTER IV

ANALYSIS OF THE DATA

The Sample

The sample for this study was collected during a three-week period of September 1985 in Stillwater, Okla. A purposeful, cluster sampling technique was used to obtain a total of 50 completed interviews. A random sample of 176 households was drawn.

To maintain homogeneity, a geographically distinct low-income neighborhood was selected for the project based on demographic information from the "Neighborhood Statistics Program". The study neighborhood was chosen for its high incidence of poverty, large number of elderly residents, and low level of education (Table I, p. 31). Since it is one of the earliest settled neighborhoods, it has the city's oldest houses, with a mean average of 31 years. The combination of old structures and limited resources of residents provided the proper environment to study how low-income households meet the challenge of rising energy costs.

The sample consisted of 17 males and 33 females. Race of the respondents in the sample included 94 percent white and 6 percent non-white (Table II). The race of respondents

TABLE II

PERSONAL CHARACTERISTICS
OF RESPONDENTS
(N=50)

Characteristic	N	%
Sex of respondents		
Female	33	66
Male	17	34
Ages of respondents		
22 years to 29 years	7	14
30 through 39 years	5	10
40 through 49 years	1	2
50 through 59 years	7	1
60 through 69 years	5	10
70 through 79 years	16	32
80 through 84 years	9	18
Race of respondents		
White	47	94
Non-white	3	6
Tenure		
Owners	36	72
Renters	13	26
Live rent free	1	2

was recorded by the interviewer at the conclusion of the meeting.

Ages ranged from 22 to 84 years for the household heads, with the mean age being 60.8 years. Sixty percent of the household heads were 60 or more years old, and 10 percent were 75 years old. Seventy-two percent of respondents were home owners, 26 percent were renters, and 2 percent lived rent-free (Table II).

Structural Characteristics

Forty percent of respondents reported that their houses possessed at least one structural deficiency making it difficult to conserve energy. Of the 50 houses in the sample, 12 percent lacked insulation, and 8 percent were in need of extensive repair. Other structural faults mentioned and their percentages of frequency are as follows: door needs repair, 10 percent; settling of foundation, 8 percent; windows need repair, 6 percent; air leakage, 6 percent; walls separating, 6 percent; too many windows, 6 percent; no way to circulate air, 2 percent; construction underway, 2 percent; and slightly off foundation, 2 percent (Table III).

Natural gas was the primary heating source for 94 percent of the houses. Electricity was used to heat 2 percent of the houses in the sample. Thirty-two percent of the homes used floor furnaces, and 24 percent used central furnaces to heat. Twenty percent of homes had circulator or wall heaters, and 18 percent had space heaters. Other

TABLE III

STRUCTURAL DEFICIENCIES
OF SAMPLE HOUSES

Flaws	N	%
Lacks insulation	6	12
Door needs repair	5	10
Needs extensive repair	4	8
Settling of foundation	4	8
Windows need repair	3	6
Air leakage	3	6
Walls separating	3	6
Too many windows	3	6
No way to circulate air	1	2
Construction under way	1	2
Slightly off foundation	1	2

Note. Columns total more than 100% because respondents could list more than one item.

sources used in conjunction with natural gas were kerosene heaters, 2 percent, and wood stoves, 2 percent (Table IV).

To cool space, 42 percent of the respondents relied mainly on fans supplemented by window air conditioners. The air conditioner was not turned on until the hottest portion of the day. Twenty percent of respondents used mainly window air conditioners supplemented with fans to cool space, and 16 percent had central air conditioning. fourteen percent of households reported they relied only on fans, and 8 percent used evaporative coolers (Table V).

Reactions to the Energy Crisis

Sixty-four percent of all respondents believed that an energy problem exists; 20 percent did not. Sixteen percent of respondents were not certain if an energy problem exists (Table VI).

Of those believing an energy crisis exists, 75 percent believed that the energy problem had affected their life-style. The remaining 25 percent reported no change in the way they lived (Table VI).

Respondents who believed an energy crisis existed were asked who was responsible for the problem. Nearly a third, 31.3 percent, claimed that government policies were responsible for the energy crisis. A fourth, 25 percent, blamed the public's blatant waste of energy, and 12.5 percent reported the oil companies were responsible for the problem. Other causes of the energy problem that respondents

TABLE IV

TYPES OF HEATING SYSTEMS

Systems	N	%
Fuel source		
Natural gas	47	94
Electricity	1	2
Kerosene/natural gas	1	2
Wood/natural gas	1	2
Heating unit		
Floor furnace	16	32
Central furnace	11	22
Circulator/wall heaters	10	20
Space heaters	10	20
Wood stove	1	2

TABLE V

TYPES OF COOLING SYSTEMS

System	N	%
Fan supplemented by window air conditioner	21	42
Window air conditioner supplemented by fans	10	20
Central air conditioning	8	16
Fans only	7	14
Evaporative coolers	4	8

TABLE VI

REACTIONS TO THE ENERGY CRISIS

Belief	N	%
[a]Do you believe that utility costs will become a problem for you in the near future?		
Yes	22	44
No	10	20
Already are	16	32
Not sure	2	4
[a]Do you believe that there is an energy problem?		
Yes	32	64
No	10	20
Not certain	8	16
[b]Has the energy problem had an effect on your house or how you live?		
Yes	24	75
No	8	25
[b]Who do you feel is responsible for the energy problem?		
Government policies	10	31.3
Wastefulness of public	8	25
Oil companies	4	12.5
Utility companies	4	12.5
No one	2	6.3
Builders	1	3.1
Not know	3	9.3

[a]N = 50, all respondents

[b]N = 32, only respondents who believe an energy crisis exists

reported and their percentages of frequency are listed as follows: utility companies, 12.5 percent; no one, 6.3 percent; and builders, 3.1 percent (Table VI).

All respondents were asked if utility costs would become a problem for them in the near future. Forty-four percent reported that they believed utility bills would become a problem, while 32 percent stated that the bills already posed a monthly problem. Twenty percent of respondents reported that they would probably not have difficulty paying utility bills in the near future, and 4 percent reported that they were not sure (Table VI).

Information Sources

When asked to state the sources of energy information household heads used to weatherize their houses, an overwhelming majority, 72 percent, of respondents listed personal experiences. Respondents stated that their rural backgrounds, job experiences, and common sense helped develop their knowledge of energy conservation. Other sources of energy information mentioned and their percentages of frequency are as follows: friend or family member, 22 percent; newspapers, 18 percent; television, 18 percent; utility companies, 14 percent; radio, 10 percent; government sources, 2 percent; Cooperative Extension, 2 percent; and hardware stores, 2 percent (Table VII).

TABLE VII

ENERGY INFORMATION SOURCES
USED BY HOUSEHOLDS

Sources	N	%
Personal experiences	36	72
Friend or family member	11	22
Newspapers	9	18
Television	9	18
Utility companies	7	14
Radio	5	10
Government	1	2
Cooperative Extension	1	2
Hardware stores	1	2

Note. Columns total more than 100% because respondents could list more than one item.

Motives to Conserve

Seventy-eight percent of the houses in the study were weatherized with at least one of the following: storm or double pane windows, caulking, or weather stripping. Sixty-six percent of homes in the sample were weatherized by the present residents, and 12 percent had been weatherized by previous residents (Table VIII).

TABLE VIII

WEATHERIZATION OF HOMES

Condition	N	%
Homes not weatherized	11	22
Homes weatherized	39	78
By current resident	33	66
By previous resident	6	12

To determine what motivated residents to conserve energy, the 33 respondents who weatherized their homes were asked to state the main reason they made these structural changes. Nearly half, 48.5 percent, reported high utility bills lead them to try to conserve energy through structural improvements. Twenty-four and two tenths percent of respondents made their homes more energy efficient because of cold drafts. Other motives listed for weatherizing or installing energy efficient equipment and the percentages of occurance are as follows: urban renewal program paid most of structural improvements, 6.1 percent; more comfort, 3 percent; made improvements when remodeled, 6.1 percent; would rather spend money on other things than utilities, 3 percent; and everyone else was doing it, 3 percent (Table IX).

To discover the motive involved in the decision not to weatherize or install energy efficient equipment in the home, the 17 household heads who did not weatherize their homes were asked to list the main reason for not making these structural changes. Thirty-five and three tenths percent of respondents reported they did not make structural improvements because the houses were already weatherized. Seventeen and eight tenths percent lacked the money to weatherize, and 11.6 percent stated the landlord should weatherize the house they were renting (Table X).

Residents who lived in non-weatherized homes, 22 percent of the sample, were asked whether or not they planned to weatherize in the near future. Seventy-two and seven tenths percent of respondents living in non-weatherized homes stated that they did not plan to make structural changes, and 27.3 percent planned to make changes soon (Table XI).

TABLE IX

MOTIVES TO CONSERVE ENERGY
BY WEATHERIZING HOME
(N=33)

Motivating Factor	N	%
Utility bills too high	16	48.5
Cold drafts	8	24.4
Urban renewal program paid for most of the structural improvements	2	6.1
Made improvements when remodeled	2	6.1
For more comfort	1	3
In order to spend money on other things	1	3
Everyone else was making improvements	1	3
No response	2	6.1

Note. Columns total more than 100% because of round off error.

TABLE X

MOTIVE CONTRIBUTING TO DECISION NOT TO WEATHERIZE HOME (N=17)

Motiving Factor	N	%
House already weatherized	6	35.3
Lack the money to weatherize	3	17.8
No response	3	17.8
The landlord should do it	2	11.6
Not like confinement of storm windows	1	5.9
Not know, yet, if there is a need to weatherize	1	5.9
House is warm enough	1	5.9

Note. Columns total more than 100% because of round off error.

TABLE XI

ENERGY PLANS OF RESPONDENTS LIVING IN NON-WEATHERIZED HOMES

Decision	N	%
Respondents who plan to weatherize their homes in the near future	3	27.3
Respondents who do not plan to weatherize their homes in the near future	8	72.7

Opinions on Energy Policies

To gauge opinions on public policies that could save energy, respondents were asked to state if they were against, in favor of, or neutral towards selected energy proposals. A scale of 1 to 3 was used to determine a rating for each policy. Answers were assigned the following scores: against = 1; neutral = 2, and favor=3. The mean average was calculated for each policy. The policies, frequencies, and percentages of opinions are listed in Table XII.

Eighty-four percent of respondents were against placing high taxes on gasoline. Six percent of respondents favored higher taxes as a way to reduce gasoline usage, while 10

TABLE XII

OPINIONS ON PUBLIC POLICIES
THAT COULD SAVE ENERGY

Policy	Against N	Against %	Neutral N	Neutral %	Favor N	Favor %
Place high taxes on gasoline	42	84	5	10	3	6
Require home thermostats be set no higher than 65 degrees in winter	35	70	7	14	8	16
Require home thermostats be set no lower than 78 degrees in summer	21	42	7	14	22	44
Keep 55 mph speed limit	14	28	2	4	34	68
Provide larger tax credits to improve home energy efficiency	13	26	13	26	13	26
Require every house pass an energy audit	27	54	15	30	8	16
Require utility companies charge lowest rates to low users and highest rates to high users	18	36	9	18	23	46
Charge all users more for energy	42	84	3	6	5	10
Require better energy information on appliances	10	20	4	8	36	72
Rely on state instead of federal programs to encourage energy conservation	9	18	15	30	26	52

percent took a neutral stance. The mean average for this public policy was 1.2.

Seventy percent of household heads were against requiring all thermostats be set no higher than 65 degrees in the winter. Sixteen percent were in favor, and 14 percent were neutral towards the issue. The mean average for this policy was 1.5.

Forty-four percent of respondents were in favor of requiring home thermostats be set no lower than 78 degrees in the summer. Forty-two percent were against, and 14 percent were neutral towards the policy. The mean for a required summer thermostat setting was 2.0.

Sixty-eight percent of respondents were in favor of keeping the 55 mph speed limit; 28 percent of respondents were against the policy, while 4 percent had neutral opinions. The mean average for keeping the 55 mph speed limit was 2.4.

Nearly half, 48 percent, of respondents favored a policy that would provide larger tax credits to improve home energy efficiency. Twenty-six percent were against, and 26 percent were neutral towards such a policy. The mean average for a policy providing larger tax credits to improve home energy efficiency was 2.2.

The majority, 54 percent, of respondents were against requiring that every house pass an energy audit. Thirty percent took a neutral stance, while sixteen percent were in favor of the required audit policy. The mean average of opinions scores for this policy was 1.6.

Forty-six percent of household heads interviewed were in favor of requiring utility companies to charge the lowest rates to low energy users, and the highest rates to high users. Thirty-six percent were against, and 18 percent were neutral towards the policy. The mean average for this utility pricing policy was 2.1.

An overwhelming 84 percent of respondents were against charging all households more for energy as a method to reduce energy usage. Ten percent of respondents favored raising energy prices, while six percent were neutral. The mean average of opinion scores for this policy was 1.3.

The majority, 52 percent, of household heads favored states handling energy conservation programs instead of the federal government. Thirty percent took a neutral stance, while 18 percent were against the policy. The mean average for this policy was 2.3.

Seventy-two percent of respondents favored better label information on appliances that tell how much energy is used. Twenty percent were against, and eight percent were neutral. This policy, which had a mean of 2.5, was received the most favorably by respondents (Table XIII).

Energy Knowledge Measurement

Respondents were asked seven items as a measure of their knowledge about energy. Responses were coded as follows: correct answer = 1, and incorrect answer = 0.

TABLE XIII

OPINIONS ON PUBLIC ENERGY POLICIES IN DESCENDING ORDER OF ACCEPTABILITY

Policy	N	%	$\bar{X}$
Require better energy information on appliances	36	72	2.5
Keep 55 mph speed limit	34	68	2.4
Rely on state instead of federal energy conservation programs	26	52	2.3
Require utility companies charge highest rates to high users and lowest rates to low users	23	46	2.1
Require home thermostats be set no lower than 78 degrees in summer	22	44	2.0
Provide larger tax credits to improve home energy efficiency	13	26	2.2
Require every house pass an energy audit	8	16	1.6
Require home thermostats be set no higher than 65 degrees in winter	8	16	1.5
Charge all users more for energy	5	10	1.2
Place high taxes on gasoline	3	6	1.2

<u>Note</u>. Opinions were rated 1 to 3 with the high end describing favorability.

Responses were totaled to obtain an energy knowledge score. The range of energy knowledge scores was 2 to 7, and the mean average was 5.5. Nearly a third, 30 percent, of respondents answered five items correctly on the energy knowledge test. Scores, frequencies, and percentages are listed in Table XIV.

When asked which direction most of the windows of a house should face, 70 percent of respondents correctly answered south. Other responses and their percentages of occurance are as follows: east, 12 percent; west 2 percent; north, 2 percent; does not matter, 6 percent; and do not know, 8 percent (Table XV).

Eighty-eight percent of respondents correctly answered that the amount of glass in a house does affect energy use. Ten percent responded that glass does not affect the energy required in a house, and 2 percent specified that they did not know (Table XV).

When asked to name the most important place to put insulation in a house, 66 percent of respondents correctly answered the ceiling/attic. Four percent responded the floor; 24 percent stated the walls; 4 percent did not know; and 2 percent specified everywhere (Table XV).

Ninety-eight percent of respondents correctly answered that shading from trees on the east side, west side, and roofline of the house could reduce the cost of air conditioning. The remaining 2 percent answered that shading would not make any difference (Table XV).

TABLE XIV

ENERGY KNOWLEDGE TEST SCORES

Score	N	%
2	3	6
4	6	12
5	15	30
6	13	26
7	13	26

Note. Maximum score = 7.

TABLE XV

ENERGY KNOWLEDGE ITEMS

ITEM	N	%
In which direction should most of the windows of a house face?	35	70
Does the amount of glass in a house affect energy use?	44	88
Where is the most important place to put insulation in a house?	33	66
Will shading from trees on the east side, west side and roofline of the house reduce the cost of air conditioning?	49	98
Will planting a windbreak on the north side of the house lower heating costs?	47	94
Are air leaks the largest single source of energy loss in a house?	45	90
Which agency controls utility rates in Oklahoma?	21	42

Note. This table represents only correct responses.

Ninety-four percent of respondents correctly answered that a windbreak on the north side of the house could lower heating costs. Two percent answered that a windbreak would not lower heating costs, and 4 percent responded that they did not know (Table XV).

When asked if air leaks were the largest single source of energy loss in the house, 90 percent correctly answered affirmative; 4 percent answered no; and 6 percent answered that they did not know (Table XV).

Forty-two percent of respondents correctly identified the Corporation Commission as the agency that controls utility rates in Oklahoma. Thirty-four percent incorrectly responded that the utility companies control utility rates, and 24 percent answered that they did not know (Table XV).

Energy Behavior Measurement

To measure energy behavior, subjects responded to 16 items concerning behavioral and structural practices that are energy conserving. Items were coded as follows: performs conserving practice = 1, and does not perform conserving practice = 0. Items were totaled to calculate an energy behavior score. The scores for this sample ranged from 4 to 15, with a mean average of 9.8. Twenty percent of respondents rated a score of 9. Scores, frequencies, and percentages are listed in Table XVI.

A majority of respondents, 56 percent, reported that they lower their thermostats in winter. Twenty-six percent

TABLE XVI

ENERGY BEHAVIOR SCORES MEASURING CONSERVATION PRACTICES

Behavior Scores	N	%
4	2	4
5	2	4
6	5	10
7	2	4
8	3	6
9	10	20
10	5	10
11	5	10
12	5	10
13	6	12
14	4	8
15	1	2

Note. Maximum score = 16.

do not lower their thermostats, and 18 percent of sample houses do not have thermostats to control the warmth of the room. Thirty percent of respondents reported that they raise the thermostat in summer, and 34 percent do not. Thirty-six percent of the homes do not have thermostats to control space cooling (Table XVII).

Fifty-two percent of respondents have installed insulation in their homes, and 56 percent have installed storm or double-pane windows. Sixty percent of respondents hung heavy drapes or curtains on the windows (Table XVII).

Eighty-four percent of respondents reported that they try to use appliances more efficiently, and 58 percent have lowered the hot water heater thermostat. Forty-eight percent of residents reported that they have weather-stripped their homes (Table XVII).

Fifty-six percent of respondents have caulked around windows, and 86 percent close off rooms. During the winter, 72 percent of respondents wear extra layers of clothes, and 66 percent add moisture to the air (Table XVII).

Seventy-four percent of residents stated that they stop air leaks around windows and doors with paper, rags, or rugs, and 62 percent use a fan to circulate warm air into a cold room. Ninety-two percent of respondents use a fan instead of an air conditioner to cool (Table XVII).

Sixty-two percent of respondents listed other methods they employ to conserve household energy in Table XVIII.

TABLE XVII

ENERGY CONSERVING MEASURES
PRACTICED BY RESPONDENTS

Practice	N	%
Lowered thermostat in winter	28	56
Raised thermostat in summer	15	30
Added insulation	26	52
Added storm or double-pane windows	28	56
Hung heavy drapes or curtains on the windows	30	60
Use appliances more efficiently	42	84
Lowered water heater thermostat	29	58
Weather-stripped	24	48
Caulked	28	56
Closed off rooms	43	86
Wear extra layers of clothes in the winter	36	72
Add moisture to the air	33	66
Stopped leaks around windows and doors with paper, rags, or rugs	37	74
Use a fan to circulate warm air into a cold room	31	62
Use a fan instead of an air conditioner to cool	46	92
Other[a]	31	62

[a] Items listed in Table XVI.

TABLE XVIII

ENERGY CONSERVING MEASURES
LISTED FOR "OTHER"

Practice	N	%
Other	31	62
Ceiling fan	7	14
Hang out clothes	6	12
Limit cooking and baking	4	8
Use windows to control temperature	4	8
Limit dishwashing	3	6
Plastic over windows	3	6
Turn air conditioner off	3	6
Turn off appliances when not using	3	6
Double or vinyl walls	3	6
Use windows to control temperature	4	8
Hand wash clothes	2	4
Water cooler	2	4
Microwave	2	4
Attic fan	2	4
Storm door	1	2
Limit use of washing machine	1	2
Closed off fireplace	1	2
Wash filter monthly	1	2
Turn heat off	1	2

TABLE XVIII (Continued)

Practice	N	%
Water bed	1	2
Recarpet house	1	2
Installed refrigerator gasket on outside door for tight seal	1	2
Not heat back porch	1	2
Rigged air conditioner coils	1	2
Built enclosed porch	1	2
Save on lighting by using lights from store across the street	1	2

Note. Columns total more than 100% because respondents could list more than one item.

Correlation of Selected Variables

Energy knowledge scores, derived from adding correct answers of the knowledge test; and energy behavior, derived from totaling energy conservation behavior practices; were used to statistically test relationships between variables.

Spearman's rank correlation coefficients was used to test the relationship between energy knowledge and energy behavior. No significant relationship was not found between energy knowledge and energy behavior (r = 0.13696, p = 0.3429) in Table XIX.

TABLE XIX

CORRELATION BETWEEN ENERGY KNOWLEDGE AND BEHAVIOR

Variable	$\bar{X}$	SD	Mdn	Score Ranges
Energy Knowledge	5.9	1.3	6	2-7
Energy Behavior	9.8	2.9	10	4-15

Note. No significant relationship was found at the .05 level.

$r = 0.137$, $p = 0.342$.

Chi-square coefficient was calculated to test the strength of relationships between energy knowledge and behavior to belief in the energy crisis. Energy knowledge and behavior scores were divided into three ordinal categories of low, medium, and high (Table XX).

TABLE XX

RANK DIVISIONS FOR KNOWLEDGE AND BEHAVIOR SCORES

Score Ranges	Rank Scale	N	%
Energy knowledge			
2	Low	3	6
4-5	Medium	21	42
6-7	High	26	52
Energy behavior			
4-7	Low	11	22
8-10	Medium	17	34
10-15	High	22	44

A significant relationship was observed between belief in the energy crisis and energy knowledge (Chi-square=9.526, DF=4, p=0.0492) in Table XXI. No significant relationship existed between belief in the energy problem and energy behavior (Chi-square=6.801, DF=4, p=0.1468) in Table XXII.

TABLE XXI

RELATIONSHIP BETWEEN ENERGY KNOWLEDGE AND BELIEF IN THE ENERGY CRISIS

Variable	N	%
Believe in energy crisis/		
Low energy knowledge	1	2
Medium energy knowledge	16	32
High energy knowledge	15	30
Not believe in energy crisis/		
Low energy knowledge	0	0
Medium energy knowledge	2	4
High energy knowledge	8	16
Not certain if energy crisis exists/		
Low energy knowledge	2	4
Medium energy knowledge	3	6
High energy knowledge	3	6

Note. A significant relationship was found at the 0.05 level.

$X^2 = 9.53$, DF = 4, $p = 0.049$.

TABLE XXII

RELATIONSHIP BETWEEN ENERGY BEHAVIOR AND BELIEF IN THE ENERGY CRISIS

Variable	N	%
Believe in energy crisis/		
Low energy behavior	5	10
Medium energy behavior	13	26
High energy behavior	14	28
Not believe in energy crisis/		
Low energy behavior	2	4
Medium energy behavior	4	8
High energy behavior	4	8
Not certain if energy crisis exists/		
Low energy behavior	4	8
Medium energy behavior	0	0
High energy behavior	4	8

Note. No significant relationship was found at the .05 level.

$X^2 = 6.80$, DF = 4, $p = 0.147$.

Since over 20 percent of the cells of both 2-way tables have expected counts of less than five, and the tables were so sparse, Chi-square may not be a valid test.

Summary

Forty percent of the homes in the sample had at least one structural deficiency that made it hard to efficiently manage household energy. Natural gas was the main heating source, and fans supplemented by window air conditioners, was the main method of cooling space.

The majority of respondents believed an energy problem exists, with seventy-five percent believing that the problem had affected their life-style. A third of respondents believed that government policies were responsible for the problem. Forty-four percent of respondents believed that energy costs will become a problem in the near future.

Seventy-two percent of respondents reported that personal experiences provided the information necessary to weatherize their homes. Nearly half of respondents who had weatherized their homes were motivated to conserve energy by high utility prices. Of those living in non-weatherized homes, 72.7 percent reported that they did not plan to make structural improvements in the near future.

Of the 10 public energy policies presented to respondents, better energy labeling on appliances was viewed the most favorably. The policy which would place high taxes on gasoline was rated the lowest.

The mean of the energy knowledge test was 5.5, and the mean of the energy behavior measurement was 9.8. Every respondent reported performing at least two energy conserving practices.

No significant correlation was found between energy knowledge and energy behavior. A significant relationship was observed between belief in the energy crisis and energy knowledge, but no significant relationship between belief and energy behavior was observed.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

Prior to the energy crisis of the 1970s, consumers had little concern about the energy that fueled their cars and homes. The fuel shortages spawned a new interest in energy by consumers, business, and government. The energy crisis focused public attention on the finite nature of fossil fuels, the status of current and future supplies of energy, and the inherent dangers of over consumption. The crisis forced changes and motivated action to conserve.

The energy crisis is over--as far as severe shortages in the marketplace are concerned. The need to manage energy efficiently continues, since new energy supplies are not likely to be found or developed in the near future. The modern energy crisis is one of price. Many low-income and elderly consumers cannot budget rising energy costs. Houses built in warm climate regions, such as the Southwest, are lacking in thermal integrity, which results in serious energy loss. While natural gas, the main source of heating in this area, was inexpensive, insulating and preventing air infiltration were not major concerns of builders or consumers.

Recently, however, housing standards have become more energy efficient. But many of the older dwellings with poor thermal integrity are currenty occupied by low-income families or elderly persons, who are the least able to afford the waste of energy.

Energy management research of low-income households is needed. Information describing the energy-related characteristics of low-income households is needed to determine urgent household energy requirements and to assist policy makers in developing and implementing energy programs.

Objectives of Study

The purpose of this study was to examine how low-income households were coping with the energy problem, especially rising utility costs. Major objectives were: 1. to measure energy knowledge and behavior; 2. to record motives for conserving, opinions on public policies, and sources of energy information; 3. to test the relationships between energy knowledge and behavior to belief in the energy crisis; and 4. to test the correlation between energy knowledge and behavior.

Summary and Conclusions

The sample of 50 households was drawn from a low-income neighborhood in Stillwater, Okla., during September 1985. The neighborhood was identified by the "Neighborhood

Statistics Program" as a low-income area. The method of data collection was personal interview. The head of household was interviewed.

The sample of this study consisted of 17 males and 33 females. The sample reflected that more women than men were available to participate in this study, since women out-number men during the retirement years, and younger people at home during the day are usually female, full-time home-makers.

Comparable to previous energy studies of low-income households, this study was biased toward the elderly with a mean age of 60.8 years. Since older people usually have lower incomes than the general population, they often live in older, established neighborhoods which have deteriorated. In both the Tyler, Lovingood, Bowen, and Tyler (1982) study, and the Williams, Braun, and Lauener (1981) study, 44 percent of the samples were older persons.

Influences to Conserve

The majority, 78 percent, of houses in this study were weatherized. Forty-eight and five tenths percent of respondents reported that high utility bills motivated them to try to conserve energy by weatherizing their homes. Previous studies have also reported that the major influence to conserve energy is price, especially for low-to-middle income groups.

To better analyze influences to weatherize, tenure was also considered. Seventy-two percent of respondents owned their homes. Current literature suggests that home ownership is a prerequisite of home adaptation, but the need must be great enough to justify the change. The present condition of living in an energy-inefficient structure, which requires large amounts of energy to maintain, may justify the cost of making the improvements.

Of the 11 residents living in non-weatherized homes in this sample, only three were home owners. An owner who did not weatherize explained that the house was warm enough, and another reported that she did not like the confining feeling of storm windows. These owners were not motivated to conserve energy, since they reported no deficit between their household energy needs and their present structures.

Renters who did not weatherize reported that they lacked the money to make structural improvements, or they suggested that the landlord should make the improvements. One renter had not lived in the dwelling long enough to determine if winterizing the house would be necessary. Renters may hesitate to invest in structural improvements in a house they do not own, or the deficit between conserving energy and present housing conditions may not be great enough to warrant a change.

Cunningham and Lopreato (1977) found that individuals most likely to install energy conserving materials in the home were minorities, females, and less educated, lower income persons--with the elderly reporting the most conservation efforts. More often than not, these groups of persons live in older houses, which tend to have serious structural deficiencies (HUD, 1980). The installation of conserving materials may be necessary to make the dwellings livable or to keep utility bills manageable.

Forty percent of respondents in this study reported that their homes had at least one structural deficiency. The lack of insulation was reported most frequently as the structural fault that made it difficult to conserve energy, as is often reported about houses built prior to the energy crisis. Other deficiencies reported were the results of the structure aging, such as settling of foundation, door and windows needing repair, and air leakage. While the residents were aware that these conditions were energy wasters, these conditions represented major financial investments to correct.

Natural gas was the main source of heating for 94 percent of the residents of the sample. Floor furnaces were the main type of heating unit used, which is typical of older houses in the area. To cool the house, 21 percent of the respondents used fans supplemented by window air conditioners. Air conditioners were turned on only during the hottest part of the day and usually turned off in the evening. While 18 percent of respondents did not have thermostats to control the warmth of the room, and 36 percent did not have thermostats to control cooling of space, no one listed the lack of thermostats as a structural deficiency that made it difficult to conserve energy. From respondents' comments, it can be assumed that residents, especially older persons, regulate room temperatures based on personal comfort; therefore, thermostats were considered unnecessary. It may also take higher settings on heaters to keep drafty, old houses as warm as a house with a high, thermal integrity.

Public Policies

Respondents' opinions on policies regulating house temperature were also based on personal comfort and health. Only 16 percent of respondents viewed favorably a policy that would require home thermostats be set no higher than 65 degrees in winter. Respondents commented that 65 degrees were not warm enough for elderly persons, children, and the sick. Yet, 22 percent of respondents were more likely to accept a policy that would require home thermostats be set no higher than 78 degrees in the summer. This may be more acceptable to respondents because of elerly persons' ability to handle high temperatures better than they can withstand lower temperatures. Personal comfort may be important to older persons and shut-ins, since they spend most of the day at home. Some respondents commented that a summer setting of 78 degrees and a winter setting of 65 degrees were adequate, but they were uneasy about having the government dictate how they should live, and respondents would prefer having these settings advocated as recommendations and not as laws. Respondents also commented that enforcement of these policies threatened their personal freedom and likened regulatory policies such as these to acts of a police state. These findings were different from previous research which reported that low-income individuals were most likely to support government intervention than other income groups (Claxton, Ritchie, & McDougall, 1983).

Subjects of this study rated highest the policies that would have only indirect effects on their lives, such as better labeling and keeping the 55 MPH speed limit. Policies that could result in higher prices to the consumer ranked in the bottom four of acceptability. This finding was contrary to previous studies that suggested low-income persons were the least responsive to price increases of all income persons (Cunningham & Lopreato, 1977).

Attitudes Toward the Energy Crisis

The majority, 64 percent, of persons in this study believed that an energy problem existed. This finding is comparable to the Cunningham and Lopreato (1977) study which reported that 58 percent of persons with incomes less than $10,000 and 65 percent of persons earning more than $20,000 believed an energy problem existed. While further research is necessary, the similarity of responses of this study to responses of high-income respondents of the Cunningham and Lopreato study may imply that income and belief in the energy problem are not positively related.

Seventy-five percent of respondents in this study who believed an energy problem existed, reported that the energy problem had affected their life-styles. This finding is consistant with previous studies that showed people were more likely to believe a problem existed if they felt a personal impact from the situation. Forty-four percent of all respondents reported that utility costs will probably become a problem for them in the near future. Elderly respondents commented that it may become difficult to manage rising utility costs on their fixed incomes. Sixteen percent of respondents reported that utility bills were already a problem. Of those believing an energy problem existed, 31.3 percent reported that government policies were responsible for the problem.

Energy Information Sources

Twenty-two percent of subjects reported that friends or family members provided the information necessary to weatherize their homes. This finding was similar to the Williams et al. (1981) study, in which 23 percent of subjects participating in an energy conservation education program passed on information to neighbors or friends. Information obtained from persons known to the recipient may carry more credibility than a suggestion from the media. In this study 75 percent of respondents reported that personal experiences provided information on energy conservation. Unlike results reported by Cunningham and Lopreato (1977), the mass media was not a major source of energy information in this study.

Energy Knowledge

Respondents stated that their rural backgrounds, job experiences, and common sense helped develop their knowledge of energy conservation. This may also help explain why respondents scored fairly high on the energy knowledge measurement, with a mean of 5.5. People who live in rural and farm areas may have a closer relationship with nature. This association may be developed through careful observation of the weather, which often determines the success of the year's crops and dictates the activities to be done that day or season. Respondents raised on farms commented that money was scarce, and they had to weatherize to keep large, old farm homes warm and to keep costs down. The values of frugality and conservation were instilled in older persons raised in rural areas. These values were displayed through current energy consumption behavior. Despite the suggestion by previous studies that higher education (directly related to income) and an awareness of what can be done to conserve energy were positively related, the extraneous variable of rurality in this sample may have influenced energy knowledge. Rurality may also be a factor influencing belief in the energy crisis as discussed in previous pages.

Energy Behavior

Respondents scored a mean of 9.8 on the energy behavior measurement. This score represented nearly 10 out of 16 items that respondents performed or installed to conserve energy. All respondents performed at least two energy-conserving practices. As might be expected of persons with limited incomes who desire to conserve, behavioral methods of conserving energy were used more often than the more expensive structural methods. Using a fan to cool was performed by the largest number of respondents--followed by closing off rooms and using appliances more efficiently.

Only 29 percent of respondents reported lowering thermostats on hot water heaters. Some respondents commented that they needed hot water to properly launder their clothes. Others were not certain how to lower the thermostat and feared that a serious accident might occur.

Relationships Among Variables

No significant correlation was observed between energy knowledge and energy behavior. Since respondents scored relatively high in the energy knowledge measurement, they may not be putting their knowledge into practice. Energy behavior in this sample was often determined by cost, comfort, health, and housecleaning standards.

A significant relationship was found between belief in the energy crisis and energy knowledge. But no significant relationship was found between belief in the energy problem and energy behavior, as has been reported by previous studies. It is generally assumed that persons with higher incomes are not motivated financially to conserve, and persons with lower incomes lack the resources to conserve.

Recommendations

Recommendations to improve this study include:

1. A gauge or measurement that can separate older persons' experiences into specific components to better explain the diffusion of energy information. An older person may incorporate everything that has been learned during his or her lifetime into a general category of "past experiences"--as when explaining sources of energy information.

2. A larger sample is needed to permit generalizations for the entire neighborhood.

3. A larger sample is needed for more accurate analyzation of the data using Chi-square coefficients.

4. In order that a larger sample be drawn, resident compliance must be obtained. Perhaps the local media and local civic organizations can be used to stress the importance of participating in the study.

Recommendations for further study include:

1. A similar study be conducted with middle- and high-

income residents to compare results.

2. Compare the energy knowledge of low-income, urban households with that of low-income, rural households to develop an index to predict energy knowledge based on rurality or urban characteristics.

3. A detailed study be conducted on the resources, both private and public, available to help residents weatherize their homes in order to examine how these resources affect household energy characteristics.

4. A study be conducted to examine the probability of adoption of energy-efficient structural improvements by low-income households.

Concluding Statement

Studies such as this one may provide much needed descriptive information about the household energy management of low-income families. This baseline data can help identify the energy needs of the low-income community. Scarce public resources can then be implemented more effectively to solve the energy problems of households with limited resources.

This study suggests that low-income households are actively conserving energy through behavioral and structural efforts. While household heads may know what is necessary to make their homes more energy efficient, they may not have the resources to make the improvements.

Local housing authorities and utility companies can help direct and implement programs that assist residents finance and install energy-conserving materials, such as insulation, and storm windows and doors. Local civic organizations can also assist by donating materials and man power to install weather stripping and caulking as in an energy program conducted by the Cooperative Extension in Choctaw County, Okla.

Minimal or lifeline utility rates charged to low-income families, who are already low users of energy, may be the most equitable way to distribute household energy. The lifeline rate, which provides enough energy to maintain basic comfort and health standards, is currently being successfully used by utility companies throughout the United States.

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APPENDIX

STUDY INSTRUMENT

NEIGHBORHOOD ENERGY USAGE

Items about energy efficiency. Circle subject's answer.

1. In which direction should most of the windows of a house face?

   1. East 2. West 3. South 4. North 5. Doesn't matter

2. Does the amount of glass in a house affect energy use?

   1. Yes 2. No

3. Where is the most important place to put insulation in a house?

   1. Floor 2. Ceiling/attic 3. Walls

4. Will shading from trees on the east side, west side, and roofline of the house reduce air conditioning costs?

   1. Yes 2. No

5. Will planting a windbreak on the north side of the house lower heating costs?

   1. Yes 2. No

6. Are air leaks the largest single source of energy loss in a house?

   1. Yes 2. No

7. Which agency controls utility rates in Oklahoma?

   1. Utility companies 2. Corporation Commission

Items on the energy crisis and its effect on consumers.

8. Do you believe that there is an energy problem?

   1. Yes 2. No 3. Not Sure

9. Who do you feel is responsible for the energy crisis?

   1. Oil companies 2. Foreign oil producers
   3. Government policies 4. Wastefulness of public
   5. Other, state ______________________________________

10. Has the energy problem had an effect on your house or how you live?

    1. Yes 2. No

11. Circle items subject performs to conserve energy.
    1. Lower thermostat in winter
    2. Raise thermostat in summer
    3. Added insulation
    4. Installed storm or double-pane windows
    5. Hung heavy drapes or curtains on the windows
    6. Use appliances more efficiently
    7. Lowered water heater thermostat
    8. Weather-stripped
    9. Caulked
    10. Closed off rooms
    11. Wear extra layers of clothes in the winter
    12. Add moisture to the air in winter
    13. Stopped air leaks around windows and doors with paper, rags, or rugs
    14. Use a fan to circulate warm air into a cool room
    15. Use a fan instead of an air conditioner to cool
    16. Other, state ___________________________________

12. Circle subject's motive to weatherize or install energy-conserving equipment in the home.
    1. Because of the cold drafts
    2. For more comfort
    3. My utility bills were too high
    4. I'd rather spend money on other things than utilities
    5. To save energy for future generations
    6. Because tax credits were offered
    7. Because the supply of energy is so scarce
    8. Other, state ___________________________________

13. How did subject learn about energy conservation.

    1. Newspaper 2. Radio 3. Television

    4. Government 5. Cooperative Extension 6. Utility co.

    7. Hardware store 8. Friend or family member told me

    9. Other, state --

14. Motive leading to decision not to weatherize home or install energy-conserving equipment.

    1. Lack of money

    2. The weather was either too hot or too cold

    3. I rent the residence. The landlord should do it.

    4. It won't save energy.

    5. I don't have the time.

    6. I'm not able to do the work.

    7. I don't know how to weatherize.

    8. The home was already weatherized.

    9. Other, state --

15. Do you plan to weatherize or install energy-conserving equipment in the future?

    1. Yes 2. No

16. Do you believe that utility costs will become a problem for you in the future?

    1. Yes 2. No 3. They already are

17. Circle structural faults that make it difficult to conserve energy.

    1. None 2. Lacks insulation 3. Walls separating
    4. Numerous air leaks 5. Major settling of foundation
    6. Older house in need of extensive repair
    7. No way to monitor air temperature
    8. No way to circulate air in the house
    9. Other --

Circle subject's opinion on each public policy that could reduce energy usage. 1=against; 2=neutral; and 3=favor.

18. Place high taxes on gasoline . . . . . . 1 . . 2 . . 3

19. Require home thermostats to be no higher than 65 degrees in winter . . . 1 . . 2 . . 3

20. Require home thermostats to be no lower that 78 degrees in summer. . . . 1 . . 2 . . 3

21. Keep 55 MPH speed limit. . . . . 1 . . 2 . . 3

22. Provide larger tax credits to improve home energy efficiency . . . . . . 1 . . 2 . . 3

23. Require that every house pass an energy audit . . . . 1 . . 2 . . 3

24. Require that utility companies charge lowest rates to low users and highest rates to high users. . . . 1 . . 2 . . 3

25. Charge all users more for energy . . . 1 . . 2 . . 3

26. Require better label information on appliances telling how much energy they use. . . . . 1 . . 2 . . 3

27. Rely on state instead of federal programs to encourage energy conservation . . . . 1 . . 2 . . 3

Personal information about subject and house.

28. Do you own or rent your home? 1. Rent 2. Own

29. How do you heat your home? --------------------------

30. How do you cool your home? --------------------------

31. The age of the household head ---- sex ---- race ----

VITA

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Thesis: ENERGY CONSERVATION: A STUDY OF ENERGY KNOWLEDGE AND BEHAVIOR OF HOUSEHOLDS IN A LIMITED-INCOME NEIGHBORHOOD

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