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A PRELIMINARY STUDY OF HOUSEHOLD ENERGY ADJUSTMENT OF NIGERIAN URBAN DWELLERS (FAMILY MANAGEMENT BEHAVIORS)

The Ohio State University  Ph.D.  1981

University Microfilms International  300 N. Zeeb Road, Ann Arbor, MI 48106
A PRELIMINARY STUDY OF HOUSEHOLD ENERGY
ADJUSTMENT OF NIGERIAN URBAN DWELLERS
(Family Management Behaviors)

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Afiong E. Akpan, B.A., M.S.

* * * * *

The Ohio State University
1981

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Dedicated to my parents
ACKNOWLEDGMENTS

My sincere appreciation is directed to the following people:

Dr. Fern Hunt, my academic adviser, for her cooperation, advice, and emotional and intellectual support throughout my graduate program;

Dr. Francille Firebaugh, whose suggestions led to the collection of data for this study and who has shown unfailing support and cooperation throughout the period of the study;

Dr. Alfred Clarke, for his cooperation and suggestions as a member of the dissertation committee;

Friends and colleagues who contributed ideas, criticisms and encouragement for this research;

All the interviewers and the supervisors from University of Nigeria, Nsukka, without whose help this study would have been nothing but an unfulfilled dream; and

Pattie Costello, computer consultant, Statistics Laboratory, for her assistance on computer programs.

The most special thanks go to my husband, Dr. Emmanuel Akpan, and our children, Nnamso, Ofonmbuk and Anietie, for their unlimited understanding, support, encouragement and cooperation throughout the period of my graduate program.

Loving thanks to my parents, Archibong and Mary Uboh, who provided me with the best possible role models.
And lastly, but not the least, my sincere thanks go to the University of Nigeria, Nsukka, for granting me the fellowship which made it possible for me to undertake graduate studies, and to the American Home Economics Association and the P.E.O. Sisterhood for their financial assistance at critical periods in my graduate program.
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CHAPTER I

INTRODUCTION

Setting

Nigeria is a country on the west coast of Africa. It is bounded on the south by the Gulf of Guinea and on the landward sides by Cameroon, Chad, Niger, and Benin. Nigeria occupies an area of 356,669 square miles (about the size of Texas and Oklahoma combined). The population is approximately 80 million (Nigerian-American Economic Relations, 1978:8).

Although 90 percent of Nigeria's revenue is derived from oil, of which she is the world's sixth largest producer, the country is basically an agricultural country. Her land area covers many ecological zones and thus makes possible the production of a wide range of agricultural products. About 30 percent of the country's vast land mass is cultivated and agriculture accounts for 70 percent of the country's labor force.

Problem Statement

The sudden raising of oil prices in October, 1973, belatedly awakened the world to the realization that it was facing an energy crisis because of the rapid depletion of nonrenewable fossil fuel resources on which it depended so heavily. This has stimulated a number of studies on the use of energy in many developed countries of the world.
In the developing world as a whole, fuelwood is very important as a source of energy, representing 88 percent of the total. In Africa the consumption of fuelwood may be almost one and one-half times that of commercial energy (Abercrobie, 1978:13). About 86 percent of the wood used in developing countries is for household fuel.

There is a fuel crisis in many developing countries that, in immediate human terms, is far worse than the world's fossil fuel crisis (Abercrobie, 1978:16). Most of the half of the world's population living in the rural areas of the developing countries depend mainly on fuelwood to cook their food and keep their homes warm in cold weather. In many places the demand for fuelwood has seriously depleted the available resources so that families have to go farther and farther away to gather their requirement or spend an increasing part of their meager income to buy wood.

In some countries such as India, increasing demand for fuelwood and charcoal over the years has led to extensive felling of trees for firewood and the diversion of farm waste and animal dung for fuel purposes. Serious loss of soil fertility and low yield of food grains with that practice has compounded their problems (Kalpagam, Rathnam and Malligeswar, 1968:109). Countries like Nigeria, China, India, and the Republic of Korea have tried to expand the production of fuelwood by planting fast-growing trees in degrading land near villages.

In Nigeria the frustrating conditions of living in rural areas has forced many youths to migrate to the cities in search of jobs and better living conditions. The Nigerian government is quite aware of this, so under Nigeria's 1975-80 Development Plan, rural electrification
was accorded priority. The scheme reflects a mixture of social, political and economic objectives, the main emphasis being to "bridge the social and economic gap between the urban and the rural areas and to ensure more effective utilization of the installed capacity" (Nigerian-American Relations, 1978).

Over $2 billion was budgeted for power supply under this plan. About $2 billion of the total amount was earmarked for the provision of electricity to rural areas in an effort to stem emigration to the cities (Nigerian-American Relations, 1978:23).

Need for the Study

While we have some knowledge of the estimated world energy production, consumption, and projection into the year 2020 (World Energy Supplies, 1973-78), there is little factual data on household energy management and adjustment behaviors of people in the developing world. In Nigeria, the major part of the total consumption of domestic fuels is directed toward cooking and transportation. The demand for firewood in recent years has increased so greatly that the trend for those who can afford it is to use kerosene or natural gas for cooking. This has led to such a scarcity of domestic fuel that families have to line up for hours in some areas of the country to obtain a gallon of kerosene for cooking and/or lighting their homes. Those using gas may have to be on the waiting list for weeks before they can obtain a bottle of gas for their household use.

In Nigerian households, the wife is traditionally responsible for providing and managing domestic fuels. This is because within the Nigerian families the men maintain the traditional attitude of
repulsion to participating in household tasks. There is often pressure on the woman to perform her role according to traditional interpretation while the husband remains the primary economic supporter of the family. The general pattern that emerges is one in which domestic roles are segregated to a considerable degree. Household tasks are generally performed by the wife, servants, and children.

Today, free education at all levels has moved children and servants away from homes. Also increased interest in women's education is introducing changes of many kinds into the family. Many Nigerian wives today are qualified to work in industries in addition to managing their households.

With increased industrialization and influence of developed countries, more and more households will be utilizing commercial energy and information will be needed regarding how families adjust to the limited energy supplies. Murthy (1978:147) mentioned that countries that are not yet industrialized should make every effort to avoid other's mistakes by promoting the stabilization of population, striving for agricultural self-sufficiency, exploiting labor-intensive technology and minimizing the need for large quantities of commercial energy.

In order to understand the present and have some chance of influencing future energy consumption patterns in Nigerian urban households, there is a need to determine energy management behaviors of Nigerian families. No study has yet been done to determine energy management behaviors of Nigerian urban dwellers for the purpose of developing formal or non-formal educational programs that will promote
efficient household energy management in the country. This study was designed to: 1) determine household energy behavior of Nigerian families, 2) examine individual and family variables that relate to household energy management behavior, 3) assess attitude of respondents toward selected energy issues and 4) assess the needs of households in managing limited energy resources.

Objectives

The following were the specific objectives for the study:

1. To determine whether the family's current fuel for cooking is different from its preferred fuel.

2. To determine whether the preferred fuel for cooking differs among levels of household income and levels of education of the respondents.

3. To determine the relationship between the most disliked fuel for cooking and the employment status of the respondent.

4. To determine the relationship between type of fuel preferred for cooking and housing type.

5. To identify household energy management problems of Nigerian home managers and the relationship between the problems reported and the respondent's employment status.

6. To assess the attitude of the home manager toward selected energy issues and determine the relationship between attitude score and demographic variables (educational level, household income, and age) of the respondent.

7. To determine the relationship between household income, level of education of the respondent and the score for the frequency of use of selected energy conservation techniques.

8. To determine the difference between level of the respondent's household income and score for household energy management problems experienced by the respondent.
9. To determine whether the frequency of visits to check for gas is related to the proximity to the nearest gas distributor.

10. To determine whether proximity to the nearest gas distributor is related to the respondent's attitude toward gas shortage.

11. To identify household energy management strategies used by families in coping with energy problems.

12. To identify areas of household energy management needs of Nigerian home managers.

The information obtained from this study will be useful to home economists, educational planners and policy makers in understanding energy needs of Nigerian urban dwellers and in developing appropriate educational programs—formal and informal—that will help serve these needs. It could also help families make creative decisions about their future energy managerial behaviors and life styles.

**Hypotheses**

The following hypotheses are based on a review of literature on household energy management. The level of significance selected for testing is 0.05.

1. The type of fuel a family is currently using differs from the family's preferred fuel for cooking.

2. The type of fuel preferred for cooking differs among a) levels of household income and b) levels of education of the respondents.

3. The most disliked fuel type for cooking differs among employment status levels of the respondents.

4. Fuel preference is related to housing type.
5. There is a relationship between the employment status of the participants and types of household energy management problems reported.

6. The score for attitude toward selected energy issues is related to a) level of education of the respondent, b) household income and c) age of the respondent.

7. The score for the frequency of use of selected energy conservation techniques differs among levels of a) education of the home manager and b) household income.

8. The score for household energy management problems experienced by the respondents differs among levels of household income.

9. The frequency of visits to check for gas is not related to proximity to the nearest gas distributor.

10. There is no relationship between proximity to the nearest gas distributor and attitude toward gas shortage.

Definition of Terms and Variables

Age—The number of years the respondent has been living, counting to the last birthday.

Attitude—Opinions or feelings that activate or retard action. Attitudes are closely related to values because they have "directive and/or dynamic influence on behavior" (Engel et al., 1973). In this study attitude toward energy problems was measured with a ten-item attitude scale developed to determine direction and intensity of feeling toward selected issues and problems related to energy.

Education—The highest level of schooling completed by the respondent.

Employment Status—Whether the respondent was employed outside the home or not.
Energy—The capacity to do work or the power to adapt, change or maintain the system. It is the vitality of all living systems. In this study it refers to electricity, gas and fuel oils and firewood used by Nigerian urban dwellers in managing various household processes.

Energy Management Behaviors—Activities related to planning the supply and use of household energy resources and implementing the plans to meet the demands and achieve family goals. In this study it includes how families obtain household fuels, regulate use to meet demands, and cope with events such as power failures or shortages of fuel.

Household—All persons who occupy a housing unit.

Housing Type—The classification of the dwelling as a) single family (permanent building), b) flat or apartment (permanent building), or c) thatched roof house (house built with local material such as bamboo, sticks, sand blocks, mats, etc.)

Income—The amount of net taxable Naira reported on the respondent's 1980 income tax return.

Mode of Transportation—The respondent's means of travelling—whether he/she walks; cycles; takes a bus, train, taxi; or drives own car most of the time.

Proximity to Shopping Area—The Distance from the respondent's place of residence to the nearest shopping center or town where household fuel may be obtained.

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\(^{1}\) Naira is Nigerian currency. At the time of this study one naira was equivalent to $1.85.
Assumptions

1. In this study it is assumed that household energy management behaviors can be measured by means of the respondent's responses to the interview schedule.

2. A person's attitude affects the type of information the person seeks, the method of information processing, and the person's behavior toward the attitude object or situation.

3. The instrument that was developed for use in this study was such that could test for the required information.

4. Individual behavior is rational in activities involving energy usage.
CHAPTER II

REVIEW OF LITERATURE AND FRAMEWORK FOR THE STUDY

The main purpose in this study was to explore household energy management behaviors of Nigerian families living in Anambra State, Nigeria. Among the factors that may affect energy management behavior are attitude, education, income, age, employment status and housing type. The theory underlying some of these factors and selected research findings dealing with these factors are reviewed in the first section of this chapter. The second section focuses on the framework for studying family management.

Theoretical Background

Attitudes

There is widespread agreement among scholars that in order to understand why choices are made one must examine the decision-maker's perceptions or images of reality. These perceptions and images are results of differential interactions of attitudes, values and beliefs. Holsti (1972:362) distinguished among these concepts in the following statements:

Attitudes are general evaluative propositions about some objects, facts, or condition, more or less friendly, hostile, desirable or dangerous. They often influence the reaction of policymakers to the signals, actions, and demands of other states, the perceptions of the other governments, and the definition of their objectives.
toward others. Values are general conceptions of the good toward which actions are directed and by which they are often judged.

Holsti proceeded to explain that values may not always explain or prescribe responses in specific cases, but they often establish attitudes toward a situation and provide justifications and suggestions for policies designed to deal with it. Beliefs, according to Holsti (1972:362), are "propositions that decision-makers hold to be true. They are particularly important in the study of foreign policy because they often are the basis for policy choices."

Kerby (1975:336) pointed out the importance of attitude in the following statements:

One's attitude toward a specific object or condition in a specific situation seems to be a function of the way one conceives that object from the standpoint of its effect on one's most cherished values . . . If, in the judgement of the individual a given object has no effect on his high values he will exhibit a neutral attitude toward it. If he conceives it to be destructive of his high values, he will exhibit a negative attitude toward it, and vice versa.

Kassarjian and Robertson (1968:37) defined attitudes as "functional parts of the system through which the individual relates himself to his surroundings and forms a conception of himself." Attitude research focuses on the interaction between individuals and their world. In relation to consumer behavior Kassarjian and Robertson pointed out that
interaction occurs between individual needs and drive and the product which the consumer wishes to buy or has bought. This relationship is influenced by a variety of psychological, cultural, sociological, and economic influences (1968:37).

They further identified four dimensions of the underlying structures of an individual's attitudes as follows:

1) cognition—awareness and knowledge; 2) frame of reference—values and norms that establish the context of reaction; 3) evaluation—positive or negative direction of reaction; and 4) affect—intensity of feeling and involvement (1968:37).

After examination of attitudes in the light of behavior theory, Doob (1948:178) concluded with the following statements:

It would be tempting to propose (if such a proposal had any prospects of success) that the concept of attitude be dropped from social science, that the concept serve a quasi-scientific need, and that when the concept will finally be abandoned, it will be a happy day for social science, since this event will signify the emergence of a more integrated and scientific system of human behavior.

In a review of attitude theory, Kelman (1974) stated that a person's attitudes toward a particular object are formed in the course of his interaction with that object, his interaction with other persons, or with communication media transmitting information about the object. These interactions, according to Kelman, may
yield information a) about the object itself, obtained through observation, heresay, or some combination of these; b) about the attitudes of others and the prevailing group norms vis-a-vis the object; or c) about the person's own relationship to the object, particularly in the form of feedback from his own actions toward it (Kelman, 1974:310).

The above theoretical background indicates that an analysis of a person's behaviors and his reasons for engaging in the action may reveal that there were indeed some meaningful relationships between his initial attitudes and the action he has taken. It also reveals the conditions in which the person is likely to act on these attitudes, as well as the conditions under which the attitudes are likely to change.

**Attitude Measurement**

As early as 1928, Bain, concerned with the lack of accuracy in the usage of the term attitude, said that this concept has been so widely applied that it has come to mean all things to all men:

> Attitude is a term which has recently come into very general use among sociologists, social psychologists, and writers on education. It is a good example of an ill-defined, or under-defined concept used in a loose, pseudo-scientific manner (Bain, 1928:942).

The main aspect of the confusion which exists is the lack of distinction between opinions and attitudes. Bain suggested that it is indefensible to identify attitude with opinion, especially as revealed in verbal responses. These responses, according to Bain (1928),
are inadequate indicators because they tend to be of a conventional rather than a revealing nature.

In the same year, Thurstone made it clear that attitude is far from a simple matter. It is a complex affair which cannot be characterized by any single quantitative measure. Accordingly, he defined the term rather comprehensively as "the sum total of man's inclinations and feelings, prejudice and bias, preconceived notions, ideas, fears, threats and convictions about any specific topic" (Thurstone, 1929:7).

Attempts to measure attitudes necessitated specific definitions of what was being measured. As one of the early experimenters to construct an attitude scale, Likert deplored the existing definitions as impossible to measure. He pointed out that the whole range of stimuli could be grouped and subgrouped indefinitely, thus creating a non-ending chain of attitudinal responses. Instead, Likert felt that responses should be considered in groups or attitude families. Likert stated,

Contemporary definitions (of attitude) cluster about two chief conceptions: first, that attitudes are disposition toward overt actions; second, that they are verbal substitutes for overt action (Likert, 1932:9).

He was more inclined to agree with the former rather than the latter. Green (1954) also made it clear that attitudes are "latent variables" as contrasted to "direct observables." Thus the term does not refer to any one specific response but it is an abstraction from a large number of related responses. In measuring attitudes,
then, we actually collect a sample from the "attitude universe,"
which consists of manifest variables, and from this sample we make
certain inferences about the nature of the entire universe.

In 1929, Thurstone devised an attitude scale based upon verbal
statements. He argued that although attitude tests can measure a
subject's attitude through his agreement or disagreement with
certain statements, this does not provide any guarantee that he will
actually act in accordance with his professed opinions. Still this
does not mean that measurements of this type are without value.
Thurstone said,

The measurement of attitudes expressed by a man's
opinions does not necessarily mean the prediction
of what he will do . . . we shall assume that it
is of interest to know what people say they believe
even if their conduct turns out to be inconsistent
with their professed opinions. Even if they are
intentionally distorting their attitudes, we are
measuring at least the attitudes which they are
trying to make people believe that they have
(Thurstone, 1929:7).

Thurstone fully recognized the possibility that people may either
intentionally or unintentionally misrepresent their feelings on a
subject. This may be done because of a desire to impress others or
for a variety of other reasons. But, by the same token, a person's
actions may also present a distorted view of his/her attitudes, for
much the same reasons.

Since neither our statements of our opinions nor our overt acts
provide an infallible index of our attitudes, we must be content to
use such statements of opinion as the best available indices of
attitude. We know that this discrepancy between index and real "truth" is not peculiar to attitude measurement alone; discrepancies exist even in such simple measurements as length, weight, and temperature (Thurstone, 1929:7-10).

Consumer Awareness, Attitudes, and Behavior in Relation to Energy

The understanding that resources are finite and that there are interrelationships among "heavy consumption, environmental damage, and degradation of the quality of life" (Hannon, 1975:95) should alter the traditional assumptions of consumers toward energy and environment.

It should be within the reach of the individual consumer to perceive that he must forego certain forms of energy consumption now in order to ensure their availability to his offspring or to his own generation in the future (Hannon, 1975:95).

Conspicuous consumption would have to be replaced with "life styles of elegant frugality" (Hannon, 1975:95). The good life will have to be redefined so that "empty consumerism" (Udall, Conconi, & Osterhout, 1974:281) becomes a thing of the past. It is apparent that changes would have to be made in the way energy is used.

Murthy (1978:157) mentioned that serious considerations must be given by international organizations (such as UNESCO) to promote lifestyles based on decentralization, especially in developing countries, and encourage the development of appropriate technology. The development of appropriate technology may not go a long way in
solving the energy problem unless consumers are aware of the problem and willing to make the best use of the available resources.

Hogan (1976), in her study of energy conservation, family values, household practices and conceptual variables identified "eco-consciousness" as a value that influences household energy-conserving behaviors. She found that when husband and wife in her sample were committed to "eco-consciousness" which reflects concern for people's dependency on their environment, they were more likely to conserve household energy. As a value, eco-consciousness might have developed, according to Baker (1979:27), as "a result of perceived resource scarcities in the environment." Thus, physical resources may be strong stimuli in energy use, shaping values and motivations underlying family decision making.

Awareness and Behavior

In a national survey (1977) of 10,000 people on diverse topics conducted at the University of Texas, less than one-half of the adult population was "functionally competent." A large population of the sample was unaware of what is happening in the world outside of their personal experience. The less informed people were the less receptive. They tended to call energy conservation a sacrifice. Those concerned and those who thought energy shortages were real were more likely to hold attitudes that deny consumers the right to waste energy and also to support policy proposals that foster energy conservation. The concerned were 10 to 30 percent more likely than the unconcerned to support conservation policies (Gottlied, 1977).
In an energy conserving behavior survey, Milstein (1976-1977) conducted a telephone survey of 1,014 people to determine the effects of the natural gas crisis on the public. He reported that a large fraction of the people lack the knowledge about what to do to conserve energy. Half of the people surveyed thought that one must reduce the indoor temperature by 5°F or more in order to save energy and did not know that turning down the thermostat temperature setting even 1° or 2°F would save.

Murray et al. (1974) reported that they found some awareness by the public of energy concerns in a nationwide survey. Only 8% of their sample thought that energy shortages were not a problem, whereas 25% of their respondents pointed out that energy is the most important problem facing the United States and 59% considered the problem to be very important. It was also shown that exposure to problems with one type of fuel led to the expectation of difficulty with other types. According to the median of the response estimates, the respondents anticipated that energy shortages would be overcome before 1980.

In a Texas study of Gottlieb and Matre (1976), researchers focused on the attitudes of 782 respondents toward potential long-term shortages in view of the short-term shortage that occurred after the Arab oil embargo and the respondents' efforts to conserve energy. Although 71% of the sample believed that the energy crisis existed in the United States, only 28% definitely agreed with the existence of the crisis. People who believed that world fuel supplies were running out tended to believe that the energy crisis was real.
Awareness of energy shortage has been found to influence consumer's household energy management behavior; e.g. a report from the United States Federal Energy Administration survey (1977) showed that people who think the energy shortage is real also tend to be more concerned about such shortages and that they tend to practice conservation behaviors. In the home, reduction of room temperature and closing off unused rooms was reported. Behaviors also included insulating the attic, caulking windows and doors, and using storm windows or plastic sheeting over windows. People who reduced their home heating also tended to have purchased a more energy-efficient car. They tended to drive less, drive slower, car pool, use a bicycle, and walk (Federal Energy Administration, 1977).

**Household Energy Management Behaviors**

Energy is vital in the provision of the most essential human needs—food, shelter, clothing and sanitation. Ashworth pointed out the major differences in energy use between poor residents in rural areas of developing nations and their counterparts in urban areas of both the industrial and developing world in the following statements:

. . . rural poor use energy almost exclusively for these life-sustaining activities. A second difference is that they do not have enough energy available to them to even meet these needs adequately, much less create economic surplus or to provide additional amenities. In the tropical areas where there is settled agriculture, preliminary field observations have indicated that most energy is consumed in cooking. Researchers working developed (sic) in Africa and Asia have estimated that 40-70% of all energy expended (including human and animal power) are used in food cooking and preparation (Ashworth, 1979:243).
Some Nigerian citizens are beginning to feel the impact of energy shortages within the country. Udemah, the administrator of the Nigerian Coal Corporation, disclosed to the Daily Times that Nigeria needs a district energy policy in order to achieve industrial greatness. He observed that for any country to have an industrial take-off, there must be a clear-cut energy policy that would stipulate how and where certain forms of energy could be used. He further added:

"... Nigeria's over-dependence on electricity as its main source of energy was an economic blunder which was telling adversely on the economy of the nation (Daily Times, June 19, 1980:6)."

According to studies of household energy management, socioeconomic status is a major determinant of conservation behaviors. Generally, the higher one's socioeconomic status, the more likely one is to adopt energy conservation practices and to support energy conservation policies. The most important factor in this relationship is the level of family income. Newman and Day (1975) reported that not only is income the strongest determinant of energy consumption for residential and transportation use, but it is also one of the best predictors of a person's willingness to practice energy conservation in various ways, both in the present and in the future (Barnaby and Reinstein, 1975; Warren, 1974). This tendency is probably due to the fact that high income people use much energy for nonvital or luxury purposes and they have considerably more latitude than low-income people for reducing energy consumption without significantly
altering their life styles. Moreover, the energy-conserving efforts made by high-income consumers have been reported to make no change in the fact that they still consume much more energy per capita than low and middle income people (Gottlieb & Matre, 1976; Warren, 1974).

The relationship between income, energy consumed by a household, and the percentage of total income allocated to energy is direct (Energy Policy Project of the Ford Foundation, 1974:118; Newman and Day, 1975). According to the Ford Foundation energy study, the higher the income, the higher the energy use. High income families used twice as much energy as the poor. Although the poor families in the study used less energy than the well-off, they tended to spend a higher percentage of their income on energy. Newman and Day (1975) reported also that the use of energy by the poor is entirely for essentials—heating, cooking, refrigeration and lighting.

Education and occupation are two other major components of socioeconomic status that are reported to be directly related to energy management. In general, the greater a person's education the more likely he or she is to practice certain household conservation measures and to accept the need for future conservation programs (Barnaby and Reinstein, 1975; and Warren, 1974).

Employment status of women has been reported to affect time spent in food preparation. According to studies reported by Walker and Woods (1976), less total time is spent in food preparation in employed-wife households. Similarly Holmes (1965), in a study of management practices in the home with a sample of 744 families from
Zanesville, Ohio, reported that non-employed wives served an average of 20 meals a week, whereas 18 meals were served in homes where the wife was employed. According to the Holmes report, employed women spend less time in activities which require the use of cooking fuel. Since employed wives served fewer meals, and thus probably spent less time cooking, the finding would probably support the hypothesis that employed respondents in this study would prefer energy such as gas and electricity to the traditional cooking fuel, firewood, because their time to spend in cooking would be limited.

Age is a sociodemographic characteristic that has been reported to be related to conservation behavior. Younger people are reported to be generally more conserving than older people, although middle-aged people tend to be particularly concerned about reducing home heating costs (Lopreato and Meriwether, 1976), and old people are especially likely to cut back on driving (Gottlieb and Matre, 1976).

In their Twin Rivers survey, Seligman et al. (1976) clearly showed the importance of human attitudes in residential energy consumption. The sample consisted of 56 couples. The husbands were in their mid-thirties and the wives were in their early thirties. The majority of the couples had one or two children. A questionnaire method was used in collecting the data and there were seven attitudinal categories. The first category indicated the importance of personal comfort and health in decisions to regulate the use of the air conditioner. People who scored high in this factor tended to perceive a close connection between those variables and air conditioning usage. For them, to be cool is to be healthy. A concern was
indicated for the effort or bother involved in conserving energy and individual ability to pay for energy needs. Most respondents felt that conserving energy in the home requires a great deal of effort. The role of individuals in contributing to the alleviation of the energy crisis was examined. Individuals who scored high on this factor regarded the ordinary home owner as having little or no role in the national energy crisis. Beliefs about the energy crisis were measured: those who believed there is a real shortage of fuels believed it is immoral to overconsume.

Energy Use and Housing

Newman and Day (1975:95) reported that housing characteristics are closely related to the income level of the household. The poor are the more likely income group to live in apartments, have fewer rooms in their homes and smaller living rooms, and have fewer and smaller windows. The homes of the well-off use more energy than the poor because of differences in structural characteristics. The well-off are more likely to live in single family homes, to have homes with five or more rooms, to have large living rooms, and to have more than fifteen windows (Newman and Day, 1975:95).

Conditions for low income Nigerian urban dwellers are somewhat similar to those described above but the families are likely to live in thatched roof homes. They are less likely than Americans to use gas and electricity. They may use kerosene if they can afford to buy some—often for home lighting but seldom for cooking. Their main energy resources are generally firewood for cooking and kerosene for lighting. They seldom own electronic appliances, unless they
are the battery-operated type. They often walk or ride a bicycle. It is likely that families that live in thatched roof houses would have simple equipment and hence prefer kerosene and firewood to other energy resources.

Christner (1979) pointed out that the ways individuals perceive calls for voluntary conservation will be based on personal variables such as comfort needs, ego needs for status and internalized norms. Human need for status and esteem, according to Christner, is also related to the definition of comfort levels and styles. Energy is mentioned as having a status dimension because it is required to produce and transport consumer goods, to operate those status goods and to participate in energy-intensive leisure activities.

Also Christner stated that energy decision is greatly influenced by lifestyle and role expectations based on social class, occupation and place of residence—that is, region (urban, suburban or rural locations). She pointed out that people of higher socioeconomic classes and certain occupations are expected by peers and associates to maintain role performances that demand high energy consumption levels. On the other hand people in a lower socioeconomic class may be forced to consume more energy than they can afford due to the poor conditions of their housing or other facilities.

Morrison and Gladhart (1976) suggested that energy use may be understood as a consequence of lifestyle because the decision to conserve energy may be more closely motivated by commitment to present lifestyle than price increases per se. Schippers and Darmstadter (1978) also pointed out that energy conservation reflects the
response of energy users to factors dominated by, though not necessarily limited to, prices and scarcity.

Tinker (1980) pointed out that as fuel costs rise or traditional fuel sources disappear, most poor households tend to seek wood, animal waste, leaves, or other energy sources wherever they can, ignoring property rights as well as national concerns for forest reserves or erosion control. She added,

Households operating under such crisis conditions are likely to be more responsive to changes in cooking methods, in cooking utensils or stoves, or in type of fuel than cultural traditions would suppose (Tinker, 1980:5).

**Conceptual Framework**

A diagram of the conceptual framework for this study is presented in Figure 1. It is adapted from Deacon and Firebaugh's framework (1975) for studying management within families. According to these authors, no family can exist for long without resources and no family remains free from outside demands. The focus in this study is on the person who assumes the role of home manager and takes the major responsibility for the management of the household energy. Based on this framework, the Nigerian urban family is viewed as a living, open and adaptive system that requires continuous exchanges (input and output) within and outside its environment in order to sustain itself and function at a survival level and beyond.
Fig. 1. Conceptual Framework for Analyzing Household Energy Management of Nigerian Families.
Definition of Terms

Terms used in describing the conceptual framework for analyzing and interpreting energy management behaviors are defined as follows:

**System**—A set of parts coordinated to accomplish a set of goals (Churchman, 1967:29).

**Input**—Any movement of matter, energy or information from the environment into an acting system (Kuhn, 1974:497).

**Throughput**—The transformation or the processing of input. It involves planning and implementing plans.

**Output**—The met demands and used resources that flow from the family system across its boundaries into the environment.

**Management**—Planning the use of household resources and then implementing the plans to meet demands (Deacon and Firebaugh, 1981).

**Resources**—Means for achieving goals or for meeting the demands placed upon families. They are classified as human and material or non-human resources (Deacon and Firebaugh, 1981).

**Material Resources**—All the things that belong to or things that can be made available for use in household energy management, including income, energy, residential type, proximity to the nearest gas distributor, means of travelling as well as equipment owned and operated by the household.

**Human Resources**—Traits or qualities within people that are instrumental to reach goals. Human resources include cognitive, affective, psychomotor and temporal traits or characteristics of people and other resources that cannot be used independently of individuals (Nickell, Rice, and Tucker, 1976).

**Cognitive resources**—Mental traits or characteristics that relate to knowledge acquired by reasoning and perception such as intelligence, understanding or adaptability (Rice, Nickell and Tucker, 1976).
Affective resources—Traits and feelings pertaining to or resulting from emotions, such as interests, attitudes, motivation or enthusiasm.

Psychomotor resources—The capacity to do work or the power to produce movement.

Environmental Resources—Qualities, characteristics or components of one's surroundings that may be used to achieve goals.

Inputs

The resources that a family and individuals within the family possess and the demands which enter the family system from the environment comprise household inputs. Input factors are goals, events, human and material resources. Family or individual resources make it possible for any demand to be met and goal reached. The home manager uses appropriate resources within the family and its environments to meet various demands of household members.

In this study, inputs include the various forms of human, material, and environmental resources that may affect household energy management as well as demands (goals and events) placed on the family system either from within or outside the family.

Material Resources

Material resources are all those things that belong to or are otherwise available for use by the household in meeting goals and events that are not part of persons (Deacon and Firebaugh, 1981: 229). In this study material resources include household fuels that are already available for use within the family; money required
for the purchase of fuel, stored-up fuel for future use, storage facilities, household appliances, means of travelling to obtain needed fuel.

**Human Resources**

Human resources are "characteristics or personal attributes used as means for meeting goals and events" (Deacon and Firebaugh, 1981:228). Human resources are less tangible but significant in management. The three aspects of human resources include the cognitive, the affective and the psychomotor domains.

The cognitive domain of human resources includes knowledge, comprehension, application, analysis, synthesis and evaluation. The homemaker's knowledge of the energy situation is an important part of the family's human resources stock. The ability of the home manager to use the knowledge can simplify activities and can facilitate acquisition of the needed fuel.

In our rapidly changing environment, homemaker's acquisition of knowledge which can apply to new situations is a significant cognitive resource. The ability to analyze, synthesize and reformulate varied insights and experiences into new approaches to situations can be very helpful in simplifying household energy managerial activities.

The affective domain of human resources input concerns the homemaker's personal feelings or the feelings of other family members about certain objects, activities or situations. In this study it
concerns the respondent's attitude toward selected energy issues, his/her household fuel preference and dislike. Personal interests and attitudes play an important role in the type of fuel the homemaker selects and uses.

The value that the homemaker attaches to the type of fuel he/she prefers may affect her/his ability to adapt to changing situations which may eliminate undesirable alternatives and give meaning to important ones. For example, if using gas for cooking is valued highly over other fuels, the result may be that the homemaker spends a greater portion of the household income on gas or more time and trips to visit the gas distributor in an attempt to facilitate the supply of cooking gas to his/her household. Since values are "rooted in a person's personality, and are identified with the personal subsystem, they also guide managerial behavior because they provide the orientation for good development and guide decisions and actions" (Deacon and Firebaugh, 1981:38).

Psychomotor resources are means of responding to physical stimuli. They are the capacity to do work or produce physical movement. Psychomotor and cognitive resources are closely interrelated, e.g. lighting a new gas lamp during an electric power shortage requires information that differs from that required when switching on electric lights. Both cognitive and psychomotor resources are required for the operation, use and maintenance of a new household appliance or a new energy resource. The acquisition of cognitive and psychomotor resources can be very useful in analyzing alternatives in decision making and identifying resources that are pertinent for a situation.
Environmental Variables

The choices that families make are influenced by the family's lifestyle, market demand, the family's capabilities and the circumstances and constraints of the general economy. The homemaker's outside employment in addition to homemaking activities may help raise the family income and, in turn affect the family's lifestyle. Once the family reaches the preferred lifestyle or desired level of living, it often tries to maintain it, especially if there is a threat to reduction in the standard. Also families that have a wide gap between their desired standard of living and their current level of consumption often strive to close the gap.

Environmental variables affect the choices that families make about their individual standard and level of consumption. The choices that families make are also affected by the society's living standard, whether or not the family rejects or accepts the majority's consumption standards and the family's lifestyle and living level.

Demands

Demands as family system's inputs comprise goals and events. Goals give "direction and purpose to values" (Deacon and Firebaugh 1975:149) and fulfilled goals become outputs of the managerial subsystem. Goals direct planning and they develop from values, knowledge, insights and the environment, e.g., the homemaker's goal may be to provide meals for family members in a neat kitchen. The homemaker's value of a neat kitchen may become a goal to conserving the use of household gas because the homemaker knows that a gas shortage will lead to the use of a kerosene stove or even
firewood which will produce smoke and mess up the kitchen. The goal to have a neat kitchen without smoke may be sharpened by the homemaker's choice of gas for cooking and having two or three gas cylinders on stand-by in order to avoid running out. He/she may even have to examine available resources in relation to her desired objective. She may decide to cut down in the use of hot water in the home in order to conserve gas; or she may decide to spend money on an electric water heater so that gas is used only for cooking. She may cut down in baking and spend some hours each week cooking foods and storing up for future use instead of cooking fresh food daily.

Events

Events as inputs are "unexpected, or low probability occurrences that require action" (Deacon and Firebaugh, 1981:228). An external event that reaches the family system may be in the form of energy crisis--shortage of electricity (black-out), lack of kerosene for home lighting or cooking or lack of gas for cooking resulting from mechanical breakdown in the refinery. Events can originate from the family system, e.g., forgetting to turn off the stove after cooking and allowing gas or kerosene to burn up; or forgetting to turn off lights before leaving for a trip or holiday. Events can add to the demand for electricity, gas, kerosene or firewood which could call for adjustments in household energy management behaviors. Whatever the nature of the event, the family has to deal with it in one way or the other and in so doing resources are used.
Transformation

The family system inputs described above are processed or transformed within the family to produce outputs. The transformation process is referred to by Deacon and Firebaugh (1981:221) as the "throughput" process. Throughput is the activity that goes on inside the system boundary.

In this study the transformation process deals with the overall management of household energy resources. It involves planning for the supply of household fuel and implementing the plan to meet demands. The transformational processes to be observed in this study include planning the means for obtaining household energy. This may involve standard setting which may determine the type of fuel the family prefers or uses. Decisions have to be made concerning payment, delivery or pick up. In order to facilitate the plans, the homemaker may decide to check up at the gas station or send someone to do it for her or may even send a note to the manager in order for the plans to be implemented.

Within the household the homemaker would also plan the use of energy resources. This may involve buying a container for storage for future use; instructing children, servant or maid on the correct use of fuel. He or she may control the plans by checking, e.g., making sure lights are turned off when not in use and regulating the use of kerosene or gas in the household.

Output

The outputs from the family managerial subsystem are the "met demands and used resources" (Deacon and Firebaugh, 1981:223). This
represents a shift in available resources. In this study, a part of the family income that is used to purchase household energy (e.g., kerosene, gas or firewood) represents used resources (output). The firewood, kerosene or gas that has already been used for cooking or lighting represents used resources. In addition, the time that the homemaker spends looking for fuel, checking with the dealers or searching for firewood is also a used resource.

Output or used resources represents a shift in available stock which could result in spoiled food items due to lack of firewood for boiling meat, fish or warming up soup; it may result in spoiled food items due to lack of electric power to operate the refrigerator or freezer, lack of hot water for household use, high cost of needed fuel and shortages.

Part of these outputs is fed back into the family managerial subsystem in the form of knowledge or information (input) which the homemaker could use to adjust or regulate family behaviors. Output can also be positive in nature, e.g., the satisfaction the homemaker derives from accomplishing household work—preparing family meals, clean ironed clothes, having hot water whenever it is needed, having light and a neat kitchen, being able to have the fan or air conditioner on at any time it is needed and having a regular supply of fuel for household use because of her/his ability to manage effectively.

In this study an attempt will be made to analyze household energy management behaviors of Nigerian families, viewing the family as a system operating with input, transformation, output processes. Consideration will be given to individual and family variables as
well as environmental constraints that may affect household energy management behaviors.
CHAPTER III

METHODOLOGY

Household energy management behaviors of Nigerians living in urban areas of Anambra State were examined in this study. Relationships between selected behaviors, attitudes, and selected human and material resources were also examined. The methodology used and the rationale are presented in this section.

Population and Sample

The population for the study was composed of households in Nsukka town in Anambra State, Nigeria (Figure 2). A sample of three hundred households was randomly selected from a population of approximately ten thousand people. One of every four households on both sides of the street within a radius of three miles of the center of the town was included in the sample for the study. This ensured an equal representation of the population of households in different locations (Figure 3). The seven major residential communities in which the sample was drawn include:

1. The campus of the University of Nigeria, Nsukka.
2. Market area community.
3. Nru (from market toward Isi Enu).

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\(^2\) At the time of the study no census information was available to indicate the number of households in Nsukka.
MAP OF IBOLAND
(Southern Nigeria)

Figure 2. Location of Nsukka.
Figure 3. Map of sampling areas in Nsukka.
4. Ngwuoye (from market to Queen's School).
5. Aku Road (area behind and including Bishop Shanahan Hospital community).
6. Odenigbo (from Nsukka roundabout near post-office to Ogurugu Road including Ofuruono).
7. Onuiyi (area behind and including Zik's Flats).

Those included in the study consisted of families with or without children who had lived in their present homes for at least six months. The criterion for selecting participants interviewed was that the respondents be the person who assumes a majority of the responsibility for managing the household. Participation in the study was voluntary; therefore only households willing to participate in the study were included in the sample.

**Research Design**

The survey research method was used in this study. The survey is considered an appropriate means for discovering the relative distribution and interrelations of sociological and psychological variables. It has been used mainly, though not exclusively, to ascertain what exists and how it exists in the social environment of a group, a geographical or political area, or even a whole country. According to Kerlinger (1973:422) the survey research method is efficient in providing accurate information in a whole population of people with a relatively small sample. Compton and Hall (1972:139) considered the method an efficient way to obtain information about behavior, consumption patterns or social conditions. Babbie (1973), Moser (1967) and Kerlinger (1973) suggested the survey research method as an efficient and effective mode of data collection when information is required about a particular situation that
affects a large population and of which explanation or description is desired and involves a large number of variables.

Energy adjustment among Nigerian urban dwellers is a particular situation that has impact on the lives of the people and of which both descriptive information and explanation of attitude and management behaviors are desired. The survey method with interview schedules as the major means to elicit information was considered the most efficient and economically feasible approach within the budget constraints for the study.

Data Collection Instrument

A set of interview schedules was developed for use in collecting the data. The statements on the interview schedules were divided into sections relating to the following topics:

a) the different types of energy resources available to the family;

b) the attitudes of respondents toward selected energy issues;

c) the family's energy management behaviors;

d) strategies used by families in coping with selected energy problems;

e) individual and household variables relating to energy management behaviors; and

f) environmental, household, and individual variables.

The instrument was pre-tested with a few (N=10) Nigerian families residing in Columbus, Ohio. Changes in the schedule were based on the information and suggestions obtained from the families who participated in the pretest.
The ten items used to measure attitude in this study were selected during a review of literature on household energy management. They were developed, tested and used by authors in the field (Hogan, 1976; Gottlied and Matre, 1976, and United States Federal Energy Administration Survey, 1977). The responses to the statements were scored on a five-point scale (Likert Type). The highest score was assigned to the most favorable attitude toward energy situation, indicating a willingness to conserve or adjust behavior to improve the energy situation and the lowest score was assigned to the most unfavorable attitude. The scores ranged from 10 (most unfavorable) to 50 (the most favorable).

To validate the scoring of the 10-item Likert-type attitude scale (interview schedule item number 9a-9j, Appendix A), some Nigerians and other individuals working in the field of home economics and related fields (N=20) were asked to indicate either an agreement or a disagreement with each of the statements. Agreement of at least 75% of the judges on the classification of each item was selected as the level required for the item to be used. None of the items received less than 75% agreement; three items received from 80% to 85% agreement and seven items received 100% agreement. The interview schedules were duplicated and mailed to Nigeria where the data were collected.

Interviewers

Seven trained interviewers participated in collecting data used in this study. The interviewers were home economics students at the University of Nigeria, Nsukka. Instructions and techniques for
conducting the interview were pre-recorded and mailed to the supervisors—Dr. Emmanuel Akpan (Department of Communications) and Mrs. T. Nwoko (Department of Food and Home Sciences), both at the University of Nigeria, Nsukka. The training and supervision of the interviewers were carried out by the supervisors. An interview kit which contained a letter of introduction, sampling techniques, purpose of the study and color-coded cards were provided for the supervisors to distribute to the interviewers during interviewer training.

The letter of introduction served as an identification card for the interviewers. The three color-coded cards were designed for three questions on the interview schedules—blue for item 1a-1f; yellow for item 9a-9j and green for item 18a-18e (Appendix A). On the cards, possible responses for the item each represented were written on them. The interviewer handed the appropriate card to the interviewee during the interview as each item arose. The interviewee picked the appropriate response from the list on the card after each statement was read. This technique was designed to facilitate the interview making it easier for both the interviewer and the respondent to complete the interview.

Data Collection

The investigation was focused on energy management behaviors of Nigerian urban dwellers. The data were collected in a period of approximately six weeks—from the last week of September to the end of October, 1980. The respondent was the person who assumed the major responsibility in managing the household.
The interviewer visited each of the households selected for the study, presented a letter of introduction to the occupant and requested his/her willingness to participate. If the occupant expressed a willingness to participate the interview was conducted or an arrangement made regarding a convenient time for both the interviewer and the prospective participant. The completed interview schedules were returned to the supervisors who forwarded them by mail to the researcher at the Ohio State University, Columbus, Ohio, after checking for completeness and accuracy.

Data Processing and Analysis

The collected data were coded (Appendix B) and checked for coder accuracy and were transferred to computer cards for data analysis. The statistical laboratory and the Instructional and Research Computer Center at the Ohio State University provided computing facilities as well as statistical consultation services.

The initial analysis by means of the SPSS program (Nie et al., 1975) was performed to determine the frequency distribution of individual items for the purpose of describing the sample. The statistics used in the analysis of the data included Chi-square tests and analysis of variance. In testing hypotheses 1 through 5, the chi-square test was used to analyze the bivariate frequency distribution to determine whether current fuel used by a family and the family's most preferred fuel were associated with the employment status, level of education of the homemaker, household income and housing type. Contingency tables and the hypotheses of independence were employed to determine whether the classification of responses was
independent of the classification of the respondent's individual and family variables. Log-linear analysis was also employed to determine the direction and strength of the relationship (if any).

Analysis of variance was used to test hypotheses 6, 7, and 8 to determine if significant differences existed between means for attitude score; problem score; energy conservation technique score and selected independent variables—age, level of education of the homemaker, household income and employment status. Duncan's multiple range test was also employed to determine the differences in mean scores among groups of participants.

Description of Sample

A total of 193 families was surveyed. The distribution of respondents by selected individual and household characteristics is presented in this section. 3

Education

Educational level of the sample was fairly high. The highest level of education for 29% of the respondents was university graduate. Almost another 29% had completed one to three years of college (Table 1). The high educational attainment of the sample, could be attributed to the fact that since this is a university town, most of the residents are employed by the university and are likely to be people who have been exposed to education.

3 It was not possible to compare characteristics of the sample with characteristics of the population because of lack of census information.
TABLE 1

Frequency Distribution of Households by Selected Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education of respondent</strong></td>
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<td></td>
</tr>
<tr>
<td>0 to 8 years</td>
<td>10</td>
<td>5.2</td>
</tr>
<tr>
<td>Partial secondary</td>
<td>25</td>
<td>13.0</td>
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<tr>
<td>Secondary graduate</td>
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<td>18.7</td>
</tr>
<tr>
<td>1 to 2 years of college</td>
<td>24</td>
<td>12.4</td>
</tr>
<tr>
<td>3 years of college</td>
<td>32</td>
<td>16.4</td>
</tr>
<tr>
<td>College graduate</td>
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<td>29.0</td>
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<td></td>
</tr>
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<td>18 to 30</td>
<td>106</td>
<td>54.9</td>
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<td>2.6</td>
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<tr>
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<td>193</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Employment status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed outside home</td>
<td>134</td>
<td>69.4</td>
</tr>
<tr>
<td>Self-employed</td>
<td>33</td>
<td>17.1</td>
</tr>
<tr>
<td>Not employed</td>
<td>16</td>
<td>8.3</td>
</tr>
<tr>
<td>No information</td>
<td>10</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>193</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Household income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below N3552</td>
<td>83</td>
<td>43.0</td>
</tr>
<tr>
<td>N3553 to N6734</td>
<td>76</td>
<td>39.0</td>
</tr>
<tr>
<td>N6735 to N9024</td>
<td>19</td>
<td>9.8</td>
</tr>
<tr>
<td>N9025 to N12,620</td>
<td>12</td>
<td>6.2</td>
</tr>
<tr>
<td>Above N12,620</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>No information</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>193</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Housing type</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single family home</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(concrete building)</td>
<td>87</td>
<td>45.1</td>
</tr>
<tr>
<td>Apartment/flat</td>
<td>79</td>
<td>40.9</td>
</tr>
<tr>
<td>Thatched roof house</td>
<td>17</td>
<td>8.8</td>
</tr>
<tr>
<td>No information</td>
<td>10</td>
<td>5.2</td>
</tr>
<tr>
<td></td>
<td>193</td>
<td>100.0</td>
</tr>
</tbody>
</table>
<h3>Age</h3>

Participants in the study were young. The mean age for the sample was 36 years (Table 1). Only 5 respondents (2.6%) were between 50 and 60 years of age. Seventy-seven respondents (39.9%) were between 31 and 50 years. More than one-half (54.9%) of the respondents were between 18 and 30 years of age. The low age of the participants may be related to the fact that most people who migrate to urban or semi-urban areas to work are young.

<h3>Employment Status</h3>

More than two-thirds (69.4%) of the home managers were employed outside the home and 33 (17.1%) were self-employed (Table 1). Only 16 (8.3%) were not employed. The high employment rate may be attributed to the fact that Nsukka is a university town with employment opportunities.

<h3>Household Income</h3>

The mean taxable household income of the respondents at the time of the study was N5,384 (in Nigerian currency). Only one household had a net taxable income of over N12,000 (Table 1). About 16% of the households had incomes above the mean and 43% had incomes below the mean.

<h3>Housing Type</h3>

Nearly one-half (45.1%) of the families lived in single family homes, almost as many (40.9%) lived in an apartment or flat and 8.8% lived in thatched roof houses (a house made with local materials) (Table 1).
Ownership of Selected Home Appliances

The most commonly owned appliance among participants was an electric iron: 77.2% of the households in the sample had one. A high percentage (75.6%) had either a freezer or refrigerator. Slightly fewer than 38% had either an electric stove or an electric cooker. The least often owned home appliances were clothes dryer (1.0%) and dishwasher (1.0%) (Table 2).

Cooling appliances owned by the respondents included electric fans and air conditioners. Nearly all households (91.1%) had at least one cooling appliance. Seventy-one percent of the families had an electric fan and almost 20% (19.7%) had an air conditioner (Table 2).

The type of floor cleaning equipment often used by the households in the sample included broom, vacuum cleaner, carpet sweeper and electric sweeper. Although not quite 10% of the sample used vacuum cleaners, only two households (1.0%) reported that they used the vacuum cleaner frequently. The most frequently used cleaning equipment reported by participants (83.9%) was a broom (Table 3).
### TABLE 2

Distribution of Households (n=193) by Selected Household Appliances and Motor Vehicles

<table>
<thead>
<tr>
<th>Item</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric iron</td>
<td>77.2</td>
</tr>
<tr>
<td>Electric fan</td>
<td>71.4</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>54.4</td>
</tr>
<tr>
<td>Motorcycle</td>
<td>38.9</td>
</tr>
<tr>
<td>Automobile</td>
<td>30.6</td>
</tr>
<tr>
<td>Freezer</td>
<td>21.2</td>
</tr>
<tr>
<td>Air Conditioner</td>
<td>19.7</td>
</tr>
<tr>
<td>Electric cooker</td>
<td>19.2</td>
</tr>
<tr>
<td>Electric stove</td>
<td>18.7</td>
</tr>
<tr>
<td>Vacuum cleaner</td>
<td>9.8</td>
</tr>
<tr>
<td>Washing machine</td>
<td>7.8</td>
</tr>
<tr>
<td>Clothes dryer</td>
<td>1.0</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### TABLE 3

Distribution of Households by Type of Floor Cleaning Equipment Often Used

<table>
<thead>
<tr>
<th>Item</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broom</td>
<td>162</td>
<td>83.9</td>
</tr>
<tr>
<td>Broom and vacuum cleaner</td>
<td>9</td>
<td>4.7</td>
</tr>
<tr>
<td>Carpet sweeper</td>
<td>8</td>
<td>4.0</td>
</tr>
<tr>
<td>Broom and electric sweeper</td>
<td>6</td>
<td>3.1</td>
</tr>
<tr>
<td>Vacuum cleaner</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>No information</td>
<td>6</td>
<td>3.1</td>
</tr>
<tr>
<td></td>
<td>193</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Type of Food Preservation Methods Families Used

Families often used more than one food preservation method. Refrigeration was used by a little over 54% of the sample. Smoking was the second most used method reported (32.6%) and oven drying was the least used method (15%) (Table 4).

<table>
<thead>
<tr>
<th>Methods</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refrigeration</td>
<td>105</td>
<td>54.4</td>
</tr>
<tr>
<td>Smoking</td>
<td>63</td>
<td>32.6</td>
</tr>
<tr>
<td>Freezing</td>
<td>45</td>
<td>23.3</td>
</tr>
<tr>
<td>Sun drying</td>
<td>34</td>
<td>17.6</td>
</tr>
<tr>
<td>Oven drying</td>
<td>29</td>
<td>15.0(^a)</td>
</tr>
</tbody>
</table>

\(^a\) This does not add to 100% because some families combine two or three methods depending on the circumstance or the type of food item that was preserved.

Current Fuels Used by Households

Major fuels used for cooking were wood and kerosene. Just under 35% of the sample used those fuels for that purpose. Almost 39% used kerosene and gas, and the third most used fuel was kerosene only, reported by 15% of the sample. No household used electricity only for cooking, but six families (3.1%) reported using gas only (Table 5). On the other hand, 37.3% used electricity for home lighting. The second most used fuel for home lighting was kerosene, reported by a little over 32% of the sample, and the third fuel was firewood, reported by slightly over 26% of the households. Gas was again the least used fuel for home lighting (Table 6).
### TABLE 5

**Distribution of Households by Current Fuel Used for Cooking**

<table>
<thead>
<tr>
<th>Current fuel</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kerosene and wood</td>
<td>67</td>
<td>34.7</td>
</tr>
<tr>
<td>Kerosene and gas</td>
<td>48</td>
<td>24.9</td>
</tr>
<tr>
<td>Kerosene only</td>
<td>29</td>
<td>15.0</td>
</tr>
<tr>
<td>Kerosene and electricity</td>
<td>12</td>
<td>6.2</td>
</tr>
<tr>
<td>Gas and electricity</td>
<td>10</td>
<td>5.2</td>
</tr>
<tr>
<td>Firewood only</td>
<td>10</td>
<td>5.2</td>
</tr>
<tr>
<td>Bottle gas only</td>
<td>6</td>
<td>3.1</td>
</tr>
<tr>
<td>Gas, kerosene, and wood</td>
<td>5</td>
<td>2.6</td>
</tr>
<tr>
<td>Gas and wood</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Electricity and wood</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Electricity, kerosene and wood</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>No information</td>
<td>1</td>
<td>0.5</td>
</tr>
</tbody>
</table>

| Total                               | 193       | 100.0   |

### TABLE 6

**Distribution of Households by Fuels for Home Lighting**

<table>
<thead>
<tr>
<th>Fuels</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>72</td>
<td>37.3</td>
</tr>
<tr>
<td>Kerosene</td>
<td>62</td>
<td>32.1</td>
</tr>
<tr>
<td>Electricity and kerosene</td>
<td>51</td>
<td>26.4</td>
</tr>
<tr>
<td>Electricity and gas</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>Gas</td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>No information</td>
<td>1</td>
<td>0.5</td>
</tr>
</tbody>
</table>

| Total                               | 193       | 100.0   |
Proximity to the Nearest Gas Distributor

More than a quarter of the sample lived within less than one-half mile from the nearest gas distributor and about 7% of the sample lived within three miles (Table 7).

TABLE 7
Distribution of Respondents (Gas Users) by Proximity to the Nearest Distributor

<table>
<thead>
<tr>
<th>Proximity to the distributor</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>About 3 miles</td>
<td>13</td>
<td>6.7</td>
</tr>
<tr>
<td>Between 2 and 3 miles</td>
<td>8</td>
<td>4.1</td>
</tr>
<tr>
<td>Between 1 and 2 miles</td>
<td>16</td>
<td>8.3</td>
</tr>
<tr>
<td>About 1 mile</td>
<td>32</td>
<td>16.6</td>
</tr>
<tr>
<td>Less than 1 mile</td>
<td>49</td>
<td>25.4</td>
</tr>
</tbody>
</table>
CHAPTER IV

FINDINGS AND DISCUSSION

The objectives in this study were to investigate household energy management behaviors of a sample of Nigerian home managers and determine what variables were related to those behaviors. In this chapter, the findings are presented and interpreted in two sections: a) analysis of hypotheses to determine whether or not relationships exist between behavior and selected independent variables, b) description of response distribution where statistical analysis was considered invalid due to the nature of the distribution. Chi-square contingency tables and analysis of variance were computed with the appropriate statistical package (SPSS) (NIE, 1975). A statistic was considered significant at the \( p \leq .05 \) level.

Hypotheses Testing

Hypothesis 1: The type of fuel a family is currently using differs from the family's most preferred fuel for cooking.

Information regarding the fuels currently used by respondents as well as preferred fuels was obtained. A Chi-square test was computed to compare the distributions by current and preferred fuels. A very small proportion of the households in the sample was using the preferred fuel (Table 8). The confidence interval fell between .0489 and .1309 indicating that the proportion of
the population using its preferred fuel fell between .0489 and .1309. This was not significant at p=.05. Therefore the hypothesis was not rejected.

**TABLE 8**

Chi-Square Distribution of Current Fuel by Preferred Fuel\(^a\) (N=190)

<table>
<thead>
<tr>
<th>Preferred fuel</th>
<th>Firewood</th>
<th>Kerosene</th>
<th>Gas</th>
<th>Electricity</th>
<th>Gas &amp; electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>4</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Kerosene</td>
<td>1</td>
<td>10</td>
<td>12</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Gas</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Kerosene and gas</td>
<td>1</td>
<td>11</td>
<td>35</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Kerosene and wood</td>
<td>7</td>
<td>34</td>
<td>13</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Kerosene and electricity</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Gas and electricity</td>
<td>1</td>
<td>0</td>
<td>8</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Gas and wood</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Electricity and wood</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Gas, kerosene and wood</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Electricity, kerosene and wood</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>63</td>
<td>81</td>
<td>27</td>
<td>4</td>
</tr>
</tbody>
</table>

\(^a\)Only 17 households were using their preferred fuel.

\[ \chi^2 = 80.3; \quad 95\% \text{ C.I.} = 0.0489, 0.1309 \]
Respondents who had a fuel preference were asked their reasons for the preference. The various reasons given are presented in Table 9. The characteristics of household fuel played a role in determining its preference or acceptance as an appropriate resource. The fuel desirability—pleasantness or suitability to social or physical situation was important in determining its acceptability to some households in the sample. Families are interested in fuel that is neat and clean, that facilitates cooking, is easy to use, and is safe and easy to obtain (Table 9).

### TABLE 9

Frequency Distribution of Households by Fuel Preference and Reasons for Preference

<table>
<thead>
<tr>
<th>Reasons for preference</th>
<th>Types of fuel preferred</th>
<th>Gas (N=82)</th>
<th>Electricity (N=27)</th>
<th>Kerosene (N=63)</th>
<th>Wood (N=15)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>f %</td>
<td>f %</td>
<td>f %</td>
<td>f %</td>
</tr>
<tr>
<td>Facilitates cooking</td>
<td></td>
<td>40 48.8</td>
<td>10 37.0</td>
<td>9 14.3</td>
<td>--</td>
</tr>
<tr>
<td>Clean and neat</td>
<td></td>
<td>19 23.2</td>
<td>8 29.6</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Less risky</td>
<td></td>
<td>--</td>
<td>3 11.1</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Easy to use</td>
<td></td>
<td>18 21.9</td>
<td>4 14.8</td>
<td>16 25.3</td>
<td>3 20.0</td>
</tr>
<tr>
<td>Safe</td>
<td></td>
<td>2 2.4</td>
<td>--</td>
<td>23 38.1</td>
<td>--</td>
</tr>
<tr>
<td>Less expensive</td>
<td></td>
<td>--</td>
<td>2 7.4</td>
<td>3 4.8</td>
<td>4 26.7</td>
</tr>
<tr>
<td>Easily obtained</td>
<td></td>
<td>--</td>
<td>--</td>
<td>11 17.5</td>
<td>--</td>
</tr>
<tr>
<td>Less shortage</td>
<td></td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>8 53.3</td>
</tr>
<tr>
<td>Economical</td>
<td></td>
<td>3 3.7</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td></td>
<td>82 100.0</td>
<td>27 99.9</td>
<td>62 100.0</td>
<td>15 100.0</td>
</tr>
</tbody>
</table>
Hypothesis 2: The type of fuel preferred for cooking differs among a) levels of household income and b) levels of education of the respondents.

Electricity, gas and kerosene are used primarily with the non-traditional cooking stoves, and most of the families using the non-traditional cooking stoves are likely to live in urban areas; they are likely to be employed and are likely to have a high level of education. The rationale for the hypothesis was that participants a) with high household income and b) with high level of education would be more likely to prefer gas and electricity than firewood and kerosene.

The Chi-square test was computed to determine the relationship between household income and respondents' fuel preference. No significant difference was found (Table 10).

### TABLE 10

<table>
<thead>
<tr>
<th>Preferred fuel</th>
<th>Household income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N3500</td>
</tr>
<tr>
<td>Firewood</td>
<td>6</td>
</tr>
<tr>
<td>Kerosene</td>
<td>32</td>
</tr>
<tr>
<td>Gas</td>
<td>32</td>
</tr>
<tr>
<td>Gas and electricity</td>
<td>12</td>
</tr>
</tbody>
</table>

\[ X^2 = 7.72, \text{ d.f.} = 3, P = .2586 \]
For part b of hypothesis 2, a significant difference existed between fuel preference and level of education of the respondent ($p = .0008$) (Table 11). Therefore part b of the hypothesis was not rejected.

**TABLE 11**

Distribution of Preferred Fuel by Level of Education of the Respondent

<table>
<thead>
<tr>
<th>Preferred fuel</th>
<th>0 to 8 yrs. of school</th>
<th>Secondary school</th>
<th>1 to 3 yrs. of college</th>
<th>University graduate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Kerosene</td>
<td>17</td>
<td>19</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>Gas</td>
<td>9</td>
<td>10</td>
<td>28</td>
<td>31</td>
</tr>
<tr>
<td>Gas and electricity</td>
<td>3</td>
<td>4</td>
<td>12</td>
<td>11</td>
</tr>
</tbody>
</table>

$x^2 = 28.427$, d.f. = 9, $p = .0008$

To determine the direction and strength of the association, a log-linear analysis was performed. More respondents than expected, who had 8 years of education or less, preferred firewood for cooking than those in the higher levels of education (Lambda = 2.255); and more participants than expected with secondary school education had a strong preference for kerosene for cooking (Lambda = 2.006) (Table 12). Also more university graduates than expected preferred gas for cooking.
TABLE 12

Estimates of the Log-Linear Parameters for Determining Strength and Direction of the Relationship between Preferred Fuel and Levels of Education of the Participants (Data from Table 11)

<table>
<thead>
<tr>
<th>Fuel type</th>
<th>Levels of education</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 8 yrs. of school</td>
</tr>
<tr>
<td>Firewood</td>
<td>2.255*</td>
</tr>
<tr>
<td>Kerosene</td>
<td>1.340</td>
</tr>
<tr>
<td>Gas</td>
<td>-1.831</td>
</tr>
<tr>
<td>Gas and electricity</td>
<td>-1.616</td>
</tr>
</tbody>
</table>

*P < .05

Hypothesis 3: The most disliked fuel type for cooking differs among employment status levels of the respondents.

The distribution of respondents by fuel disliked and employment status is shown on Table 13. The relationship between employment status of the respondents and type of fuel disliked was not significant at $p = .05$. The hypothesis was therefore rejected.

Firewood was the least popular fuel; gas and electricity also were not well liked by the sample (Table 13). Why respondents disliked certain fuels was investigated. According to the frequency distribution by the most disliked fuel and reason for dislike, 45 of 70 respondents who disliked firewood reported that it is messy, dirty and smokes. Ninety percent of those who disliked kerosene reported that it also is messy and dirty and, in addition, has an offensive odor (Table 14).
TABLE 13

Distribution of Respondents by Fuel Dislike and Employment Status

<table>
<thead>
<tr>
<th>Disliked fuel</th>
<th>Employed outside home</th>
<th>Self-employed or not employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>57</td>
<td>11</td>
</tr>
<tr>
<td>Kerosene and wood</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Gas</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>Gas and electricity</td>
<td>35</td>
<td>15</td>
</tr>
</tbody>
</table>

\[ x^2 = 6.954, \text{ d.f.} = 3, \ p = 0.07 \]

TABLE 14

Frequency Distribution of Households by the Most Disliked Fuel and Reason for Dislike

<table>
<thead>
<tr>
<th>Types of fuels</th>
<th>Firewood (N=70)</th>
<th>Kerosene (N=11)</th>
<th>Gas (N=29)</th>
<th>Electricity (N=49)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reasons for disliking</td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Messy, dirty, smoke</td>
<td>45</td>
<td>64.3</td>
<td>10</td>
<td>90.0</td>
</tr>
<tr>
<td>Time consuming</td>
<td>15</td>
<td>21.4</td>
<td>1</td>
<td>10.0</td>
</tr>
<tr>
<td>Constant shortage</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Constant power failure</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Not readily available</td>
<td>6</td>
<td>8.6</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Hard to regulate</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Complicating</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Hard to get during rainy season</td>
<td>4</td>
<td>5.7</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Costly</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Risky, dangerous, shocks</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Can poison or kill</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
Hypothesis 4: Fuel preference is related to housing type.

The Chi-square test was used to test the hypothesis that fuel preference is independent of the type of housing (in terms of structure and materials used) a respondent occupies. Housing type was significantly related to the respondent's fuel preference (Table 15, $X^2 = 15.050$, d.f. = 6, $p = .01$). The hypothesis was, therefore, not rejected. Estimates of the log-linear parameters (Lambda) were applied to the distribution to determine the nature and direction of the relationship. More respondents than expected who lived in thatched roof houses preferred kerosene for cooking (Table 16).

A very small number of respondents who lived in thatched roof houses mentioned gas and electricity (Table 15). Most such housing have no electrical facilities. Further, most of the people who occupy such housing have very low incomes and could not afford to buy gas for cooking. They are, therefore, limited to only two alternatives—either kerosene (if they can afford a kerosene stove) or firewood.

### Table 15

Distribution of the Respondents by Fuel Preference and Housing Type

<table>
<thead>
<tr>
<th>Preferred fuel type</th>
<th>Single family (concrete)</th>
<th>Flat/apartment (concrete)</th>
<th>Thatched roof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>6</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Kerosene</td>
<td>35</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Gas</td>
<td>31</td>
<td>43</td>
<td>4</td>
</tr>
<tr>
<td>Gas and electricity</td>
<td>14</td>
<td>13</td>
<td>2</td>
</tr>
</tbody>
</table>

$X^2 = 15.050$, d.f. = 6, $p = .01$
TABLE 16

Estimates of the Log-linear Parameters for Determining Strength and Direction of Relationship between Preferred Fuel and Type of Housing Occupied by the Respondent (Data from Table 15)

<table>
<thead>
<tr>
<th>Preferred fuel</th>
<th>Single family house</th>
<th>Flat/apartment</th>
<th>Thatched roof house</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>-0.220</td>
<td>0.539</td>
<td>-0.202</td>
</tr>
<tr>
<td>Kerosene</td>
<td>0.390</td>
<td>-3.097*</td>
<td>2.024*</td>
</tr>
<tr>
<td>Gas</td>
<td>-0.233</td>
<td>1.840</td>
<td>1.000</td>
</tr>
<tr>
<td>Gas and electricity</td>
<td>0.188</td>
<td>0.320</td>
<td>-0.326</td>
</tr>
</tbody>
</table>

*p < .05

Hypothesis 5: There is a relationship between the employment status of the participant and types of household energy management problems reported.

The distribution of respondents by employment status and type of energy problems reported is presented in Table 17. A significant relationship was found between employment status of the respondent and energy management problems reported (Table 17, $X^2 = 8.16$, d.f. = 3, $p = .04$). Therefore the hypothesis was not rejected.

TABLE 17

Chi-Square Distribution of Respondents by Employment Status and Type of Energy Problem Reported

<table>
<thead>
<tr>
<th>Types of problem</th>
<th>Employed outside</th>
<th>Not employed/self-employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helpers are wasteful</td>
<td>32</td>
<td>11</td>
</tr>
<tr>
<td>High cost</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td>Unsure of what to do</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Shortage and failure,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lack of time</td>
<td>34</td>
<td>3</td>
</tr>
</tbody>
</table>

$X^2 = 8.16$, d.f. = 3, $p = 0.04$
Log-linear analysis was used to determine the strength and the direction of the relationship. More respondents than expected who were employed outside the home experienced problems with energy shortages and failures than those who were either not employed or self-employed (Lambda = 2.364 and -2.564, respectively, Table 18). The non-employed and the self-employed women had more problems with high cost and being unsure of what to do than those employed outside the home.

<table>
<thead>
<tr>
<th>Types of problem</th>
<th>Employed outside</th>
<th>Not employed/self-employed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Helpers are wasteful</td>
<td>-0.311</td>
<td>0.311</td>
</tr>
<tr>
<td>High cost</td>
<td>-1.284</td>
<td>1.284</td>
</tr>
<tr>
<td>Unsure of what to do</td>
<td>-1.521</td>
<td>1.521</td>
</tr>
<tr>
<td>Shortage and failure, lack</td>
<td>2.564*</td>
<td>-2.564*</td>
</tr>
<tr>
<td>of time</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*P < .05

The problems faced by respondents who were employed outside the home could be attributed to the fact that their time is shared between outside employment and household management. This may create a problem for them in terms of having time to follow up on their plans, e.g., checking for gas or following up on an order that had been placed previously. Further, they are not usually at home to make use of slack periods when electric power supply is available as would the self-employed or non-employed women be.
Employment status of the home manager is one of the factors that has been reported to affect household energy use. The findings in this study support conclusions of Steidl and Bratton (1968:88) that a home manager who is not employed outside the home has a certain amount of freedom in deciding when to perform different tasks in the home.

**Hypothesis 6:** The score for attitude toward selected energy issues is related to a) level of education of the respondent, b) household income and c) age of the respondent.

To analyze hypotheses 6 through 8, multiple comparisons analyses (ANOVA) were employed. For hypothesis 6, no significant interaction was found between education, household income and age ($F = 1.69$, d.f. = 3, $p = .12$; Table 19). The hypothesis was therefore rejected.

**TABLE 19**

Multiple Comparisons (ANOVA) of Mean Scores for Attitude toward Selected Energy Issues by Levels of Education, Age and Household Income

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>d.f.</th>
<th>Sum of squares</th>
<th>Mean square</th>
<th>$F$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>171</td>
<td>4182.92</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>3</td>
<td>11.37</td>
<td>0.15</td>
<td></td>
<td>.92</td>
</tr>
<tr>
<td>Income</td>
<td>2</td>
<td>30.58</td>
<td>0.59</td>
<td></td>
<td>.55</td>
</tr>
<tr>
<td>Age</td>
<td>3</td>
<td>138.12</td>
<td>1.79</td>
<td></td>
<td>.15</td>
</tr>
<tr>
<td>Education x income</td>
<td>6</td>
<td>162.46</td>
<td>1.05</td>
<td></td>
<td>.39</td>
</tr>
<tr>
<td>Education x age</td>
<td>7</td>
<td>31.09</td>
<td>0.17</td>
<td></td>
<td>.98</td>
</tr>
<tr>
<td>Income x age</td>
<td>5</td>
<td>99.42</td>
<td>0.77</td>
<td></td>
<td>.75</td>
</tr>
<tr>
<td>Education x income x age</td>
<td>6</td>
<td>254.35</td>
<td>1.69</td>
<td>.13</td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>138</td>
<td>3453.44</td>
<td>25.025</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In examination of the least squares means distribution of mean scores, no variation was shown in the participants' scores. The mean score for all educational levels ranged from 36.7 to 38.4, mean scores for all income groups ranged from 37.2 to 37.7; and the mean scores for all age groups ranged from 36.6 to 38.8. The total possible score for all items on the scale was 10 for the most unfavorable attitude and 50 for the most favorable attitude. According to the least squares means distribution most respondents were similar in their scores for attitude and tended to be in favor of activities or behaviors that would promote efficient household energy management.

The lack of relationship between attitude score and education; income, age, may be due to other factors such as cultural or environmental variables. Attitude may also be influenced by cultural orientation rather than by those variables that were used in testing the hypothesis. Cultural factors have been found to play an important role in shaping attitudes. In a study of adoption of farm practices in Wisconsin, Penderson (1951) reported that Danish farmers had adopted many more improved dairy practices than Polish farmers. Explanations of the differences were that Danish farmers had been accustomed to dairy farming in their own country. They respected intellectual pursuits and freedom of choice for individuals. Polish farmers, on the other hand, had been accustomed to oppressive restrictions and economic deprivation in their home land. They tended to place high premium on security and primary group conformity.
All members of the family were expected to work toward that end. A similar comment can be made in the case of the Nigerian homemaker. Traditionally, a woman is responsible for providing and managing domestic fuel. In times of crisis, the burden is still on her shoulders regardless of whether she is employed outside the home or not. Within each community there is often much interaction between the womenfolk: values are shared as they struggle to solve their day-to-day energy problems. The environmental setting encourages interactions between the poor and the rich, the educated and the illiterate, the young and the old. These daily interactions and transactions may have stronger effects on the attitude of people toward energy issues than would income, age or education.

**Hypothesis 7:** The score for the frequency of use of selected energy conservation techniques differs among levels of education of the homemaker and household income.

In a multiple comparison of mean scores for conserving electricity by levels of education of the respondent and household income, no significant interactions were found ($F = 0.27, d.f. = 5, p = .92$, Table 20). When the effects of the two-way interaction were removed, education had no effect on the way respondents conserved electricity ($F = 2.01, p = .11$) but income had some effect on conservation techniques used ($F = 3.14, d.f. = 2, p = .04$, Table 20). The hypothesis was rejected for relationship with education but not with income. The low income and high income groups were similar in their mean scores for techniques used in conserving electricity.
TABLE 20

Multiple Comparisons of Mean Scores (ANOVA) for Conserving Electricity by Level of Education and Household Income of the Respondents

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>d.f.</th>
<th>Sum of squares</th>
<th>Mean square</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>147</td>
<td>1039.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education x income</td>
<td>5</td>
<td>9.37</td>
<td>0.27</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>3</td>
<td>41.79</td>
<td>2.07</td>
<td>0.11</td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>2</td>
<td>42.26</td>
<td>3.14</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>137</td>
<td>945.76</td>
<td>6.903</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It may be speculated that the reason that low income and high income groups were similar in their mean scores for techniques used in conserving electricity was related to the fact that most high income families hire outside help to assist them in housekeeping chores. These helpers often assume the full responsibility for running the household, especially if the wife is working. Most such helpers are not trained for the role they play. They are often from low income rural families, lacking the education that would enable them to manage a home effectively. The type of conservation techniques used by such participants may be similar to those used by low income families.

On the other hand, the sample for this study was drawn from a university town. Most low income participants in the study were working outside the home. In a community such as this, most of the employed women may be working as helpers, cleaners or matrons in the university community. Their association with the elite or high income families in the industry may influence their conservation techniques which in turn may lead to the similarity in mean scores.
Another explanation for this finding proposed in the study by Newman and Day (1975) is that low income families may fail to conserve energy because they lack the education required for the development of the necessary skills or they don't have adequate knowledge of what to do while the high income family may fail to conserve because it can afford. The ideas of affordability and lack of knowledge may lead to the similarity in the findings.

Hypothesis 8: The score for household energy management problems experienced by respondents differs among levels of household income.

In a one-way analysis of variance of scores for household energy management problems and levels of income, an F-value of 8.15 was obtained with two degrees of freedom, and \( p = .0004 \) (Table 21); therefore the hypothesis was not rejected. Duncan's multiple range test was used to determine which means were significantly different. Low income and high income respondents were again similar in their mean scores for energy management problems (\( \bar{X}_1 = 22.35, \bar{X}_3 = 21.21 \)) but low and middle income families were different (\( \bar{X}_1 = 22.35, \bar{X}_2 = 19.85 \)). The possible scores for energy problems experienced by the women ranged from 12 (for no problem at all) to 30 (for great problem). The respondents in the middle income group were experiencing fewer problems than the other two groups.
TABLE 21

One-Way Analysis of Variance for Scores for Energy Problems Experienced by Household Income

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>Sum of squares</th>
<th>Mean square</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>162</td>
<td>2290.99</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>2</td>
<td>211.81</td>
<td>8.15</td>
<td>.0004</td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>160</td>
<td>2079.17</td>
<td>12.99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 9: The frequency of visits to check for gas is not related to proximity to the nearest gas distributor.

No significant relationship was shown between frequency of visit to check for gas and proximity to the nearest gas distributor \( (X^2 = 8.58, \text{d.f.} = 12, p = 0.73, \text{Table 22}) \). The hypothesis was not rejected. The distance that the participant had to travel to check for gas was not related to the frequency of visits.

TABLE 22

Distribution of Respondents (Gas Users) by Frequency of Visits to Check for Gas and Proximity to the Nearest Gas Distributor

<table>
<thead>
<tr>
<th>Frequency of visits</th>
<th>Proximity to the gas distributor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Over two miles</td>
</tr>
<tr>
<td>Once</td>
<td>1</td>
</tr>
<tr>
<td>Twice</td>
<td>2</td>
</tr>
<tr>
<td>Three times</td>
<td>2</td>
</tr>
<tr>
<td>Several times</td>
<td>1</td>
</tr>
</tbody>
</table>

\( X^2 = 8.58, \text{d.f.} = 12, p = 0.73 \)
Hypothesis 10: There is no relationship between proximity to the nearest gas distributor and the respondent's attitude toward gas shortage.

In a Chi-square distribution, no significant relationship was shown between proximity to the nearest gas distributor and the respondent's attitude toward gas shortages ($X^2 = 25.18$, d.f. = 16, $p = .06$, Table 23). The hypothesis was, therefore, not rejected. The distance that the participant had to travel to check for gas was not related to attitude toward gas shortage.

**TABLE 23**

Distribution of Participants by Proximity to the Nearest Gas Distributor and Attitude toward Gas Shortages

<table>
<thead>
<tr>
<th>Proximity to gas distributor</th>
<th>Great problem</th>
<th>Some problem</th>
<th>Slight problem</th>
<th>No problem at all</th>
<th>Can't tell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 3 miles</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2 to 3 miles</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1 to 2 miles</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>About 1 mile</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Less than 1 mile</td>
<td>4</td>
<td>2</td>
<td>20</td>
<td>12</td>
<td>10</td>
</tr>
</tbody>
</table>

$x^2 = 25.18$, d.f. = 16, $p = .06$

Managerial Strategies Used by Families in Coping with Energy Problems

Planning Household Energy

Plans according to Murdick (1965) are concerned with lines of actions to be taken. In this study plans involved those actions the homemaker or other family members took in order to provide future energy inputs to the household. An hypothesis was stated concerning
the relationship between the management strategies used by households and demographic variables but this could not be tested since in the Chi-square distribution more than 20% of the cells had frequencies of less than 5. It is important, however, to note how families went about obtaining the fuels they used in their households.

Concerning planning future fuel supply, 49 of 100 respondents who used gas reported that they made no plans; 17 ordered and requested that it be delivered to them; while 32 respondents ordered and picked up when the order arrived. The waiting period for delivery on the order ranged from less than one month for 53 respondents to between two and three months for 12 respondents, the average being two months (Table 24). For those who used kerosene, 96 of 169 reported that they often bought in large quantity to last for a certain period; 66 reported they usually bought from the local market when they need some. They also reported that they often queued up for between 1 and 4 hours for kerosene (Table 24).

About 47% of those who used firewood for either roasting, other cooking or drying reported that they often bought from the local market or street seller. The rest either went out to gather by themselves or sent children or servants to do it. It must be mentioned here that there is no fixed way of getting wood for household use. Each family utilizes a variety of ways to make wood available for cooking.
### TABLE 24

**Distribution of Households by Means for Obtaining Cooking Fuels**

<table>
<thead>
<tr>
<th>Means for obtaining gas (N=100)</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No previous planning</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>Order and request to be delivered</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Order and pick up</td>
<td>32</td>
<td>32</td>
</tr>
<tr>
<td>Go to big town to buy</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Waiting period for gas (N=100)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 3 months</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Between 2 and 3 months</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Between 1 and 2 months</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>About 1 month</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Less than 1 month</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time spent queuing for kerosene (N=110)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 4 hours</td>
<td>13</td>
<td>11.8</td>
</tr>
<tr>
<td>About 4 hours</td>
<td>7</td>
<td>6.4</td>
</tr>
<tr>
<td>About 3 hours</td>
<td>15</td>
<td>13.6</td>
</tr>
<tr>
<td>About 2 hours</td>
<td>28</td>
<td>25.5</td>
</tr>
<tr>
<td>About 1 hour</td>
<td>22</td>
<td>20.0</td>
</tr>
<tr>
<td>Less than 1 hour</td>
<td>25</td>
<td>22.7</td>
</tr>
<tr>
<td></td>
<td>110</td>
<td>100.0</td>
</tr>
</tbody>
</table>

**Means for Facilitating Plans for Energy Supply**

Eighty-three respondents reported that they facilitated plans for fuel supply by either going by themselves or sending someone to the store to check (Table 25). Of these, 58 were employed outside the home. The frequency of visit ranged from once for 17 respondents to over three times for 27 respondents.
TABLE 25

Distribution of Respondents by Means for facilitating Plans for Energy Supply

<table>
<thead>
<tr>
<th>Method</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Go or send someone</td>
<td>83</td>
<td>81.4</td>
</tr>
<tr>
<td>Write a note to the salesman</td>
<td>5</td>
<td>4.9</td>
</tr>
<tr>
<td>Wait for delivery or pick up notice</td>
<td>14</td>
<td>13.7</td>
</tr>
<tr>
<td></td>
<td>102</td>
<td>100.0</td>
</tr>
</tbody>
</table>

It was interesting to note that for the majority of the respondents who used gas for cooking, the husband did the checking while in a majority of the households that used kerosene the homemaker checked (Table 26). This may be related to the attitude of the people toward individual fuels. For firewood only the homemaker, children or servant did the gathering.

TABLE 26

Distribution of Respondents by Fuel Type and Who Does the Checking and Queuing

<table>
<thead>
<tr>
<th>Person</th>
<th>Gas (N=116)</th>
<th></th>
<th>Kerosene (N=140)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Homemaker</td>
<td>43</td>
<td>37.1</td>
<td>66</td>
<td>47.1</td>
</tr>
<tr>
<td>Husband</td>
<td>53</td>
<td>45.7</td>
<td>41</td>
<td>29.3</td>
</tr>
<tr>
<td>Maid/servant/children</td>
<td>20</td>
<td>17.2</td>
<td>26</td>
<td>18.6</td>
</tr>
<tr>
<td>Hire/tip someone to do it</td>
<td>--</td>
<td>-----</td>
<td>7</td>
<td>5.0</td>
</tr>
</tbody>
</table>
Coping Strategies Used by Households

The environmental, household and individual resources that enter the family system have some influence upon the different activities requiring the use of resources and the way families cope with the demands. In the case of fuel shortages, power failure or if a family runs out of an energy resource of any sort, a substitute for either lighting, cooking or heating must be sought. Tinker (1980:4) pointed out that "human energy cannot heat water or space, or provide light. Any fuel will be used to meet these requirements since insufficient fuel means eating uncooked food, getting cold or living in the dark."

Nickell, Rice and Tucker (1976:169), in their explanation of the most crucial resources to successful management, pointed out that success in meeting daily problems depends largely on the ability to adapt to changing circumstances. They added that the human environment is not static: conditions and demands change from day to day. Plans must frequently be shifted or given up. The Nigerian household energy situation demands quite a lot of adaptability. The interest in this section is to find out how families attempt to cope with the changing energy situations.

In testing hypothesis one it was noted that families preferred different types of fuels from those they were currently using: only 17 of 190 households were using their preferred fuels. In Table 27, explanations of respondents for use of substitute fuels are presented. Since family members must be fed even during blackouts or fuel shortages, families in the study have devised means for coping with
fuel crises by substituting one type of fuel for others or by using
one type of fuel at one time and another at a different time,
depending on the situation. Gross, Crandall and Knoll (1980:127)
see the use of alternatives as one of a set of strategies, each
capable of fulfilling a common objective in some degree but each
resulting in somewhat different consequences.

| TABLE 27 |
| - Distribution of Households by Time of Use and Substitute Fuel |

<table>
<thead>
<tr>
<th>Time of use</th>
<th>Substitute fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gas</td>
</tr>
<tr>
<td>For baking &amp; emergencies</td>
<td>31</td>
</tr>
<tr>
<td>When there is no electricity</td>
<td>4</td>
</tr>
<tr>
<td>When time is limited, e.g. morning</td>
<td>11</td>
</tr>
<tr>
<td>When out of gas</td>
<td>8</td>
</tr>
<tr>
<td>When there is power supply</td>
<td>9</td>
</tr>
<tr>
<td>During gas shortage</td>
<td>2</td>
</tr>
<tr>
<td>When out of kerosene</td>
<td>1</td>
</tr>
<tr>
<td>During rainy season</td>
<td>5</td>
</tr>
<tr>
<td>When out of wood</td>
<td>14</td>
</tr>
<tr>
<td>When there is time</td>
<td>7</td>
</tr>
<tr>
<td>When long cooking time is required</td>
<td>6</td>
</tr>
<tr>
<td>Whenever it is available</td>
<td>22</td>
</tr>
<tr>
<td>During dry seasons</td>
<td>6</td>
</tr>
<tr>
<td>When roasting is required</td>
<td>5</td>
</tr>
</tbody>
</table>
Substitute energy resource use was also indicated in food preservation methods and this varied with environmental conditions. Twelve participants in the sample reported that they used their oven only for baking; 30 used sun drying whenever it is sunny and food items require drying. Smoking was reported by 11 respondents and they smoke when food requires either smoking or roasting.

**Selected Energy Management Activities**

In examination of a few of the routine household energy-related behaviors, 85 respondents turned off lights before going to bed. The same number turned off lights whenever they were not in use (Table 28). Ninety-four households reported that they ironed daily; only 10 households ironed once a week. Duration of ironing ranged from less than an hour to over three hours. Most of the households ironed for about one hour (Table 28). Their normal behavior if electric power fails during ironing was to wait until power was restored or postpone ironing (Table 28).
### TABLE 28

Frequency Distribution of Respondent by Selected Household Energy Management Behaviors

<table>
<thead>
<tr>
<th>Selected activities</th>
<th>Number (N=193)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Turning off lights</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before going to bed</td>
<td>85</td>
<td>44.0</td>
</tr>
<tr>
<td>When not in use</td>
<td>85</td>
<td>44.0</td>
</tr>
<tr>
<td>Sleep with light on</td>
<td>20</td>
<td>10.4</td>
</tr>
<tr>
<td><strong>Frequency of ironing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once a week</td>
<td>10</td>
<td>5.2</td>
</tr>
<tr>
<td>Twice a week</td>
<td>19</td>
<td>9.8</td>
</tr>
<tr>
<td>Three to four times a week</td>
<td>45</td>
<td>23.3</td>
</tr>
<tr>
<td>Daily</td>
<td>94</td>
<td>48.7</td>
</tr>
<tr>
<td>Don't iron at home</td>
<td>24</td>
<td>12.4</td>
</tr>
<tr>
<td><strong>Length of ironing period</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 3 hours</td>
<td>10</td>
<td>5.2</td>
</tr>
<tr>
<td>Between 2 and 3 hours</td>
<td>19</td>
<td>9.8</td>
</tr>
<tr>
<td>Between 1 and 2 hours</td>
<td>45</td>
<td>23.3</td>
</tr>
<tr>
<td>Less than 1 hour</td>
<td>94</td>
<td>48.7</td>
</tr>
<tr>
<td>Don't iron at home</td>
<td>24</td>
<td>24.4</td>
</tr>
<tr>
<td><strong>If electric power fails during ironing</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait until power is restored</td>
<td>70</td>
<td>33.3</td>
</tr>
<tr>
<td>Change to charcoal iron</td>
<td>42</td>
<td>21.8</td>
</tr>
<tr>
<td>Postpone ironing</td>
<td>49</td>
<td>25.4</td>
</tr>
</tbody>
</table>

**Household Energy Control**

Concerning whether or not home managers had any means for controlling the use of energy resources within the family, 118 participants said they used some sort of control measures. These included storing some fuel for emergencies (N=30); checking an appliance after each use to make sure it was turned off (N=17); and measuring...
the quantity for use each time and using a little at a time (N=25).
Seventy-eight respondents reported no form of regulation.

Firewood-related Problems

The main firewood-related problem, reported by 53 respondents, was the increase in price of regular size bundles (Table 29).
Ashworth (1979) reported that the price of traditional fuels in those places where they are commercially sold has increased sharply. Further there is an increasing expenditure of time and effort by villagers who gather firewood for their own use. Ashworth also reported that the price of firewood in the Sudanese market town of Bara had tripled in ten years while the time to gather firewood for personal use had risen from 15 to 30 minutes per day to 1 to 2 hours.

<table>
<thead>
<tr>
<th>Firewood-related problems</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finding wood to buy</td>
<td>20</td>
</tr>
<tr>
<td>Increase in price of regular-sized bundle</td>
<td>53</td>
</tr>
<tr>
<td>Decrease in size of bundle for regular price</td>
<td>19</td>
</tr>
<tr>
<td>Decrease in size and increase in price</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>129</td>
</tr>
</tbody>
</table>

Perceived Cause of Energy Problems

Families were asked to mention what they felt was the problem with household energy supplies in Nigeria. Fifty-three respondents felt that the problem with firewood was increase in price (Table 29).
The main problems associated with other forms of household energy resources (kerosene, gas and electricity) were irregularity in supply (N=60) and frequent power failure (N=53). Fifteen respondents saw the problem as being that of high cost and eleven felt it was poor distribution (Table 30).

TABLE 30
Distribution of Households by Perceived Source of Their Energy Problems

<table>
<thead>
<tr>
<th>Supply-related problem</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irregularity</td>
<td>60</td>
<td>31.1</td>
</tr>
<tr>
<td>High cost</td>
<td>15</td>
<td>7.8</td>
</tr>
<tr>
<td>Frequent power failure</td>
<td>53</td>
<td>27.5</td>
</tr>
<tr>
<td>Ineffective government program</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>Increased consumption</td>
<td>7</td>
<td>3.6</td>
</tr>
<tr>
<td>Poor distribution</td>
<td>13</td>
<td>6.7</td>
</tr>
<tr>
<td>No information</td>
<td>41</td>
<td>8.8</td>
</tr>
<tr>
<td></td>
<td>193</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Self Assessment and Interest in Educational Program

Respondents were asked to assess their managerial skills and to indicate whether or not they would be interested in any form of educational program dealing with household energy management. Approximately 41% of the women rated their skills as "good"; 11% rated as "very good" and the rest were between "not so good" and "low."

Most of the participants (N=108) expressed interest in educational programs in planning the use of household energy resources; 68 respondents were interested in improving skill in the management of household resources and a few indicated interest in a regular television program on household energy resource management.
CHAPTER V

SUMMARY AND IMPLICATIONS

Information on household energy management behaviors of Nigerian families is needed for the purpose of planning for and effectively managing household energy supplies within the country. This study was designed to 1) determine household energy management behaviors of Nigerian families, 2) examine household and individual energy management behavior, 3) assess and analyze the needs of households in managing limited energy resources and 4) determine strategies used by families to cope with limited energy resources. The independent variables considered in the study were age, level of education of the participants, employment status, household income, housing type and proximity to gas distributor.

The set of interview schedules developed for use in collecting the data were divided into sections relating to:

a) the family's energy management behavior
b) environmental, household and individual variables
c) attitudes of respondents toward selected energy issues
d) household energy management needs
e) coping strategies used by families.

The instrument was pretested with ten Nigerian families residing in Columbus, Ohio, at the time of the study. Scoring for a 10-item Likert-type scale on attitudes was validated by a sample (N=20) of Nigerians and individuals in the School of Home Economics, The Ohio
State University. All items had agreement of 75% of the judges and more. On three items there was 80 to 85% agreement. The Chi-square test was used to analyze the bivariate frequency distribution to determine relationships between energy management behaviors and socio-demographic variables (hypotheses 1 through 5, 9 and 10). Log-linear analysis was also employed to determine the direction and strength of the relationship (if any). Analysis of variance was used to determine if significant differences existed between means for attitude score, means for problem score, mean scores for energy conservation techniques used and selected individual and household variables (age, level of education of the homemaker, household income and employment status) (hypotheses 6 through 8). Duncan's multiple range test was also computed to determine the differences and similarities in mean scores among groups of participants in attitudes toward selected energy issues, in energy conservation techniques used, in energy management problems reported and selected variables.

A relatively small proportion of Nigerian households in the sample used a preferred fuel. The confidence interval fell between .0489 and .1309 and was not significant at the p < .05 level. Thus the family's current fuel was independent of preferred fuel.

Respondents who had a fuel preference indicated the characteristics of preferred fuels. They said they preferred a fuel that is neat, clean, easy to obtain, easy to use and that facilitates cooking. They disliked fuels that are messy, dirty, time consuming, have offensive odor and/or are complicated to use.
The fuel a respondent preferred did not depend on household income \( (x^2 = 7.72, \text{ d.f.} = 3, p = .25, \text{ Table 9}) \), but a significant difference was shown between fuel preference and level of education of the respondent \( (p = .0008) \). More respondents than expected who had 8 years of education or less preferred firewood for cooking than those in the higher levels of education \( (\Lambda = 2.255) \). Also more university graduates than expected preferred gas for cooking than those in the lower levels of education \( (\Lambda = 2.045) \). Participants with a secondary education preferred kerosene for cooking \( (\Lambda = 2.006) \).

The relationship between employment status and fuel disliked was not significant at \( p \leq .05 \). Housing type was significantly related to fuel disliked. Fewer respondents than expected who lived in flats or apartments disliked kerosene than those who lived in thatched-roof houses \( (\Lambda = -3.097 \text{ and } 2.024, \text{ respectively}) \).

Employment status was significantly related to energy management problems reported by the participant. Respondents who were employed outside the home reported experiencing more problems with household energy shortages and failures than other groups of respondents \( (\Lambda = 2.564 \text{ and } -2.564, \text{ respectively}) \). Those not employed and the self-employed participants tended more often to report problems with high cost and not being sure of what to do in times of shortages.

Respondent's level of education, age or household income were not significantly related to score for attitude toward selected energy issues. Respondents tended to indicate favorable attitudes toward energy issues. Household income was related to the technique
used by homemakers in conserving electricity in their homes. Respondents in the middle income group engaged in more energy-conserving behaviors than those in the high and low income groups.

Women, children and servants were generally responsible for gathering wood for household use, but in 47% of the households the home manager did the gathering. For households that used gas for cooking, almost one-half planned for it in advance. Waiting periods of as long as two months on the average were reported. Families often facilitated their plans by actively checking on status of the gas order. In most of the households where gas was used, the husband did the checking. The checking could be repeated up to three times. Families that used kerosene often queued up to buy their supplies; less than one-half reported that they often bought and stored kerosene for household use.

The general problems with household energy supplies were:

a) shortages and failures in supplies of gas and electricity; b) scarcity of kerosene; and c) a decrease in size of bundle for regular price for firewood. Some of the coping strategies used by families in managing energy resources included using alternative fuel sources, i.e., substituting one type of fuel for another; controlling the use within the household either by reducing the quantity used, advising children not to waste, measuring quantity for each use or using a little at a time.

Over one-half of the participants (52%) assessed their managerial skill as either good (41%) or very good (11%). The rest rated themselves between low and not so good. Concerning interest in
educational programs, 108 of 193 participants expressed interest in programs dealing with planning the use of household resources and 68 expressed interest in improving skill in the area of household resource management. A few suggested a regular television program dealing with household resource management problems.

**Implications**

The following are implications which may be drawn from this study:

1) The pattern of household energy consumption in Nigerian urban towns, even among the low income households, is toward commercial fuels. Thus if the energy supply condition improves more households will be using commercial fuels.

2) As more women gain access to education and employment outside the home, more households will likely shift from using firewood and kerosene for cooking and home lighting to using gas and electricity if available.

3) Nigerian urban residents need a more dependable supply or more efficient distribution system of commercial energy resources in order to be able to plan and make decisions concerning fuel usage and to eliminate the time spent for searching, checking or gathering fuel for household use.

4) Nigerian Electric Power Authority should look into the possibility of improving the supply or distribution system for electric power to residential customers to help eliminate the problems arising from power failures.

5) Residential power customers should be informed about when peaks and slack periods in demand are likely to occur and how this knowledge can be used to help eliminate power failures. Further utility companies should provide households with information on their roles in improving service.

6) The problems home managers have to go through in an attempt to buy a bottle of gas for cooking—having to wait two months and over and frequent visits to check availability—results in an overall economic waste that is associated with securing cooking gas.
7) The government should consider possibilities for helping to improve the fuel wood supply for households. Programs encouraging the planting of trees and wood lot management along with research on fast growing trees could eventually help reduce the time women spend in gathering wood and assure continuing supplies.

8) Household energy management education (both formal and informal) should be included in elementary, secondary and adult education curricula in Nigeria to help develop and promote efficient use of energy resources available to households.

9) A woman is the major provider of subsistence needs in Nigerian homes. If most of her time is spent gathering wood, checking for gas or lining up for kerosene, other nutrition and family care activities are likely to suffer. This in turn is likely to affect the health and productivity of her family members and the economy of Nigeria.

Recommendations for Further Research

In this preliminary study, information collected covered a broad range of energy managerial behaviors in Nigerian households in an attempt to gain knowledge about energy practices in households. To further develop and strengthen the knowledge base in this area, recommendations are made as follows:

1) Study should focus on one or a few aspects of household energy management at a time and explore the subject in depth such as:
   a) household energy expenditure survey
   b) electricity or gas prices in different states and effect on levels of uses of different fuels
   c) data on household energy resource consumption—kinds and quantities used
   d) time spent in acquiring household fuels.

2) Refine data collection instruments to improve statistical analysis.
   a) Shorten the instrument to maintain the interviewee's attention.
b) Refine the scale on attitude toward energy and add more items relevant to the culture.

3) Increase the sample size and extend the scope of the sample to include more lower and upper income categories.

4) Collect data on housing structure and actual quantity of alternative fuel usage.

5) Investigate the effect of scarce energy resources on the social and economic lives of the people.

6) Investigate:

   a) energy information resources within the environment, including government programs at local, state and/or federal levels which may help families, and

   b) methods of getting families involved in using the information resources available.


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APPENDIX

Below is a list of statements which require responses. Please read the statements carefully and circle or check the answer you believe to be right for you. (There is no right or wrong answer.)

1. For each part of this question, please circle

GP— if you have a great problem with the item
SP— if you have some problem with the item
S1P— if you have a slight problem with the item
NP— if you have no problem at all with the item
CT— if you can’t tell if you have a problem with the item

Has any of the following items been a problem for you in the last three months?

a) Petrol shortage for driving

b) Gas shortage for cooking

c) Electricity failure for home lighting, cooling and refrigeration

d) Kerosene shortage for home lighting

e) Kerosene shortage for cooking

f) Firewood shortage for cooking, roasting or drying food

90
2. Below is a list of items of selected household equipment. Please check (✓) those that you have in your household.

   1) Freezer
   2) Refrigerator
   3) Electric fan
   4) Air conditioner
   5) Electric vacuum cleaner or carpet sweeper
   6) Electric iron
   7) Electric washing machine (for clothes)
   8) Electric clothes dryer
   9) Electric stove
  10) Electric cooker
  11) Electric dishwasher
  12) Charcoal iron
  13) Automobile
  14) Motor cycle

3. Which of the following fuels do you use for cooking? (Please check (✓) one.)

   1) Firewood only
   2) Kerosene only
   3) Bottled gas only
   4) Electricity only
   5) Kerosene and bottled gas
   6) Kerosene and wood
   7) Kerosene and electricity
   8) Bottled gas and electricity
   9) Bottled gas and firewood
  10) Electricity and firewood
  11) Other (please name)

4. If you are using two different types of cooking fuels, when do you use the first one?

   ____________________________________ and when do you use the second?

   (please state)

5. If you had to choose,
   a) Which one of the above fuels would you prefer for cooking?

   ____________________________

   (please name)

   b) What are the reasons for your choice?

   ____________________________

   c) Which one would you not use at all for cooking if you had a choice?

   ____________________________

   (please name)

   d) What are your reasons?

   ____________________________

   (please state)
6. Which one of the fuels listed below do you use most for home lighting?

1) electricity  
2) gas  
3) kerosene  
4) electricity and kerosene  
5) electricity and gas  
6) Other (please name)

7. If you had to choose, which of the above fuels would you prefer for home lighting?

______________________________ (please name)

b. What is your reason? ________________________________________

8. If you had a choice, which one of the fuels listed below would you not use at all for lighting?

1) electricity  
2) gas  
3) kerosene

b) What is your reason? ________________________________________ (please state)

9. For each of the statements that follow, please circle under:
   SA— if you strongly agree with the statement
   A — if you agree
   NO— if you have no opinion
   D — if you disagree with the statement
   SD— if you strongly disagree with the statement

a) Individual household energy consumption does not affect an energy situation.
   SA    A    NO    D    SD

b) Every citizen should be well informed about economical use of household fuels.
   SA    A    NO    D    SD

c) It is often difficult for me to sleep during dry season without fan on.
   SA    A    NO    D    SD

d) My family would like to reduce energy use if only we know how to do it.
   SA    A    NO    D    SD
e) Those who can afford to buy fuel at any cost do not have to economize their uses.
SA A NO D SD

f) If every family voluntarily cuts wasteful uses of energy it would help stretch our energy resources.
SA A NO D SD

g) The government should develop an energy policy that will assure a steady supply of fuel for household use.
SA A NO D SD

h) Government programs should be developed to help individuals and households understand how to use energy resources efficiently.
SA A NO D SD

i) I can always change my lifestyle if energy supplies become a problem
SA A NO D SD

j) There is no way my family can reduce its present energy use without making unhappy changes in the way we live.
SA A NO D SD

10. When do you usually turn off lights at night?
   ______ 1) Before going to bed
   ______ 2) Whenever nobody is using it
   ______ 3) I like sleeping with light on

11. How often do you do ironing?
   ______ 1) Once a week
   ______ 2) Two times a week
   ______ 3) Three to four times
   ______ 4) Everyday
   ______ 5) Don't iron at home
12. How long do you usually iron.

   1) About three hours
   2) Between two and three hours
   3) Between one and two hours
   4) About one hour
   5) Less than one hour
   6) Don't iron at home

13. What type of iron do you use most of the time?

   1) Electric iron
   2) Charcoal
   3) Other ________________________________

14. If you use electric iron, what do you do if the electricity goes off while you are ironing?

   ________________________________

   (please state)

b) Which of these cleaning equipment do you use most of the time?

   1) Broom
   2) Electric vacuum cleaner
   3) Carpet sweeper
   4) Broom and electric vacuum cleaner
   5) Broom and electric sweeper
   6) Other ________________________________

15. Which of these food preservation methods do you often use?

   1) Oven drying
   2) Sun drying
   3) Smoking
   4) Refrigeration
   5) Freezing
   6) If combination, please name

16. If you are using more than one method of food preservation,

   a) when do you use the first one? ________________________________

   b) when do you use the second? ________________________________

   c) when do you use the third, if any? ________________________________
17. What modes of transportation does your household use?

1) walk  
2) ride a bicycle  
3) ride a bus  
4) train  
5) ride a taxi  
6) drive your own car

18. For this question, please circle
N— if your answer is never
S— if your answer is sometimes
O— if your answer is often
A— if your answer is always

During dry season, how often do you:

a) keep the air conditioner on?

N S O A

b) keep windows open to cool the house?

N S O A

c) use floor or table fan?

N S O A

d) close all windows and doors when air conditioner is on?

N S O A

e) when cooking, do you often cook enough for several meals at the same time?

N S O A

f) When you take food items out of the refrigerator or freezer, do you often have time to thaw it completely before cooking?

N S O A

19. Complete the following statements based on what you have been doing in relation to your household energy use.

a) If electricity goes off at night before bedtime I _______
b) If I cannot obtain gas for cooking, I ________

c) Whenever there is no kerosene to buy for cooking, I ________

d) The main problem I have in managing household energy is ________

e) The problem with household energy supply in Nigeria is ________

20. How do you get cooking gas for your household?

1) don't use gas for cooking
2) buy from the store whenever you want to
3) order and request that it be delivered to your household
4) order it in advance and pick up
5) Other ____________

(please state)

21. If you have to order cooking gas in advance, how long do you have to wait to get it?

1) don't use gas
2) more than three months
3) between two and three months
4) between one and two months
5) one month
6) less than a month

22. In order to be sure you get the cooking gas you need, do you ....

1) don't use gas
2) have to go or send someone to the store frequently to find out if it is there?
3) write a letter to the manager to let him know the importance of the product to your household?
4) wait for delivery or notice to pick up?
5) Other ________________________

(please state)
23. If your answer to question 22 is 2, how often do you visit the distributor on the average before you can buy a bottle of cooking gas?

___1) once  
___2) about two times  
___3) about three times  
___4) about four times  
___5) Other ________________________________  
    (please state)

24. How far do you live from your nearest gas distributor?

___1) over three miles  
___2) three miles  
___3) two miles  
___4) one mile  
___5) less than a mile

25. If you have to make a few brief visits to the gas distributor's office to explain the seriousness of your need for cooking gas, who in your family often does this?

___1) the homemaker (wife)  
___2) the husband  
___3) a child, servant or maid  
___4) Other ________________________________  
    (please state)

26. How do you usually obtain kerosene for either cooking or home lighting?

___1) don't use kerosene  
___2) buy from the local market  
___3) buy from local kerosene station  
___4) request the seller to deliver some for you at home  
___5) Other ________________________________  
    (please state)

27. Have you ever been in a situation where you have to queue up (be in a line) for kerosene?

___1) Yes  
___2) No

28. If your answer is yes, what was the longest time you or a member of your family waited in a line for kerosene?

___1) over five hours  
___2) about four hours  
___3) about three hours  
___4) about two hours  
___5) one hour  
___6) less than an hour
29. If you have to be in a line for kerosene, who does the actual waiting?

  1) I don't use kerosene
  2) I usually do it myself
  3) I usually ask my child to do it for me
  4) My servant or maid does it
  5) I usually tip or pay someone to do it for me

30. If you need to use firewood for cooking, drying or roasting of food items, how do you obtain it?

  1) don't use firewood
  2) go out and gather some myself
  3) ask my servant/maid to gather some
  4) have my child to gather some
  5) buy from the local market or from street seller
  6) Other ________________________________ (please mention)

31. Which of the following areas have you experienced problem with in the last three months?

  1) don't use firewood
  2) finding firewood to buy
  3) increase in price of regular size bundle
  4) decrease in size of bundle for regular price
  5) decrease in size of bundle and increase in price
  6) Other ________________________________ (please state)

32. What are the ways you control the supply and use of fuel in your household?

  __________________________________________

33. How would you assess your household resource management skill?

  1) Low
  2) Not as good as I would like it to be
  3) Good
  4) Very good
34. Would you like to participate in any of the following programs dealing with household resource management? Please check all that interest you.

____ 1) planning the use of household resources
____ 2) decision making skills
____ 3) skill in organizing household work
____ 4) management skill
____ 5) skill in supervision of household work
____ 6) none
____ 7) Are there topics not listed that you would like to participate in?

________________________________________________
(please mention)

In order to group the information you have given us with that obtained from other people who are in situations similar to yours, we need the following information about you:

35. Years of school completed

____ 1) 0-8 years
____ 2) partial secondary school
____ 3) secondary school completed
____ 4) 1-2 years of college
____ 5) 3 years of college
____ 6) University degree
____ 7) Other_________________________________

(please state)

36. Household income category

____ 1) Below N3552
____ 2) N3553 to N6734
____ 3) N6735 to N9024
____ 4) N9025 to N12,620
____ 5) Above N12,620

37. Employment status

____ 1) employed outside the home
____ 2) self-employed
____ 3) not employed

38. Age category

____ 1) 18 - 30 years
____ 2) 31 - 40 years
____ 3) 41 - 50 years
____ 4) 51 - 60 years
____ 5) 61 and above
39. What type of housing unit is this?

____ 1) single family house
____ 2) flat/apartment
____ 3) thatched roof house
____ 4) Other __________________________
(please state)

Thank you very much!