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ABSTRACT

Research was undertaken to determine how differences in social status among various segments of the population in Mississippi contribute to differences in household energy costs and how socioeconomic differences coupled with social status have impact on energy consumption behavior. Two samples of the state's population were used for comparative analysis. One sample of female and elderly headed households was compared with a sample that represented the larger population of Mississippi which was stratified to be representative of the population on race, income, rural, and urban residency. Personal survey interviews were conducted with the heads of households. The questionnaire covered 11 major items concerning how the energy shortage had impact on families in general. Analyses showed that impacts of energy costs are comparable for families in different socioeconomic strata. Findings included the following: households in Mississippi, regardless of their social status or socioeconomic conditions, have adjusted their energy consumption and expenditures in accordance to what they can afford rather than in accordance with any specific energy policies or in response to any specific energy conservation programs; the type and quality of housing consistently appeared as a major factor that affects energy costs for families in both samples. National policies are needed that would require energy efficiency standards for housing. Another finding that lends itself to public policy implications is the increased energy efficiency resulting from the numbers and kinds of energy using features in households. Only a small percentage of each sample had used conservation measures (e.g., turned off lights, closed off unused rooms). Appendices include the survey questionnaire and tables of needed sample respondents. (RM)

Social Status and the Differential Impacts of Energy Costs on Families in Mississippi

FINAL REPORT

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Washington, D.C.

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A Research Report

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with

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Prepared for the U.S. Department of Energy - Office of Minority Economic Impact, Washington, D.C.

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Foreword

This report is the result of two years' work from a gigantic research effort by the authors and numerous others throughout the state of Mississippi — too many to begin to list their names here. The term "restrictive energy economy," is a term that was coined by the authors to sufficiently describe the situation that the majority of Mississippians and most of the American population face under the continuing increases in energy costs and the dwindling supply of nonrenewable energy resources.

The U.S. Department of Energy's Office of Minority Economic Impacts was one agency in the federal government that recognized the seriousness of this matter and made an attempt to address the situation. Thus, the financial support from this agency through two research grants enabled us to pursue this effort. It is unfortunate that the present administration initially proposed to discontinue this department which is needed more at the present than it was in the past.

More importantly, this effort has provided a vehicle by which the desparation of the most economically depressed segment of the nation's population — families in Mississippi — can be shared with the rest of the nation. Mississippi's population has undoubtedly been more adversely affected by the spiralling increases in energy cost than any other state in the nation. The reasons are obvious: (1) Mississippians have the lowest per capita income in the nation; (2) household energy costs for Mississippians are among the highest in the nation; and (3) state taxes on energy products in Mississippi are among the highest in the nation. Thus, in a state where capital accumulation is limited by its low economic status, the increasing costs of energy have compounded the problem of capital accumulation and capital goods development. This means that the restrictive energy economy has a devastating effect on the state in that its disparity with the rest of the nation will rapidly increase rather than gradually decrease.

This report, in addition to analyzing the various impacts of the restrictive energy economy on families in the state, also documents the reasons Mississippi is headed for an economic collapse unless serious measures are taken with expediency. A cross-section of the state's families were examined in this study. Hence, the analyses show that the impacts are comparable for families in different socioeconomic strata without significant disparity on relative measures. This finding is most significant. While it suggests that the affluent and the poor are experiencing equal relative impacts, the fact that this is the case does not indicate that this is an equalitarian situation which is good for the state and nation.

Marvel Lang
James C. Smith

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Chapter 1

Introduction and Sampling Design

Little has been written about the effects of intrinsic socioeconomic, demographic and housing characteristics of various segments of the American population or their energy consumption behavior. In fact, with the exception of verification of the fact low income groups spent a larger proportion of their disposable incomes on household energy costs in the past few years, very little else has been verified about socioeconomic differences in the impacts on increasing energy costs on different segments of the population. In view of this, it is still uncertain whether the differential impacts of increasing energy costs are the results of differences in social status, or whether these increases are in fact the causes of the widening gap in socioeconomic status.

The aim of this research was to address these issues for the population of Mississippi. Specifically, this research was undertaken in order to begin to understand how differences in social status among various segments of the population contribute to differences in household energy costs; and how socioeconomic differences coupled with social status impact on energy consumption behavior. In order to accomplish this aim, two samples of the state's population were used for comparative analytical purposes. One sample consisted entirely of female headed and elderly person headed households; the other sample was drawn from the larger general population. The second sample was stratified to be representative of the population on race, income, rural and urban residency.

The Research Problem

The specific problem of this research was to assess the differential impacts of increasing energy costs on families in Mississippi; and to assess the impacts on family household energy costs that are the effects of social status and socioeconomic conditions. In order to do this, it was decided to compare a sample of female and elderly headed households to a sample that represented the larger population of Mississippi. The female and elderly headed households represent the segment of the population that constitutes the lowest social status; perhaps with the exception of specific minorities such as blacks. Therefore, it was assumed that a comparative assessment of this segment of the population with the general population of the state on their circumstances in the restrictive energy economy would exemplify the differential impacts that have been effected on both populations as the results of this economy.

Thus, in collecting data on the two population samples and in the analyses of those data, answers were sought to the following research questions:

1. How do energy costs for female and elderly households differ from those of the larger general population in terms of the proportions of disposable incomes spent on household energy and the absolute amounts spent on household energy consumption?

2. What particular aspects and characteristic features of female and elderly households significantly impact their energy costs compared to those aspects and characteristics that significantly impact energy costs for the larger population?

3. How has participation in energy conservation and weatherization programs invariably affected the energy costs and energy consumption situation of the female and elderly population compared to the larger population?

The ultimate general objective was to determine if socioeconomic, demographic, housing characteristics, social status and differences in energy consumption characteristics were the reasons for differences in energy costs both between and within the two populations. Also, the objective was to determine how these factors differentially impacted energy costs within the two populations. In addition it was sought to determine if conservation actions by the two populations impacted their energy costs differently; and which specific conservations were most effective in impacting energy costs.

The Sample Designs and Data Collection

The main source of data for this study was through personal survey interviews conducted with respondents. As mentioned above, this study compared two population samples drawn from eight counties in Mississippi — Hinds, Leake, Bolivar, Lauderdale, Marshall, Desoto, Pike and Stone. The two population samples were selected to represent: (1) the female and elderly headed households (referred to as the female and elderly sample) in these counties; and (2) the general population in these counties (referred to as the total population sample). The eight counties were selected because they were found to be most representative of the state's population. Thus, they were both the most typical and atypical of the state's population in several aspects. For example, several counties were chosen that had larger proportions of their population that were urban than is typical for the state. Likewise, several counties were chosen whose populations were more rural than is typical for the state. The specific characteristics of the counties' general population are shown in Table 1.1 later in this chapter.

The field work for data collection started around the end of February, 1981, and lasted until May, 1982. In undertaking this phase of the project several steps were taken:

(1) Key persons in each of the eight counties were contacted to select interviewers in their counties.

(2) Training sessions were held subsequently in each county to familiarize the interviewers with the questionnaire and sampling design to select the sample elements.

(3) Bi-weekly meetings were held with the team of interviewers in each county to alleviate problems encountered in the process of data collection.

(4) Two advanced graduate students were hired as data collection monitors who visited the various counties as and when required.

(5) A total of 40 interviewers were hired to conduct personal interviews, out of which 17 belonged to the minority group to interview the black respondents.

Each interview team was given maps of the area where they would be interviewing. In general, interviewers encountered some problems with the respondents especially those who were poorly educated and/or belonged to low income groups. Some respondents expressed that the questionnaire was an invasion of privacy or that it was too time consuming. Some respondents indicated extreme apathy about the energy shortage while others were apprehensive about a stranger entering their home. Interviewers found that some of the respondents were unable to accurately estimate the amount of expenditure on energy, the number of miles driven, and the amount of money spent on gasoline.

The sampling element for personal interview was the head of the family, either male of female. The family was defined as consisting of two or more related individuals living together with at least one of them 18 years of age or older.

The Survey Questionnaire

The survey questionnaire was the main source of data collection from the heads of the families. The survey questionnaire (a copy of the questionnaire is included in the Appendix-A section of the report) was designed to explore a wide variety of topics. The questions covered the following areas of information: (1) demographic and climatological information of the study area, (2) personal background of the respondent, (3) dwelling unit features; type, size, heating method, age, etc., (4) average monthly expenditure on energy in 1976 and 1980 — electricity, gas and gasoline, (5) appliances and energy using equipments in the house, (6) behavioral responses to energy conservation,

(7) awareness and participation in weatherization programs, (8) impacts of energy shortage on: (a) educational plans (b) employment (c) health (d) leisure activities and (e) social relations, (9) levels of belief in energy crisis, (10) attitude toward energy conservation, and (11) information on personal transportation and automobile use. The questionnaire consisted of eleven major items with a total of one hundred and fourteen questions, though lengthy, was designed to be comprehensive enough to give a fairly good idea of how the energy shortage impacted on families in general.

Sampling Designs

The major objective of the research project was to compare restrictive energy economy impacts of female and elderly households with the general population. In order to achieve the aims of this research the sampling design included a variety of sampling techniques like cluster, quota, stratified, systematic, and simple random sample as deemed appropriate at different stages. In general the sample size for each county and the subsamples within the counties were determined by quota sampling techniques; the details of which are elaborated in the following sections:

(1) The Study Areas: As a preliminary phase eight counties within the State of Mississippi were determined by cluster sample method on the basis of demographic, geographical, and environmental considerations. Eight counties — Desoto and Marshall in the North; Pike and Stone in the South; Bolivar in the Delta; and Hinds, Leake and Lauderdale in the central west, middle, and east respectively — were selected with due consideration to their general representativeness of the State's distribution of racial composition, rural-urban ratios, and percentages of families below poverty level. Additional consideration was given to the climatic factor which varies considerably among these eight counties. The specific characteristics of the counties are shown in

Table 1.1 and their relative locations in the state are shown in Figure 1.1. The research team decided upon eight counties so as to get approximately 10 percent of the total 82 counties within the state. Thus, the first phase of sampling procedure involved stratified and cluster sampling methods. Each of the counties have some special geographic or other characteristic that makes it add a unique dimension for the sampled areas. For example, Bolivar County is located in one of the most distinct geographic subregions of the State, the Yazoo Basin, or the Mississippi Delta as it is known culturally. This area is characterized by its low-lying and sparsely settled rural areas based on an extensive agriculture economy. Also this area is characterized by the extreme disparity in per capita incomes between the affluent landowners and the impoverished tenant farmers and small landholders.

Hinds County was chosen because within it is located the State's capital city — Jackson — and the largest concentration of population within the state. Thus, Hinds County was chosen because it is the state's most urbanized county. Although the county is a metropolitan county, it has a sizeable rural population constituent. The per capita income in Hinds County is higher than the state's average and generally families in Hinds County are better off economically than in the remainder of the state. This makes the selection of Hinds County important for comparing the impacts of the restrictive energy economy with other areas of the state.

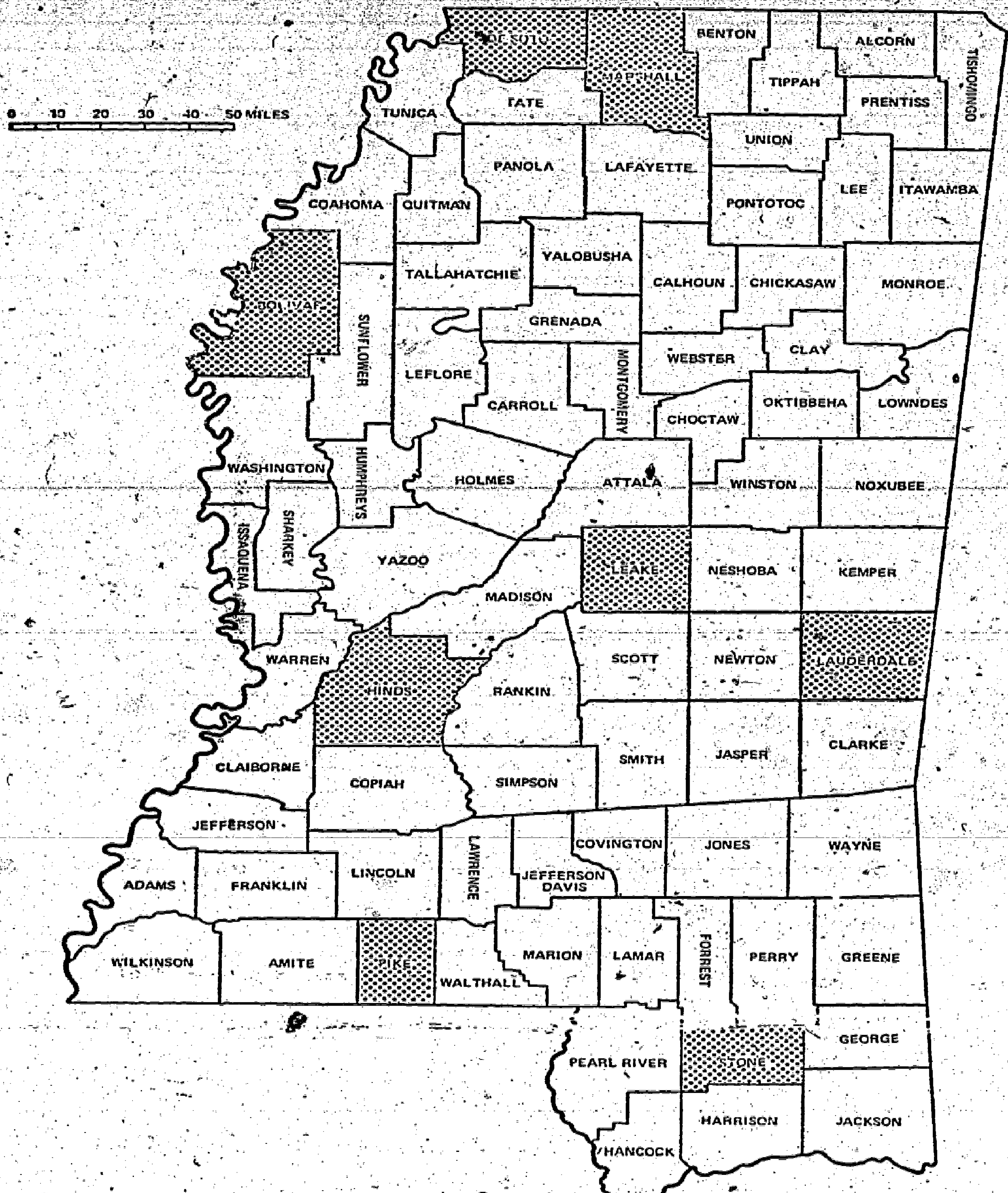
Two counties, Leake and Stone, were selected because they are almost totally rural and have substantively lower levels of economy by all indicators than the other counties included in the study sample. Both Leake County and Stone County are among the least populated areas of the state. The counties were also considered because they have similar characteristics but are located in different areas; Leake is in the central area of the state while Stone is in the southeast portion. Thus, the geographic contrast is important for the

Table 1.1: Characteristics of study Areas (Counties)[1]

County	Total Population (1970)	% Non-white	% Urban	Families Below Poverty Level (1969)
Desoto	50,500	35.3	24.9	23.3
Lauderdale	67,087	31.2	67.2	22.7
Leake	17,085	38.8	17.7	38.7
Marshall	24,027	62.1	23.8	43.9
Pike	31,756	43.6	37.71	30.8
Stone	81,101	23.2	37.0	23.4
Hinds	214,973	39.3	83.9	19.1
Bolivar	49,409	62.1	42.6	44.3

[1]Source: Mississippi Research and Development Center, Handbook of Selected Data for Mississippi; (Jackson, MS.: 1978).

Figure I-1: The Selected Study Areas (Counties)



impacts of the restrictive energy economy.

Lauderdale County was chosen because it contains the state's second largest single urban area, the City of Meridian. Lauderdale County, like Hinds County, has a sizeable rural population although it is considered an urbanized county. Likewise, it has a higher level economy as a result of its urbanization. Lauderdaly County is located in the east central portion of the state. Here again, its geographical location offers another perspective for comparison purposes with the other counties included in the sample.

Two other counties in the study — Marshall and DeSoto — were chosen also because of their locations within the state and because of their unique characteristics. These adjacent counties are located in the northwest corner of the state and have distinct contrasting characteristics in social and economic conditions. Desoto County is a metropolitan county as a suburban area of the Memphis, Tennessee Standard Metropolitan Statistical Area. Thus, Desoto County has a viable economic level. Marshall County on the other hand is mainly rural with a lower level economy and a high proportion of non-white population. In fact, Marshall and Bolivar counties have higher percentages of non-white population than any of the other counties in the study. The state's total proportion of non-white is approximately 39 percent, whereas both these counties have approximately 62 percent of their total population as non-whites.

The final county included in the study was Pike which is located in the southwest portion of the state. Pike County contains one of the state's sizeable urban centers — McComb — especially in this area of the state. Still, the county is mainly rural with approximately 63 percent of its population being classified as rural.

The major criterion for selecting the areas of study was to select a representative geographic cross-section of the state. Thus, counties were selected from different areas of the state with characteristics both typical and atypical of the state's norm. Hence, these counties could provide the necessary contrasts for comparing urban respondents with rural, black with whites and lower income respondents with higher income respondents.

(2) Target Populations: The size of the target population from each county was based upon its proportional representations in the state's population for both samples — the female and elderly households and the state total population stratified by race, income levels and rural or urban residency. A detailed distribution of each county's representation in the total population sample is shown in Table 1.2 and for the female and elderly headed households in Table 1.3. It should be noted also that female and elderly households are included in the general population sample since they constitute a large proportion of the general population of Mississippi. However, the female and elderly household sample consists exclusively of female and elderly headed households. The total population sample was calculated to include 1,295 respondents and the female and elderly sample includes 1,156. The female and elderly sample is statistically larger than would be required for reliability. However, the sample is this size to insure reliability since this group initially had a larger number of missing responses on several key questions. A larger sample was taken in order to maintain reliability and validity.

Table 1.2: Proportional Sample Sizes for Total Population Sample By County, Race and Residency

County	Total Respondents	Percent of Total Sample	Total Blacks (Non-Whites)	Total Whites	Total Urban	Total Rural
Bolivar	120	9.3	71(59.2)[a]	49(40.8)[a]	57	63
Desoto	100	7.7	47(47.0)	53(53.0	20	80
Hinds	691	53.4	304(43.9)	387(56.1)	576	115
Lauderdale	141	10.9	58(41.1)	83(58.9)	86	55
Leake	20	1.5	7(35.0)	13(65.0)	7	13
Marshall	100	7.7	68(68.0)	52(32.0)	24	76
Pike	95	7.3	46(48.4)	49(51.6)	38	57
Stone	28	2.2	6(21.4)	22(78.6)	11	17
Totals	1,295	100.0	607(46.9)	688(53.1)	819	476

[a]Numbers in parentheses represent racial percentage of county totals.

Table 1.3: Proportional Sample Sizes for Female and Elderly Households Sample By County and Race

County	Total Respondents	Percent of Total Sample	Total Blacks (Non-Whites)	Total Whites
Bolivar	162	14.0	131(80.8)[a]	31(19.2)[a]
Desoto	85	7.4	43(50.6)	42(49.4)
Hinds	473	40.9	304(64.3)	169(35.7)
Lauderdale	166	14.4	84(50.6)	82(49.4)
Leake	56	4.8	26(46.4)	30(53.6)
Marshall	79	6.8	52(65.8)	27(34.2)
Pike	118	10.2	40(33.9)	78(66.1)
Stone	17	1.5	6(35.3	11(64.7)
Totals	1,156	100.o	686(59.3)	470(40.7)

[a]Numbers in parentheses represent racial percentage of county totals.

Chapter 2

The Conceptual Framework: Literature Review

The specific objectives of this study as stated in the introduction are to assess the impacts of the increasing costs of energy on female-headed and elderly persons' households in Mississippi and to compare these impacts to those of the larger population in the state. The research is also aimed at deriving some implications for alternative public policies relative to the regulation of energy costs and the provision of energy resources to the general population. This literature review will establish a conceptual framework to guide the analysis of data from which policy implications will be drawn.

The Public Policy Dilemma

The energy crisis and the ensuing restrictive energy economy have prompted some scholars of public policy analysis to adopt the position that it may not be the scarcity or abundance of energy resources that will ultimately determine our future insofar as energy matters are concerned. Rather, it may well be the appropriateness or inappropriateness of the energy related public policies that are adopted that will determine whether or not our society will continue to thrive. If these policies are to be adequate they must address a broader area or arena of public concerns that has been the case heretofore. For example, such issues as environmental concerns, social justice and equity, the conservation of scarce resources, and protection from technological catastrophe must be considered vital to any appropriate policies dealing with the resolution of the energy problem. One author has summarized this dilemma rather concisely:

"The record is clear that Western society...has lived the dream that progress and consumption are synonymous and from it evolves the elimination of scarcity. It seems for the moment...that time has caught up with the dream, and its exposure brings us squarely to the issue of our economic values and our affluent way of life."[1]

Heretofore, most of our energy policies have been based on the technological necessities of increasing energy production, or what has been termed "technological fixes" with few requirements for lifestyle changes. However, the technological fixes have resulted in further scarcity and higher costs for energy and other goods although they have provided limited growth in available energy supply.[2]

In the energy policy arena, the rules have been mainly determined by corporate decisions that have attempted to reflect the projected responses of the marketplace. The government's role has been limited almost entirely to the management of publicly-owned energy resources, limited regulations of utilities, price control on certain energy forms, and the provisions of incentives for increased production through tax policies. It is not difficult to see that the public has been the loser in this arena, and that the poor, the elderly, households on fixed incomes, and other socially and economically disadvantaged segments of the population have been the most severely impacted by this unplanned policymaking schematic. Specifically, cadillac drivers benefit far more from price controls on oil and gasoline than do bus riders while producers of oil and gas are going to continue to reap exorbitant

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[1]Walter F. Scheffer, "Energy, Public Policy, and Administration", in Walter F. Scheffer, (ed.), Energy Impacts on Public Policy and Administration, (Norman, Oklahoma: University of Oklahoma Press, 1976) p. 5.

[2]Don Kash, "Energy in the 1970's--The Problem of Abundance to Scarcity", in Walter F. Scheffer (ed.), Energy Impacts on Public Policy and Administration, Ibid. p. 27.

benefits whether or not import quotas are imposed or price controls are imposed.[3]

The questions of social justice and equity in the adoption and implementation of energy policies will continue to pose severe problems for policymakers. On the other hand there have been attempts to alleviate the burdens of high energy costs to the disadvantaged through policies and programs. Policymakers have realized that such programs represent costs to the affluent and the producers of energy through increased taxes, higher prices and reduced profits. Thus, considering that the technological proglems of providing adequate energy resources can be solved, the adequacy of energy policies may well be judged on how well they address the social justice and equity issues.

Public Policies and the Socially Disadvantaged

In making public policies relevant to energy issues, political expediency has, in many instances, superseded sound economic principles. Hence, while policies have been adopted and programs have been implemented to relieve the burdens of higher energy costs for the disadvantaged, these programs may not have resulted in highly significant impacts on these groups energy consumption behaviors. Thus, the ultimate beneficiaries of these programs and policies have been the producers of energy resources who gain profits from these subsidies.

Energy policies aimed at minority and low-income families directly affect fuel oil dealers, utilities, social service institutions and other elements of the social and economic systems. On the other hand, oil and gas price controls, regulations for conservation and waste, and alternative energy

[3] Gerard M. Brannon, "Taxation and the Political Economy of the Energy Crisis", in Walter J. Mead and Albert E. Utton, (eds.), U.S. Energy Policy, (Cambridge, Massachusetts: Ballinger Publishing Company, 1978) pp. 124-125.

incentives affect the energy industry and its interactions with low-income, minority and other disadvantaged consumers.[4] An assessment of the changing energy prices upon the disadvantaged requires an examination of policies which create conflicts between rapidly rising household energy costs and lagging increases in aggregate household disposable income. Such policies complicate the economic situation of the disadvantaged to the extent that their ability to make essential adjustments and transitions necessary to pursue national energy policy objectives is severely hindered.

Prior to the Arab Oil Embargo of 1973, the government's role in formulating energy policies had been relegated mainly to regulating natural monopolies, granting and withholding approval of industry-initiated projects, and funding research and development. The government's role in formulating policies relevant to the allocation and consumption of energy was for all practical purposes nonexistent. Even after the energy crisis was declining and the potential devastating impacts that rapidly increasing energy costs could have on individual consumers, the general public, business and industry, and the total economy had been vividly displayed, policy makers concerns as indicated in The National Energy Plan[5] were mainly (1) how to increase the use of abundant domestic energy resources, and (2) how to reduce reliance on nonrenewable resources by vigorous expansion of the use of renewable and essentially inexhaustible sources of energy. It was not until the end of the decade that policymakers realized the socioeconomic implications and public policy demands of the energy crisis.

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[4] Lenneal Henderson, "Policy and Socioeconomic Growth in Low Income Communities", The Review of Black Political Economy, 1977, pp. 86-98.

[5] Executive Office of the President, The National Energy Plan, (Washington: Government Printing Office, April 29, 1977) pp. 25-33.

Low income, the elderly, minorities and other socially and economically disadvantaged households have been seriously impacted by energy distribution and pricing policies. This has resulted as a result of pricing policies which rewarded larger consumers with lower per-unit prices and because each unit of energy these groups consumed in their households cost them more on the average compared to households on all income levels and for all groups collectively.[6] The effects of such policies on these groups have been compounded because rising energy costs affect the prices of other essential goods and services (an increased cost of living) which they receive; and they affect community-based and social service institutions that serve these groups. One such policy is that which allows for utilities to charge regressive rates which reward higher-volume users with lower per unit costs. While studies have shown that the energy consumption patterns of the poor and socially disadvantaged are primarily for bare essentials; it has been found that they continue to pay more per unit for the energy they consume.[7]

Research similar to that being presented herein suggests that the cost/equity problems of energy distribution and consumption for the socially disadvantaged present several concepts that need to be considered in energy policymaking. For example, any special or remedial energy programs designed to alleviate the energy cost burdens of the socially disadvantaged should

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[6] Eunice S. Grier, Colder...Darker: The Energy Crisis and Low-Income Americans: An Analysis of Impact and Options (Washington: Community Services Administration, June, 1977) p. 9: Also, J. Musial, Public Utilities and Price Discrimination: The Need for Non-Promotional Electric Rates in Detroit Edison's Domestic Service Classification Before the Michigan Public Service Commission, No. 3910, January 10, 1972, Chapter 6, pp. 6-7.

[7] Lenneal Henderson, "Energy and Social Equity" in Robert Lawrence (ed.), New Dimensions to Energy Policy (Lexington, Massachusetts: D.C. Heath and Company, 1979) p. 146-147.

also seek to reduce their dependency of the government by promoting energy conservation, and efficiency. Hence, government intervention should not shift the burden from the socially disadvantaged to the advantaged and industry through long-term subsidization.

Under the Carter Administration there was a noted emphasis on policies aimed at alleviating the energy cost burdens of the poor and socially disadvantaged through energy assistance programs. This emphasis was based on the expectation that a sudden and rapid increase in petroleum prices would have a disproportionately adverse impact on this segment of the population.[8] This policy was implemented through several programs and agencies which included an Emergency Energy Assistance Program; Weatherization Program through the Community Services Administration (CSA); the Department of Energy (DOE), the Farmer's Home Administration, and the Office of Minority Economic Impacts (OMEI), established under section G41 of the National Energy Conservation Policies Act of 1978. Together, these agencies and programs provided assistance and resources to minorities and low-income groups and households including the needy elderly and handicapped.[9]

Several policies adopted during the Carter Administration had considerable effects on the energy costs of the socially disadvantaged. For example, the Public Utilities Regulatory Policies Act of 1978 addressed three energy pricing procedures that had significant social equity implications. These procedures were (1) average cost pricing, (2) declining block rates, and (3) the fuel adjustment clause. Average cost pricing provided low-income households with cheaper natural gas per unit while extracting higher total

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[8] Alfred R. Light, "The National Energy Plan and the Congress", in Robert Lawrence, (ed.) New Dimensions to Energy Policy, (Lexington, Massachusetts: D.C. Heath and Company, 1979) p. 179-190.

[9] Ibid.

charges for more natural gas consumed; forcing low-income consumers to conserve or pay higher utility bills. The declining block rate pricing structure allows the largest users of energy goods and services to receive the largest discounts. Thus, the poor pay more per unit because they use energy mainly for essential services and consequently use less energy. The effects of this policy option is it allows utilities to subsidize higher-volume (affluent) energy consumers with the higher rates charged to lower-volume, usually lower-income consumers. The fuel adjustment clause is a policy option that allows utilities to bill customers for increases in the utilities actual or projected fuel costs without filing for a rate increase. The effect of these clauses is they accelerate the increases in the costs of energy to the consumers, contributing to their inability to keep pace with rate increases.[10] For the poor, the elderly, handicapped, and other minority households that are disadvantaged, these energy pricing policy structures prevent serious social equity problems.

Under the Reagan Administration the perspectives of energy policy have completely changed. Simply stated, Reagan's economic proposals call for the implementation of the economic theory of perfect competition in a market complicated by the problems of a post-industrial society. Reagan's social policy is seemingly based on a philosophy of returning total responsibility for individual need and want satisfaction to the individual and private social institutions. Initially, Reagan's energy policies sought to relieve government regulations on the energy industry and the promotion of free market competition. For example, one of his first moves was to lift control of domestic oil prices and the repeal of national energy efficiency standards for household appliances. In summary the Reagan Administration's energy policies reflect the priorities of (1) supporting energy research and development too costly for the private

[10]Lenneal Henderson, "Energy Policy and Social Equity, Op. Cit. pp. 150-151.

sector; (2) ensuring readiness for further energy shortfalls; and (3) conducting energy related national defense activities. Obviously, in these priorities there is little preference for the concerns of the socially disadvantaged.

The Impacts of Energy on the Socially Disadvantaged

A number of studies have attempted to measure the impacts of rising energy costs on the the disadvantaged segment of the population, including minorities and the elderly. A common objective of these researches has been to determine those impacts that could be addressed through conscious policy-making. Hence, there is still a growing need for more studies to be done along these lines as the prices of energy continue to increase and continue to be controlled by factors external to the American government to a large degree. The findings of these studies as well as the current research can provide substantial documentation of policy needs to address the problems and issues of social equity for all segments of the energy consuming public.

It has been estimated by Grier[11] that the poor spent greater than 20 percent of personal income on energy. Also, The Bureau of Labor Statistics[12] has calculated that low-income individuals spend from 16 to 19 percent more of their disposable income on energy than do higher income groups. Even further, other studies have substantiated this trend and showed that in some instances low income individuals spend as much as 50 percent of disposable income on energy.[13]

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[11] Eunice Grier, "Energy Pricing Policies and the Poor" in Ellis Cose (ed.), Energy and Equity, (Washington: Joint Center for Political Studies, 1979) p. 79.

[12] Bureau of Labor Statistics, Consumer Expenditure Survey Series, (1972 and 1973 report) (Washington: Government Printing Office, 1976) pp. 455-458.

[13] See Lenneal Henderson, "Energy, Urban Policy and Socio-Economic Development", The Urban League Review, 1978; Dorothy Newman, Let Them Freeze in the Dark, (Washington, D.C.: Federal Energy Administration, 1975; and Barry Commoner, "Energy and Economic Justice", The Crisis, 1980.

Disposable income, which can be defined generally as a composite measure of individual's spending power, has become widely used as a measure for comparing the impacts of the restrictive energy economy on various groups. However, it has been found from several studies that other factors beside percentage disposable income can be used as effective measures and indicators of impacts. For example, Donnermyer[14] in 1978 found that social status, income and education together were significant in explaining the amount of energy consumed by households. However, the single best indicator he found was the size of housing. He also found that favorable attitudes toward energy conservation had little effect on consumption behavior by any groups.

In recent years stricter regulations for the adoption of energy conservation measures have become a primary policy option to relieve the impacts of the restrictive energy economy. However, for the effects of this option to be fully realized requires that public attitudes and behaviors are significantly altered. It has been indicated by Cetron and Coates[15] that low cost of energy in the context of an affluent society means that energy conservation as a general practice has been a minor consideration in determining lifestyle, even for the poor and otherwise disadvantaged. Thus, many feel that regardless to their conservation efforts, the price of energy will be little affected. However, it has been found that higher energy costs have had profound effects on individuals' expectations about the future, and their consumption patterns of energy using goods. In other words, the higher costs of energy have begun to

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[14] Joseph F. Donnermyer, "Social Status and Attitudinal Predictors of Residential Energy Consumption", paper presented at the Annual Meeting of the North Central Sociological Association, Cincinnati, Ohio, 1978.

[15] Marvin J. Cetron and Mary T. Coates, Energy and Society: The National Energy Problem (Lexington, Massachusetts: D.C. Heath and Company, 1974) p. 37.

make America in all status levels aware of the energy efficiency of the goods they buy.[16]

The impacts of increasing energy costs on the socially and economically disadvantaged have gained considerable attention over the last few years; especially since several publicly supported programs have been implemented to help alleviate their energy burdens. The reality of this situation has been that those who could least afford to be affected by increasing costs of energy - have been the hardest hit by energy cost increases, e.g., the poor, the elderly, minorities, and those households on public assistance and fixed incomes. At the same time, these households have been under increased public pressures to pay for the energy they consume which is increasingly taking a larger proportion of their incomes.[17]

Previous research has shown overwhelmingly that the disadvantaged segments of the population use a larger portion of their disposable household incomes on essential energy. It is also becoming substantially documented that these same groups are using relatively more energy per unit of living space as a result of the substandard conditions in which they live. Thus, their efforts at energy conservation are almost fruitless in terms of realized savings in energy costs. Yet, they enjoy fewer of the luxuries of energy using features in their households such as automatic washers and dryers, dishwashers, and central air and heating systems.[18]

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16 James O'Toole, Energy and Social Change, (Cambridge, Massachusetts: The MIT Press, 1976) pp. 76-77.

17 Lenneal Henderson, "Managing an Uncertain Future", The Crisis, (March, 1980), pp. 83-85.

18 Frank L. Altman, "Rising Fuel Prices and Low-Income Homeowners: An Analysis of Public Policy, Programs and Options", (Mimeographed), Minneapolis, Minnesota, 1980.

For a larger segment of the socially and economically disadvantaged, the increasing costs of energy have triggered a chain reaction of negative effects that are related. For example, they have been forced to reduce their expenditures on food and needed medical care. Still their total household costs for essentials — food, shelter, medical care and energy — continue to exceed their total disposable income by more than ten (10) percent. Hence, some families are having to go into debt to maintain a substandard level of consumption of the basic essentials of livelihood.[19]

Meanwhile, the socially and economically disadvantaged have been most severely impacted in other aspects as indirect effects of the increasing costs of energy. It is generally accepted that unemployment related to increased energy costs has had the greatest effects on those who could least afford to be unemployed. For example, it has been estimated that during the peak of the aftermath of the energy crisis — 1976 to 1978 — more than one million jobs were lost during the natural gas shortages of the winters of 1976-77 and 1977-78; more than 400,000 of these were held by women and minorities.[20] However, these impacts have been more longlasting and perhaps more severe than any other. There are no definitive estimations of the long-term unemployment these groups have incurred as the results of business failures, closings, layoffs, etc., that were the direct results of increased energy costs beyond the range of affordability of small and marginal business.

Given these conceptual and policy implication alternatives, the current research is aimed at adding to the empirical evidence that will seek to solidify a set of policy options that will have significant impacts on the

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[19] J. Ernest Wilkins, Jr., "Energy Problems and Alternatives", The Crisis, (April, 1980), pp. 130-132.

[20] Henderson, 1980, Op. Cit.

plight of the disadvantaged. These options may include such measures as: (1) rigorous enforcement of optimum conservation measures; (2) stimulating the retrofitting of existing low-income rental housing by imposing stricter housing quality standards on rental properties intended for the disadvantaged; and (3) the stricter regulation of energy efficiency in household energy-using appliances.

Chapter 3

Comparative Descriptions of Samples' Characteristics

The subsequent sections of this report are based on the analyses of data derived from the two samples mentioned in the introductory chapter — the total state population sample and the female-headed and elderly headed households sample. This section of the report provides a comparative description of the two population samples on those pertinent variables that portray their socioeconomic, demographic, and energy consumption characteristics, similarities and differences. Frequency distributions and distributional analyses are used to depict these characteristics and to portray the similarities and differences between the two samples.

Socioeconomic and Demographic Characteristics

For the purpose of describing and comparing the two samples on socioeconomic and demographic characteristics, a number of variables have been selected relating to those factors which best depict and discern their particular characteristics. The summary tables and narrative that follow provide the necessary explanations of these characteristics and details.

A. Race, Sex and Age of Respondents

Both the total population sample and the female-headed and elderly-headed households sample were designed to select respondents in proportion to the specific racial compositions of the sampled counties in each instance. Thus, the racial composition of the samples reflect the representative proportions of the racial characteristics of the counties' total population. For the total population sample, white respondents make up the majority since whites are the majority population for the state's total population and for the sampled counties' population. However, for the female and elderly-headed households' sample, black respondents are the majority as expected since black female-headed households far outnumber white female-headed households in the state. Nevertheless, white elderly-headed households outnumber black elderly-headed households in the state and in the sampled counties. Table 3.1 shows the distribution of respondents by race for the two population samples.

Table 3.1: Race of Respondents: Total Population and Female and Elderly Households' Samples

Race of Respondent	Total Population Sample		Female & Elderly Households' Sample	
	Number	% of Total	Number	% of Total
1. Blacks	601	46.4	676	58.5
2. Whites	688	53.1	469	40.6
3. Other, (Non-White)	6	.5	11	.9
Totals	1,295	100	1,156	100

Although the sex of the female and elderly households' sample was overwhelmingly dominated by female respondents, a considerable proportion of the respondents in the sample are elderly male household heads. On the other hand, male respondents are almost proportioned to their representation in the total population sample as indicated in Table 3.2.

Table 3.2: Sex of Respondents in Total Population and Female and Elderly Households' Samples

Sex of Respondent	Total Population Sample		Female & Elderly Households' Sample	
	Number	% of Total	Number	% of Total
1. Female	798	38.4	904	78.2
2. Male	497	61.6	252	21.8
Totals	1,295	100	1,156	100

The female and elderly-headed households' sample was predominated by respondents over 65 years of age because of the preponderance of households that were headed by females who were also elderly. Thus, given the time and cost constraints of this research it was impossible to control for this element sufficiently to reduce the proportion of the sample represented by this group. In the total population sample, however, a more normal age distribution of household heads is represented with the majority of respondents between the ages of 25 to 54 years old. Table 3.3 presents the age distribution of respondents for the two population samples.

Table 3.3: Age Distribution of Respondents for Total Population and Female & Elderly Samples

Age Category	Total Population Sample		Female & Elderly Households' Sample	
	Number	% of Total	Number	% of Total
Less than 24 years	87	6.8	44	3.8
25-29 years	195	15.1	63	5.4
30-34 years	191	14.7	61	5.3
35-49 years	391	30.2	100	8.7
50-54 years	132	10.2	44	3.8
55-59 years	90	6.9	33	2.9
60-64 years	81	6.3	164	14.2
65 years and above	128	9.8	647	55.9
Totals	1,295	100	1,156	100

B. Education, Income and Marital Status of Respondents

Education levels, household income levels and marital status are always important indicators of socioeconomic characteristics. In the two population samples that are used in this research their importance is of no less magnitude than in other sociological research. In later analyses it will be shown how these characteristics are important correlates to energy consumption behavior, conservation behaviors and perceptions and attitudes toward energy policies and regulatory frameworks. This section describes and compares two samples on these three characteristics.

In education levels of the respondents as indicated by the variable, years of schooling completed, the two sample distributions show similarities in some categories and obvious differences in others. For example, the total population sample distribution on this variable shows that the majority (83.8 percent) of the respondents have a high school education or beyond. The female and elderly head households' sample, however, has the majority of respondents (74.0) percent) with a high school education or less. A comparison of the distributions of the two samples on education level is shown in Table 3.4. The female and elderly households' sample shows, as is usual, that this segment of the population has a lower educational attainment level. This facotr is significantly related to their lower socioeconomic level.

Table 3.4: Education Levels of Respondents for Total Population and Female & Elderly Households Samples

Education Level	Total Population Sample		Female & Elderly Households' Sample	
	Number	% of Total	Number	% of Total
No Schooling	24	1.8	68	5.9
1 to 6 years (Elem.)	77	5.9	214	18.5
Junior High	105	8.1	215	18.6
Senior High	413	31.9	358	31.0
Junior College	221	17.1	101	8.7
Senior College	178	13.7	82	7.1
Beyond 4 years college	277	21.5	118	10.2
Totals	1,295	100	1,156	100

The distributions of household income levels for the two samples reflect their levels of educational attainment. For example, the female and elderly respondents are overwhelmingly represented in the lowest income level whereas the total population has a more evenly spread distribution of household incomes over the various categories. These data are shown explicitly in Table 3.5.

Table 3.5: Household Income Levels of Total Population and Female & Elderly Households' Samples

Income Category	Total Population Sample		Female & Elderly Households' Sample	
	Number	% of Total	Number	% of Total
Less than $5,000	179	13.9	650	56.2
$5,000 - $7,999	149	11.5	188	16.3
$8,000 - $10,999	156	12.0	110	9.5
$11,000 - $13,999	142	11.0	66	5.7
$14,000 - $16,999	121	9.3	37	3.2
$17,000 - $19,999	119	9.2	39	3.4
$20,000 - $22,999	133	10.3	23	2.0
$23,000 - $25,999	100	7.7	15	1.3
$26,000 and above	196	15.1	28	2.4
Totals	1,295	100	1,156	100

The relationship between education level, household income level and marital status are clearly indicated in the two population samples; especially as these variables relate to the households' socioeconomic status. Generally, households with both spouses present have a higher socioeconomic status. While it was expected that the female and elderly headed households would be dominated by one-person heads of households, it was not uncommon to find among this sample households where two heads (male and female) were present either as live-in mates or in other circumstances. In fact, in this sample of female and elderly headed households this was the case with 18.3 percent (212) of the respondents. However, it was expected that a considerable portion of the elderly headed households would have both spouses present. Marital Status distributions of the two samples can be computed from the data presented in Table 3.6 that follows.

Table 3.6: Marital Status of Respondents for Total Population and Female & Elderly Households Samples

Marital Status	Total Population Sample		Female & Elderly Households' Sample	
	Number	% of Total	Number	% of Total
Never Married	99	7.6	140	12.1
Married	919	71.0	332	28.7
Widowed	127	9.8	488	42.2
Divorced	103	8.0	141	12.2
Separated	47	3.6	55	4.8
Totals	1,295	100	1,156	100

C. Employment and Occupational Status of Respondents

The employment and occupational status of respondents undoubtedly have some bearings on their energy consumption and conservation behaviors. Thus, it is important to compare these characteristics of the two sampled groups. Respondents were asked to indicate whether they were presently employed, unemployed, retired or laid-off. Likewise, they were asked to indicate what their usual occupations were even if unemployed, laid-off or retired. As was expected, a larger proportion of the female and elderly households' respondents were either unemployed or laid-off opposed to the larger population. Similarly, a larger proportion of the female respondents had never worked at all; thus, they indicated no usual occupation. Tables 3.7 and 3.8 below show the distributions of respondents' employment status and occupational status for the two samples respectively.

Table 3.7: Employment Status of Respondents for Total Population and Female & Elderly Households Samples

Employment Status	Total Population Sample		Female & Elderly Households' Sample	
	Number	% of Total	Number	% of Total
Never Employed	101	7.8	403	34.9
Employed	890	68.7	286	24.7
Unemployed	137	10.6	70	6.1
Retired	134	10.3	366	31.7
Laid-Off	33	2.6	31	2.6
Totals	1,295	100	1,156	100

Table 3.8: Occupational Status of Respondents for Total Population and Female & Elderly Households Samples

Occupation Type	Total Population Sample		Female & Elderly Households' Sample	
	Number	% of Total	Number	% of Total
No occupation indicated	212	16.4	662	57.3
Professional-Technical	394	30.4	142	12.3
Managers (Administrators)	107	8.3	35	3.0
Sales Workers	64	4.9	31	2.7
Clerical Workers	126	9.7	65	5.6
Craft and Kindred (Skilled)	95	7.3	33	2.9
Operatives (except transportation)	45	3.5	12	1.0
Transportation Operatives	26	2.0	5	0.4
Non-Farm Laborers	28	2.2	15	1.3
Private Household Workers	30	2.3	22	1.9
Farm Workers	66	5.1	58	5.0
Others	102	7.9	76	6.6
Totals	1,295	100	1,156	100

D. Sizes of Families of Respondents

The final socioeconomic and demographic varaible that is compared for the respondents in the two samples is the number of children living with the respondents. This variable is used thoughout this research report as an indicator of the size of the respondents' families. Thus, the characteristics and distribution of this variable has significant implications on the respondents' energy consumption levels as will be shown in later analyses. There are pronounced differences in the numbers of children living with the respondents in the two samples as indicated in the distributions in Table 3.9 that follows. For example, in the female and elderly households sample the vast majority of respondents (79.9 percent) had two children or less living in their households. On the other hand, in the total population sample, the vast majority of respondents (93.8 percent) had four children or less living in their households with the mean being about two children in the household.

Table 3.9: Number of Children in the Households for Respondents in the Two Samples

Number of Children	Total Population Sample		Female & Elderly Households Samples	
	Number	% of Total	Number	% of Total
None	331	25.6	229	19.8
One	355	27.4	624	54.0
Two	242	18.7	70	6.1
Three	180	13.9	69	6.0
Four	106	8.2	59	5.1
Five	56	4.3	63	5.4
Six	14	1.1	32	2.8
Seven	6	0.5	5	0.4
Eight	3	0.2	1	0.1
Nine or more	2	0.2	4	0.3
Totals	1,295	100	1,156	100

Housing and Tenancy Characteristics of Respondents

This section of the report is also presented as a reference for subsequent analyses that will analyze the relationships between housing characteristics of the respondents and their energy consumption aspects and behavior. Thus, the pertinent aspects of housing and tenancy that are compared for the two samples include the type of dwelling, number of rooms in the dwelling, approximate age of the dwelling, and whether the respondent owns or rents the dwelling unit.

A. Type and Characteristics of Dwelling Units

In Mississippi in general, single family dwelling units are the predominant type for most families regardless to their socioeconomic and demographic characteristics. Historically, the state's population was predominantly rural and agricultural. Thus, this low-density population did not lend to the substantial development of multi-family dwelling units. This was true in the cities and small towns in the state as well as the rural villages and the open country. Even in the cities and small towns tract houses of single family types were developed for low-income families in preference to apartments or other types of multiple family unit. Thus, the results of the following distributions for the two samples on type of dwelling reflect this preponderence of single family dwelling.

Table 3.10: Types of Dwelling Units for Respondents in the Two Samples

Type of Dwelling	Total Population Sample		Female & Elderly Households' Sample	
	Number	% of Total	Number	% of Total
Apartment	130	10.0	255	22.1
Duplex	38	2.9	31	2.7
Single Dwelling Unit	989	76.4	768	66.4
Mobile House	86	6.6	46	4.0
Other	52	4.1	56	4.8
Totals	1,295	100	1,156	100

Another indicator of the type of housing which shows some relationship to the energy using characteristics and efficiency of the housing is the construction materials of the exterior. In Mississippi historically, the woodframe structure was the mainstay of residential dwelling units, especially for the single family structure. Also, traditionally, brick homes were affordable only to the affluent. Only during the last two decades since 1960 have brick dwellings become commonplace among those families at the lower level of socioeconomic status as federal housing martgage programs became accessible to those segments of the population. The data from the current samples of the population as presented in Table 3.11 show the predominance of woodframe and brick structures as the principal types of exterior materials for the respondents in the two samples.

Table 3.11: Type of Exterior Construction Materials of Sampled Respondents Dwellings

Material	Total Population Sample		Female & Elderly Sample	
	Number	% of Total	Number	% of Total
Bricks	587	45.3	369	31.9
Cinder Blocks	19	1.5	56	4.8
Wood frame/siding	449	34.7	521	45.1
Masonite Board	20	1.5	21	1.8
Asbestos Siding	81	6.3	81	7.0
Metal Siding	82	6.3	46	4.0
Two or More	44	3.4	33	2.9
Other	13	1.0	29	2.5
Totals	1,295	100	1,156	100

Also the above distributions show that the economically and socially disadvantaged — the female and elderly headed households — continue to occupy the less substantial housing; 68 percent in housing other than brick structure compared to 55 percent for the total population.

B. Tenancy Characteristics

The tenancy characteristic of the respondent (whether own or rent dwelling) is also a significant aspect relative to energy consumption and energy efficiency. Generally homeowners are more responsive to energy conservation and also make more efforts to improve energy efficiency in their dwellings than do renters. Hence, it is interesting to compare the tenancy characteristics of respondents in the two samples as in Table 3.12.

Table 3.12: Tenancy Characteristics of Respondents in the Two Samples

Tenancy	Total Population Sample		Female & Elderly Households Sample	
	Number	% of Total	Number	% of Total
Own	1025	79.2	728	63.0
Rent	270	20.8	428	37.0
Totals	1,195	100	1,156	100

C. Size and Age of Dwelling Units

The size of dwelling units of the respondents provides another discriminating variable that has relationship to energy consumption. Although the size of dwelling units as indicated by the respondents is a best guess' approximation, it provides a complimentary means of differentiating housing characteristics between the sampled groups when combined with other housing characteristic variables. Even as approximations of dwelling unit size, the information obtained clearly indicates that the female and elderly headed households occupy housing that is considerably smaller than that of the general population. Two measures were used in assessing housing size — approximate size of house in square feet and the number of rooms. Tables 3.13 and 3.14 show the comparative distributions of these variables for the two samples.

Table 3.13: Approximate Size of Dwelling Units for the Two Sampled Populations' Respondents

Size Category	Total Population Sample		Female & Elderly Households Sample	
	Number	% of Total	Number	% of Total
don't know	41	3.2	321	27.8
Under 500 sq. ft.	117	9.0	197	17.0
501 to 1000 sq. ft.	333	25.7	283	24.5
1001 to 1999 sq. ft.	534	41.2	243	21.0
over 2000 sq. ft.	270	20.9	112	9.7
Totals	1,295	100	1,156	100

Table 3.14: Number of Rooms in Dwelling Units for the Two Sampled Populations' Respondents

Number of Rooms	Total Population Sample		Female & Elderly Households Sample	
	Number	% of Total	Number	% of Total
One	45	3.5	73	6.3
Two	56	4.3	54	4.7
Three	100	7.7	84	7.3
Four	76	5.9	209	18.1
Five	206	15.9	224	19.4
Six	805	62.2	486	42.0
Seven	0	0	13	1.1
Eight	4	.3	9	.8
Nine or more	3	.2	4	.3
Totals	1,295	100	1,156	100

The age of dwelling units also provides a significant variable for discriminating the energy consumption characteristics of respondents. For example, generally the socially and economically disadvantaged occupy the older housing. Such housing is usually more deficient in energy efficiency aspects such as insulation, storm doors and windows, weatherstripping, etc. Thus, it is important for the age of housing to be compared for female and elderly headed households and the general population. Table 3.15 presents this comparison.

Table 3:15: Age of Housing Units for Respondents in the Two Sampled Populations

Age of Housing	Total Population Sample		Female & Elderly Households Sample	
	Number	% of Total	Number	% of Total
Less than 2 years	83	6.4	139	12
2 to 3 years 11 months	52	4.0	52	4.5
4 to 5 years 11 months	96	7.4	53	4.6
6 to 7 years 11 months	117	9.0	82	7.1
8 to 9 years 11 months	129	10.0	60	5.2
10 years and older	818	63.2	770	66.6
Totals	1,295	100	1,156	100

Energy Conusmption Characteristics

This section compares the essential energy using characteristics of the respondents in the two samples on their primary energy sources. Specifically, their types of systems and energy sources are compared for home heating and cooling, cooking and water heating. Defferences in the types of systems and the primary energy used for these systems are considered to be important in determining differences in costs of household energy when combined with housing characteristics and socioeconomic and demographic characteristics.

A. Primary Systems and Energy Sources for Heating, Cooling, Cooking and Water Heating

A comparison of the diversity in types of systems for primary heating, cooling and cooking, and water heating, although it may show some pertinent implications for potential energy consumption by households in the sample groups being compared, this comparison alone does not indicate anything about energy efficiency or cost efficiency alone. Thus, later analyses will show the pertinent relationships between these and other variables that will indicate how the use of different primary systems by the households differentiate the sample groups in terms of energy costs and impacts. Nevertheless, a descriptive comparison of the sample groups is appropriate as a general description of the samples on energy consumption characteristics.

For primary heating and cooling for both the total population sample and the female and elderly households' sample, two systems were used by the majority of respondents — a central heating and cooling system and portable space heaters. Specifically, 37 percent of the female and elderly sample respondents and 49 percent of the total population sample respondents utilize a central system for primary heating: 28 percent and 42 percent of the respondents in the respective sample correspondingly use a central system for primary cooling. As primary heating systems, portable space heaters were used primarily by 35 percent of the female and elderly households and by 20 percent of the total sample respondents. The remaining respondents in both samples were fairly evenly distributed over the remaining choices for heating. However, window air conditioning systems and fans were the second and third major systems for cooling for respondents in both samples (total population sample; window air conditioning, 30 percent of respondents, fans

14 percent; female and elderly sample; window air conditioning, 27 percent of respondents, fans 27.3 percent).

Table 3:16: Primary Heating and Cooling Systems for Total Population and Female/Elderly households Samples

A. Primary Heating	Total Population Sample		Female/Elderly Households Sample	
	Number	% of Total	Number	% of Total
Central system	633	48.9	428	37.0
Fluc system	62	4.8	51	4.4
Portable heaters	255	19.7	406	35.1
No regular system	22	1.7	23	2.0
Supplementary heaters	45	3.5	38	3.3
Fireplace/woodheaters	58	4.5	50	4.3
Floor furnace	52	4.0	43	3.7
2 or more	148	11.4	61	5.3
no response	20	1.5	56	4.9
Totals	1,295	100	1,156	100

B. Primary Cooling	Total Population Sample		Female/Elderly Households Sample	
	Number	% of Total	Number	% of Total
Central system	542	41.9	328	28.4
Window air units	394	30.4	307	26.6
Fans	178	13.7	316	27.3
Other	35	2.7	26	2.2
2 or more	93	7.2	60	5.2
no response	53	4.1	119	10.3
Totals	1,295	100	1,156	100

Table 3.16 shows the relative distributions of the respondents from the two samples on the primary types of heating and cooling systems.

The comparative distributions of energy sources as depicted in Table 3.17 clearly indicate the dependence of Mississippi's residents on natural gas and electricity as their primary sources of energy. Thus, significant changes in the costs and prices of these energy sources could have profound effects on the economy of the state as well as the economics of individual households within the state. Again, the pertinent impacts and relationships of these distributions to other variables will be discussed in later analyses in this report.

Table 3.17: Types of Energy Used by Respondents for Heating, Cooking, Cooling and Water Heating

Type of Energy	Total Population Sample								Female/Elderly Household Sample							
	Heating		Cooling		Cooking		Water Heating		Heating		Cooling		Cooking		Water Heating	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Natural gas	660	51.0	54	4.2	543	41.9	579	44.7	612	52.9	45	3.9	513	44.4	572	49.5
Bottled Butane or LP	204	15.8	36	2.8	210	16.2	143	11.1	129	11.2	30	2.6	165	14.3	127	11.0
Wood	55	4.2	61	4.7	8	.6	-	-	55	4.8	64	5.5	11	1.0	-	-
Electricity	237	18.3	961	74.2	485	37.5	534	41.2	229	19.8	742	64.2	395	34.2	338	29.2
Other (kerosene, coal, oil, etc.)	8	.6	23	1.8	-	-	15	1.1	18	1.6	17	1.5	1	.1	31	2.7
2 or more	96	7.5	40	3.1	14	1.1	-	-	58	5.0	25	2.2	12	1.1	-	-
no response	35	2.7	120	9.3	35	2.7	24	1.9	55	4.8	233	20.2	59	5.1	88	7.6

B. Comparative Energy Costs and Energy Using Features

A better indication and comparison of energy consumption for the two samples are gained by comparing their specific costs for the various energy sources. In fact, such a comparison indicates that the two sampled groups are dissimilar on the average absolute amounts spent on their various energy cource costs during 1980, regardless to their differences in size of housing, housing conditions, family sizes and other socioeconomic and demographic aspects. For example, it is found that there is a significant difference in the mean values paid for electricity per month in 1980 by respondents in the total population sample and the female and elderly household sample. Specifically, the mean absolute amounts paid for electricity per month for the two samples were $65.00 for the total population sample respondents and $48.00 for the female and elderly respondents. At the .01 level of significance these mean values are significantly different, indicating that compared to the larger population, the female and elderly households are paying significantly smaller amounts for electricity in actual amounts. However, this comparison does not consider average differences in proportions of disposable incomes of the two sampled groups' respondents.

The data further indicate by comparison that a larger proportion of the female and elderly sample respondents are paying less than $100 per month on the average for electricity than the total population sample respondents — 94 percent versus 89 percent. Again, these sample proportions are significantly different at the .01 level of significance.

A similar comparison of mean cost per month for natural gas for the two samples also indicated that the total population respondents were paying significantly larger absolute amounts per month for natural gas in 1980 than the female and elderly households. The mean average amounts paid for natural gas by the two sample respondents were $49.00 and $41.00 respectively, which represented significant mean differences at the .01 level of significance. However, there was no significance difference in the proportions of the two samples paying under $100.00 per month for natural gas in 1980. Both sample groups had 94 percent of the respondents paying less than $100.00 per month for natural gas in 1980.

It should be remembered, however, that in these comparisons the results are based on actual amounts paid for household energy in 1980 rather than percent of disposable incomes of the respondents. Thus, the only pertinent conclusion that can be inferred is that on the average, the female and elderly households are paying significantly smaller absolute amounts for electricity and natural gas, their primary household energy sources. Yet, considering that their household incomes are significantly lower than that of the larger population (9 percent of female and elderly households with household incomes under $17,000 compared to 58 percent of total population households with incomes under $17,000); the female and elderly are paying significantly larger percentages of disposable incomes for their primary energy sources — electricity and natural gas.

Chapter 4

Perspectives on the Analytical Methodological Design

The subsequent analysis of data that address the major research questions posed in the introduction to this report represent an attempt to derive the best explanations of the implications of the data on which these analyses are based. In developing an analytical methodology for the analyses of data, several problems were encountered that had to be resolved in order to arrive at a "best" analytical design. The initial intent was to base the analytical methodology on absolute energy costs or differential energy costs of the respondents in the sampled groups as the major dependent variables. Thus, the analytical design would have been based on direct linear approaches intended to show how various characteristic variables of the sampled groups explained the differences in energy costs of these groups. For example, had this approach been followed, direct linear correlation or regression techniques could have been the basis for analyses.

The nature of the data in several instances, however, dictated that this approach would not have provided the best explantations of either the interrelationships or differences among and between the various groups. The major problem in this regard arose because many of the items of data were either ordinally or nominally measured and scaled. Hence, even after recoding, conversions or rescaling, the distributions and aspects of these data items did not lend to direct linear analyses. In order to circumvent this problem, an indirect linear approach was taken.

The Non-Parametric Synopsis

As mentioned above, several of the key variables that were hypothesized as having main effects on variations in energy costs were based on data that were collected on either ordinal or nominal levels of measurement, e.g., household income, education level of respondents, size of dwelling units, etc. Thus, regardless or recoding or rescaling efforts, it was impossible to convert these measures in such a way that they could be used in direct linear analysis such as linear regression. Nevertheless, non-parametric correlations of such data give some insight into the nature of relationships that exist between aspects measured on ordinal and nominal levels in much the same fashion as direct linear analysis. The non-parametric analysis produces associational correlation coefficients (Spearman's r or Kendall's tan) which are interpreted analogous to the correlation coefficients produced by multiple and bivariate linear correlation and regression analyses.

Non-parametric correlation analysis were used in this study as a sorting mechanism to determine the nature of relationships between ordinally and nominally scaled variables and interval-level variables in the data set. This screening allowed for expediency in selecting variables for subsequent multivariate analyses. It also allowed the researchers to examine primary relationships among the variables to determine preliminary indications of effects and implications for the sampled groups. It is pertinent to examine some of these primary relationships and effects before the multivariate analytical design is discussed.

The non-parametric correlation approach using the Spearman's _r_ was used to ascertain the initial relationships between energy costs and other socio-economic, housing and energy using aspects of the comparative sample groups — the total population sample and the female and elderly household samples. Specifically, total energy costs for the respondents for 1981 were computed by summing their costs for electricity, natural gas, butane and other types of energy used in the household as indicated. Average household energy costs per month were computed in a similar fashion by dividing the total household energy costs by 12 months to obtain the monthly average. These computed variables were then correlated in the non-parametric fashion with various aspect variables. The aspect variables were ranked according to their assumed effects on energy costs *a priori*. In other words, the responses to these characteristic aspects were recoded so that those aspects which were assumed to have the greatest effects on energy costs were given highest rankings before being entered in the correlation.

Table 4.1 shows the results of the Spearman non-parametric correlation of energy cost variables for the two sample groups with those characteristic variables that had significant correlations with total energy costs for 1981 for respondents in the sample groups.

Table 4.1: Spearman Correlations of Total Household Energy Costs, 1981, With Significant Household Characteristics

Variable / with total household energy costs (Monthly, 1981)	Total Population		Female and Elderly Sample	
	Correlation Coefficient	Significance	Correlation Coefficient	Significance
Type of dwelling	.10	.001	.27	.001
Ownership type	-.16	.001	-.27	.001
Size of dwelling	.20	.001	.34	.01
Number of rooms	.15	.001	.25	.001
Age of dwelling	-.05	.03	.09	.001
Primary heating system	-.15	.001	—	—
Primary cooling system	-.16	.001	.06	.05
Type of water heating	-.09	.001	.12	.001

Although all of the correlations are significant at least at the .05 level, the small coefficient values indicate that weak relationships exist between these characteristic variables and the total monthly costs of household energy for respondents in both samples for 1981. It should be noted, however, that the age of dwelling unit, primary heating system, primary cooling system and type of water heating are negatively related to total household energy costs for the total population sample, but positively related for the female and elderly household sample. These correlations can be interpreted to infer that as these aspects decrease in their effects on energy costs for the households, the total cost of energy increases. The reverse would be the case for the female and elderly households. That is, as these effects increase so does the total energy costs.

The significant aspect of this screening analysis is the small values of the correlation coefficients which indicate weak relationships between the aspect variables and total energy costs for both sample groups. Thus, this preliminary screening indicates that some other means must be pursued to assort the succinct causes and effects of variations in energy costs and their impacts.

Multivariate Implications for an Analytical Approach

At this point two important facts have already been determined relative to the implications of this study: 1) There is a significant difference in the average absolute amounts spent on energy costs between households in the general population when compared to those households in the female and elderly sample (see Section B, Chapter 3). In fact, when the female headed and elderly households are compared on energy costs, their average energy costs in absolute amounts are significantly less than the larger general population; 2) The differences in the variations in these energy costs are not accounted for by socioeconomic, demographic or housing characteristics of the sampled groups in a direct linear fashion. In other words, the above analysis using non-parametric correlation shows that of the housing characteristics and energy using features variables that were indicated as housing significant relationships to total energy costs for the respondents in the two samples, none had even moderate relationships to total household energy costs for either sample.

Considering that the female and elderly households are paying significantly less in absolute dollar amounts, but relatively more in terms of percentage of disposable income for their total energy costs; and, considering that neither housing characteristic variables, energy use variables, nor socioeconomic and demographic characteristic variables account for the major variances in energy costs for either the general population or the female and elderly population, it was pertinent to examine other features of these groups in a multivariate scheme in order to gain more significant explanations fo the variances in their total energy costs. As a preliminary analytical procedure in a multivariate format, stepwise multiple regression was used.

In using this approach it was sought to determine if the combined effects of socioeconomic, demographic, housing, energy using features and conservation actions had significant effects on the total energy costs for households in the two sample groups. Also, it was sought to determine if either of these characteristics would indicate a more significant differential effect on total energy costs in a multivariate scheme of analysis. Hence, computations were made for both of the samples' respondents to ascertain measures on the following aspects in the respective manners:

1. Total energy using features in the household (TOTEUF) — computed by summing all energy using features indicated on the survey questionnaire (see appendix questions 38.a thru 38.h).

2. Total single actions to conserve energy or reduce energy costs (TOTSINA) — Computed by summing all one-time actions that have been indicated by respondents as being taken to reduce energy consumption and energy costs (see appendix questions 39.a thru 44.c).

3. Total repeated actions to conserve energy or reduce energy costs (TOTRAC) — Computed by summing all actions indicated by respondents is being taken to reduce energy consumption and energy costs (see appendix questions 45 thru 62).

In addition to these computed variables, age of dwelling units (VAR036), number of children in household (VAR017), household income (VAR022), education level of respondents (VAR023), and age of respondents (VAR014) were also used in the multiple correlation regression against total household energy costs for both sample groups. The results of these analyses showed that in a linear combination these variables explained insignificant amounts of variations in the total costs of energy for either the total general population or the female and elderly households population. The R-square values for the overall multiple correlations for the two samples respectively were .03 and .04. Tables 4.2 and 4.3 present the summary results of these analyses.

Table 4.2: Summary of Stepwise Multiple Correlation of Selected Variables with Total Energy Costs for General Population

Dependent Variable: (TOENC81) Total Energy Costs for 1981

Variables	Multiple R	R Square	Simple r	B	F
VAR036	.110	.012	-0.110	-6.99	15.045
TOTEUF	.152	.023	0.103	5.00	5.565
VAR017	.166	.027	0.057	3.90	5.036
VAR022	.176	.031	0.105	2.88	5.430
VAR023	.178	.032	0.036	-1.67	0.645
TOTSINA	.179	.032	0.072	0.34	0.259
VAR014	.179	.032	-0.021	0.62	0.168
TOTRAC	.179	.032	0.047	-0.10	0.022

Constant = 103.83 Overall F = 5.34 dF = 8,1268 Std. error = 98.8 P = .05

Table 4.3: Summary of Stepwise Multiple Correlation of Selected Variables With Total Energy Costs for Female and Elderly Households

Dependent Variable: (TOENC81) Total Energy Costs for Female/Elderly Households, 1981

Variable	Multiple R	R Square	Simple r	B	F
VAR022	0.119	0.014	0.12	6.21	7.38
VAR017	0.160	0.025	0.11	8.09	11.17
VAR036	0.173	0.029	-0.05	-4.96	5.71
TOTEUF	0.188	0.035	0.10	7.19	6.82
VAR014	0.192	0.036	-0.10	-3.54	3.39
VAR023	0.199	0.039	0.03	-4.71	3.17
TOTSINA	0.200	0.041	0.08	1.06	1.06
TOTRAC	0.202	0.041	0.04	-1.00	0.98

Constant = 96.78 Overall F = 6.85 dF = 7,1148 Std. Error = 129.51 P = .05

The overall correlations of the selected variables are significant as indicated by the overall F-ratios. It is seen that the unexplained variance in each case far outweighs the explained variances in total energy costs. Thus, this preliminary examination suggests that a straightforward linear approach will neither explain the differences in costs of energy for either population sample; nor will such an approach explain the reasons for their specific total costs of energy. Hence, although we know that their specific total energy costs are significantly different in absolute terms and in relative terms of disposable incomes, neither the differences nor the specific total costs can be directly attributed to nor accounted for by differences in socioeconomic status, demographic characteristics, energy using features of households, or single and repeated energy conservation actions of the respondents in a direct linear combination.

The question that arises, then, is "how can these differences in total energy costs between the two populations be explained?" Inevitably, there must be some underlying dimensions and effects that must be uncovered to provide more substantial explanations and differentiations of the energy consumption characteristics of the two samples.

Implications for a Multivariate Linear Discriminant Approach

The implications from the foregoing analyses suggest that some analytical procedure should be utilized that provides a means for differentiating between the two samples based on their specific within group characteristics simultaneously in a multidimensional fashion; while at the same time examining their linear effects, interrelationships and characteristic aspects on these dimensions. In other words, an approach that differentiates the several dimensions and at the same time combines these dimensions seems most appropriate.

Discriminant analysis of the two samples in a comparative manner provides an analytical methodology that is appropriate to fulfill such an approach. This analytical technique is based on the premise that two or more groups can be statistically distinguished on some dimensions that are inherent to both groups. In this particular research situation, these dimensions are considered as the socioeconomic, demographic, housing, energy consumption, conservation behaviors, and formal energy program participation characteristics of the two sample populations. On each of these dimensions a set of variables are available on which sufficient discriminating characteristics may be ascertained to show how the two sample groups differ within their groups. In extending this analytical approach to a comparative analysis, it should also be ascertained if two samples that can be differentiated on certain dimensions within the sample groups, may also show inherent similarities among comparative groups. In other words, the degrees of within group discrimination on these dimensions may not be significantly different from one sample population to another when the two samples are compared.

Discriminant analysis has as its mathematical objective the ability to linearly combine the discriminating variables in such a manner that groups within a sample are forced to become as statistically distinct as possible. When this analysis is performed on two samples with the same set of variables and compared, it is then possible to determine how the discriminating variables have similar discriminating effects for the samples, and if the two samples have inherent similarities and differences on their underlying dimensions as represented by the discriminating variables.

The results of discriminant analyses have two interpretive functions — analysis and classification. The analysis aspects of the technique provide for the interpretation of the extent to which the discriminating variables are able to differentiate groups within the sample on the selected aspects. The classification aspect provides for the classification of any new cases that may be entered into the sample once the initial computations are derived. Discriminant analysis derives these aspects by the computation of linear combinations of the discriminating variables into discriminant functions. The number of discriminant functions that can be derived for a sample is either one less than the number of groups being discriminated or equal to the number of discriminating variables being used.[1]

The discriminant analysis technique provides several statistical tests for analyzing the discriminating power of the set of variables used to differentiate the groups within the sample, and for determining the statistical significance of the variables' discriminating effects. It provides two measures for judging the importance of the derived discriminant functions — the eigenvalue and canonical correlations. The eigenvalue is a measure of the importance of a discriminant function. When summed, the sum of the computed

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[1]Norman H. Nie, et.al. Statistical Package for the Social Sciences, 2nd ed. (New York: McGraw-Hill Book Co., 1975) pp. 434-467.

eigenvalue is a measure of the total variance existing in the set of discriminating variables. When a single eigenvalue is computed as a relative percentage of the sum of eigenvalues, it can be expressed as the relative importance of the associate discriminant function in explaining the variance of the discriminating variables. The canonical correlation is a measure of the association between a single discriminant function and the set of variables which define the groups being discriminated within the sample. It indicates the relationship between a discriminant function and the group variable on which the groups are being discriminated and it is coded so that "1" indicates whites and "2" indicates blacks, the first canonical correlation derived indicates the relationship between the first function and the white group. If we square the value of the canonical correlation we can interpret the squared value as the proportion of variance in the discriminant function that is explained by the groups.[2]

Another statistical measure that is computed by the discriminant analysis technique is Wilk's lambda. As each function is derived starting with no functions, Wilk's lambda is computed. It is an inverse measure of the discriminating power in the original variables not yet removed by the discriminant functions. Thus, the larger the value of Wilk's lambda, the less information remaining in the variables. When transformed into a chi-square statistic, the significance of the Wilk's lambda value can be tested using the chi-square distribution.[3]

In deriving the discriminant functions, a discriminant coefficient is computed for each case in the sample for each of the discriminating variables on each function. By averaging the scores for all cases within a particular group of the sample, a group mean or the respective function is derived.

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[2] Ibid., p. 442.

[3] Ibid., p. 442.

This group mean, or group centroid, is the typical location of a case from that group in discriminant function space. By comparing the group means on each function, an indication is determined of the distance between the groups on the particular underlying dimension represented by the function. The standardized discriminant function coefficients are synonymous to beta coefficients in multiple regression for the discriminating variables. When the sign of these coefficients are considered along with their values on a function, they indicate the relative contribution of the variable to the derivation of the function and the nature of the relationship of the variable to the function-positive or negative.[4]

The discriminant functions are derived in order of their importance in explaining the variance in the discriminating variables. When these are derived in a stepwise fashion, the alignment of variables on the functions indicate the relative importance of the variables to the functions. Thus, the variables' contributions to the discriminant functions indicate the underlying dimensions that are represented by these functions in the same way that underlying dimensions are represented on factors in factor analysis.

When discriminant analysis is applied to two samples in a similar manner or the same set of discriminating variables for the samples, the results can be compared to determine if the same variables differentiate between within sample groups in the same manner and magnitudes. If this is found to be true when comparing the samples, it can be inferred that the underlying dimensions that have specific effects on the within sample groups are similar between the two samples. If this is not found to be true it can be inferred that these underlying dimensions for within sample groups are not

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[4] *Ibid.*, p. 443.

the same for the two samples, and, thus, the two samples are inherently different on the underlying dimensions represented by the discriminating variables. This is the analytical methodological approach that is the basis of the subsequent analyses in this report.

Chapter 5

Assessing the Differential Effects on Energy Costs

The comparative discriminant analysis approach was used to assess the underlying effects on differential energy costs for the total population sample in comparison to the female and elderly headed households sample. The aim of this analysis was to determine if the combinations of socio-economic, demographic, dwelling unit characteristics, energy consumption aspects, repeated and single conservation actions, belief in various aspects of the energy crisis, and attitudes toward specific energy policy actions would sufficiently differentiate groups within the two comparative samples when the groups are defined on specific levels of household energy costs. Further, the analysis compares the results for the two samples to determine how they differ in the discriminating effects of these variables between the groups across the two samples. The analysis is aimed at testing the general hypothesis that the female and elderly households sample and the larger general population are significantly different in those factors that affect their household energy costs. More specifically, using this analytical approach, the analysis is designed to ascertain those factors that most significantly affect household energy costs for the several groups within the two samples.

In employing this analytical approach to test the general hypothesis, respondents within the two samples were grouped according to their total household energy costs per month for 1981 in the following manner:

- Group 1: total monthly household energy costs fifty dollars ($50) or less;
- Group 2: total monthly household energy costs fifty-one ($51) to one-hundred dollars ($100);

- Group 3: total monthly household energy costs one-hundred and one dollars ($101) to one-hundred and fifty dollars ($150);

- Group 4: total monthly household energy costs one-hundred and fifty-one dollars ($151) to two-hundred dollars ($200);

- Group 5: total monthly household energy costs above two-hundred dollars ($200).

The distributions of respondents on these groupings are shown comparatively for the two samples in Table 5.1.

Table 5.1: Distribution of Respondents in the Two Samples by Total Monthly Household Energy Costs, 1981

Monthly Energy Costs	Total Population Sample		Female & Elderly Households Sample	
	Number	% of Total	Number	% of Total
$50 or less	146	11.3	435	37.6
$51 to $100	526	40.3	390	33.7
$101 to $150	412	31.8	212	18.3
$151 to $200	133	10.3	69	6.0
Over $200	78	6.0	50	4.3
Totals	1,295	100	1,156	100

The Discriminant Analyses Results

The discriminant analyses for the two samples produced the relevant statistics and results for estimating the discriminant functions that would allow for the interpretation of the discriminanting effects of the set of variables for the several groups described above. The analyses were performed in a stepwise fashion which permitted variables to be entered in the order of their importance in discriminating effect. Also, variables were allowed to enter the analysis as long as their discriminating effect was significant to the derivation of significant discriminant functions. Hence, forty-three variables were entered into the analysis for the female and elderly households discriminant analysis and forty-nine variables were entered into the analysis for the total population sample. The initial variable to enter the analysis for the total population sample discrimination on energy costs was the type of dwelling unit while the initial variable to enter the analysis for the female headed and elderly households sample was total energy using features in the household. In both analyses the number of bathrooms was the second variable to enter the analysis. Also in both analyses two significant discriminant functions were produced which accounted for significant amounts of variances in the sets of discriminating variables for the two samples. An examination and comparison of the specifics of these analyses give further explicit explanations of their results and implications.

The standardized canonical discriminant functions show discriminant coefficients that indicate the specific discriminating power and effects of the individual variables, when the signs of the coefficients are ignored. The signs of the coefficients indicate the nature of their influence on the functions, either positive or negative. These data and their relevant statistics for the two samples are shown in Tables 5.2 and 5.3.

Table 5.2: Standardized Canonical Discriminant Function Coefficients for Female/Elderly Sample on Energy Cost Groups Discrimination

Variables	Function 1	Function 2	Function 3
Race	.20	.06	.07
Age	.20	.06	.12
No. of children in household	-.09	.31	.07
Employment Status	-.18	-.10	-.25
Type of dwelling unit	-.39	-.23	-.21
Type of roof	-.04	.15	-.13
Tenancy type	.24	-.04	-.13
Number of rooms	-.05	-.21	.29
Number of bedrooms	-.12	-.04	.02
Number of bathrooms	-.14	.48	-.15
Primary heating system	.00	-.32	-.03
Primary cooling system	.04	-.22	-.20
Supplementary heating & cooling	-.19	.09	.16
Type of water heaters	-.08	-.04	.49
Number of water heaters	-.20	.19	.01
Type of cooking fuel	.04	-.48	-.09
Air conditioning	-.05	.29	-.07
Automatic dishwasher	.13	.08	.04
Clothes dryer	.04	.01	.20
Refrigerator	.10	.04	.12
Turn off lights	.09	-.16	-.16
Adjust thermostat at night	.01	-.03	.11
Wash clothes in warm/cold water	.10	.12	.39
Dry clothes on clothes line	-.07	-.10	-.04
Regular change of furnace filters	-.13	.15	.15
Close unused rooms	-.06	.10	.20
Reduce hours of cooking	-.07	-.01	.17
Change holiday plans	.10	-.28	.09
Change vacation plans	-.14	.07	-.18
Cancelled drinking for pleasure	-.01	.16	-.14
Other impacts	.04	-.10	.16
Belief energy laws for poor	.01	.09	.03
Energy crisis is main national problem	.02	.25	-.01
Government imposed energy conservation needed	-.001	-.13	-.21
Energy conservation as national goal	-.12	-.24	.25
Four-day work week	-.09	.10	-.19
Gasoline rationing	.23	-.07	.07
Special tax reduction for car-pooling	-.07	.16	.03
100% tax deduction for conservation expenditures	-.11	[illegible]	[illegible]
Total single conservation actions	-.21	[illegible]	[illegible]
Participation in one or more conservation programs	-.02	[illegible]	[illegible]
Participation in one conservation program	-.02	[illegible]	.67
Total Energy Using Features	-.19	-.04	-.22

Table 5.2 (Cont'd)

Variables	Function 1	Function 2	Function 3
Eigenvalues	.53	.23	.08
Canonical correlations	.59	.43	.27
% of explained variance	59%	26%	8%
Wilk's Lambda	.46	.71	.88
Chi-square	869.6	387.4	150.8
DF	172	126	82
Significance level	.001	.001	.003

Table 5.3: Standardized Canonical Discriminant Function Coefficients For Total Population Sample on Energy Costs Groups Discrimination

Variables	Function 1	Function 2	Function 3
Race	-.29	.18	-.15
Age	-.14	.03	.18
Marital status	.07	.10	-.02
No. of children in household	.15	-.03	.08
Employment status	.09	-.03	.20
Household income	.34	.03	-.11
Years of schooling	-.21	.03	.05
Type of dwelling unit	.19	.17	-.18
Construction material of dwelling	-.15	-.01	.09
Tenancy type	-.16	-.04	.06
Number of rooms	.14	-.02	-.09
Number of bedrooms	.14	-.07	-.03
Number of bathrooms	.18	-.52	.13
Age of dwelling	.05	.16	.21
Primary cooling system	.07	.20	.24
Type of fuel for cooling	.02	-.24	-.22
Type of water heater	.14	.08	-.33
Number of water heaters	.18	-.11	.11
Type of fuel for cooking	-.002	.35	.06
Air conditioning	.08	-.30	-.08
Washing machine	-.14	-.22	-.11
Automatic dishwasher	.14	-.09	-.04
Clothes dryer	-.23	.01	.14
Stove or range	.10	.04	-.24
Refrigerator	-.11	.14	.13
Separate deep freezer	-.06	.07	-.17
Turn off lights	-.15	.13	-.22
Close drapes at night	.12	.01	.17
5-minute showers	.05	-.26	.21
Adjust thermostat during day	.09	.16	-.15
Turn-off dishwasher during drying cycle	-.11	.20	-.01
Wash dishes and clothes w/full loads	-.04	.10	-.36
Regular change of furnace filters	.06	-.20	.01
Limit hours of t.v. watching	.08	-.06	-.19

Table 5.3 (Cont'd)

Variables	Function 1	Function 2	Function 3
Change vacation plans	.08	.19	-.004
Cancelled drinking for pleasure	-.01	-.22	-.12
Believe policy actions result from pressure	-.01	-.27	-.14
Believe energy policies not effective	.13	.01	-.36
Believe energy laws are for poor	-.20	-.08	.28
Government imposed energy conservation needed	.12	.06	.11
Believe price of energy too low	.18	.09	-.03
Energy conservation as national goal	.001	.21	-.10
Stricter regulations on fuel use	.16	.11	.25
Gasoline rationing	-.22	-.16	-.29
Special tax on larger autos	-.09	.03	.28
Total single conservation actions	.23	.07	.08
Total energy using features	.40	.14	.39
Participation in one or more conservation programs	.24	.44	-.04
Participation in only one program	-.33	-.57	-.11
Eigenvalues	.24	.14	.07
Canonical Correlations	.44	.35	.25
% of explained variance	49%	29%	14%
Wilk's Lambda	.79	.89	.95
Chi-square	305.4	137.4	53.0
DF	144	94	46
Significance level	.001	.01	.25

Interpretation and Comparison of the Discriminant Analyses

Several aspects of the canonical discriminant functions are important to interpreting their results and for comparing the two samples. The first aspect of interpretation is to examine the summary statistics for the functions at the bottom of the tables. In summing the eigenvalues it is seen that the three functions account for eighty-four percent of the total variance in the discriminating variables for the female and elderly sample group and only forty-five percent of the total variance in the discriminating variables for the total population sample. In both analyses, the eigenvalue summary indicates that the first discriminant function is most important in discriminating between the within sample groups on total energy costs. However, the canonical correlations indicate weak relationships between the discriminant functions and the within sample groups on total energy costs.

A second aspect that indicates the discriminating power of the set of variables among the several groups on total energy costs within the samples is the Wilk's lambda values. These values indicate an inverse relationship between the value of the statistic and the discriminating power of the functions — the larger the value of Wilk's lambda, the less discriminating power present in the function. In comparing the two analyses it is seen that on the main discriminant function — function 1 — the set of variables are better discriminators for the female and elderly sample (Wilk's lambda = .46) than for the total population sample (Wilk's lambda = .79). Nevertheless, in both analyses the functions are significant for discriminating between the groups on total energy costs.

An additional aspect of the analyses, and the most important aspect for comparative analysis of the two samples is discriminating power of the individual variables in the derivations of the discriminant functions. This aspect is determined by the coefficientc of the variables on the functions and their respective signs. The discriminating power of the variables on the discriminant functions is represented by the relative values of these coefficients; the larger the value of the variables' coefficients, the more influence the variable has in discriminating between the groups on the discriminant function. Thus, by comparing this aspect of the discriminant analyses for the two samples, the importance of particular variables in discriminating between the groups of respondents on total monthly energy costs can be determined.

Hence, for the first two discriminant functions which account for the most significant amount of variance in the set of variables, the variables with relatively larger coefficients are identified as those with the greater discriminating power on the functions. These variables, thus, help to identify those underlying dimensions that affect total monthly energy costs for respondents within the samples. For the female and elderly household sample, these variables are the following for the first discriminant function: (1) race of respondents, (2) age of respondents, (3) type of dwelling unit, (4) tenancy type (own or rent), (5) use of supplementary heating or cooling, (6) the number of water heaters, (7) their attitude toward gasoline rationing as a policy option, (8) the total single conservation actions taken in the household, and (9) total energy using features. Among the variables on the first function, the type of dwelling unit and the type of tenancy are the two variables with the greatest discriminating effects. On the second discriminant function the variables with the greatest relative discriminating power are: (1) number of children in the household, (2) type of dwelling unit, (3) number of bathrooms, (4) primary heating system, (5) type of cooking fuel, (6) changes in holiday plans, (7) belief that the energy crisis is a major national problem, (8) belief that energy conservation should be a major national goal, (9) attitude toward 100% tax deduction for energy conservation expenditures, and (10) participation in one major energy conservation or weatherization program.

In a similar manner, those variables that have the greatest discriminating effects on the respondents in the total population sample on their total monthly energy costs can be identified. For this sample those variables on the first discriminant function are the following: (1) race of the respondents, (2) household income of the respondents, (3) education level of respondents, (4) clothes dryer, (5) attitude toward gasoline rationing, (6) total single conservation actions taken in the household, (7) total energy using features, (8) participation in one major energy conservation or weatherization program, and (9) participation in one or more major energy conservation or weatherization programs, and (10) type of dwelling unit, (11) belief that energy conservation laws are mainly for the poor, and (12) belief that energy prices are too low.

The variables with the greatest effect on the second discriminant function for this sample are identified as the following: (1) the number of bathrooms, (2) the type of primary cooling system, (3) the type of fuel for cooling, (4) the type of fuel for cooking, (5) limiting showers to 5 minutes, (6) changing furnace filters regularly, (7) cancelled drinking for pleasure, (8) belief that national energy policy actions are the results of pressure from special interest groups, (9) belief that energy conservation should be a major national goal, (10) participation in one major energy conservation or weatherization program, and (11) participation in one or more major energy conservation or weatherization programs, (12) washing machine in home, (13) turn-off dishwasher during drying cycle, (14) change vacation plans.

On the first discriminant function the most powerful discriminating variables for the total population sample were total energy using features, participation in energy conservation and weatherization programs, race of respondents and household income. On the second discriminant function for the total population sample the most powerful discriminating variables were program participation, number of bathrooms and type of cooking fuel.

An examination and comparison of the signs of the most powerful discriminating variables indicate the nature of the relationships of these variables to the discriminant functions; and thus their particular effects on the separation of respondents according to their levels of total monthly household energy cost. Specifically, negative coefficients indicate a negative effect by the variable in discriminating between the respondents' levels of monthly energy costs; or they indicate a negative relationship between the specific variable and the respondents' level of total monthly energy costs. Tables 5.4 and 5.5 show in summary the most important discriminating variables for the two samples on the two main discriminant functions and the nature of their relationships to those functions.

Table 5.4: Most Important Discriminating Variables for Female and Elderly Households on Groups by Total Monthly Energy Costs

A. First Standardized Canonical Discriminant Function

Variables	Function Coefficients
Race of respondents	.20
Age of respondents	.20
Type of dwelling unit	-.39
Tenancy type (own or rent)	.24
Supplementary heating & cooling	-.19
Number of water heaters	-.20
Attitude toward gasoline rationing	.23
Total single conservation actions	-.21
Total energy using features	-.19

B. Second Standardized Canonical Discriminant Function

Variables	Function Coefficients
Number of children in household	.31
Type of dwelling unit	-.23
Number of bathrooms	.48
Primary heating system type	-.32
Type of cooking fuel	-.48
Changes in holiday plans	-.28
Belief in energy crisis as a major national problem	.25
Belief that energy conservation should be major national goal	-.24
Attitude toward 100% tax deduction for energy conservation expenditures	-.26
Participation in one major energy conservation program	-.24
Air conditioning	.29
Participation in one or more major energy conservation programs	.23

Table 5.5: Most Important Discriminating Variables for Total Population Sample on Groups by Total Monthly Energy Costs

A. First Standardized Canonical Discriminant Function

Variables	Function Coefficients
Race of respondents	-.29
Household income	.34
Years of schooling	-.21
Type of dwelling unit	.19
Clothes dryer in home	-.23
Belief that energy conservation laws are mainly for the poor	-.20
Belief that energy prices are too low	.18
Attitude toward gasoline rationing	-.22
Total single conservation actions	.23
Total energy using features	.40
Participation in one major energy conservation program	-.33
Participation in one or more major energy conservation programs	.24

B. Second Standardized Canonical Discriminant Function

Variables	Function Coefficients
Number of bathrooms	-.52
Primary cooling system type	.20
Type of fuel for cooling	-.24
Type of fuel for cooking	.35
Air conditioning	-.30
Washing machine in home	-.22
Limit showers to 5 minutes	-.26
Turn off dishwasher during drying cycle	.20
Change furnace filters regularly	-.20
Change vacation plans	.19
Cancelled drinking for pleasure	-.22
Belief that policy actions result from pressure by special interest groups	-.27

Table 5.6 (Cont'd)

Variables	Function Coefficients
Belief that energy conservation should be a national goal	.21
Participation on only one major energy conservation program	-.57
Participation in one or more major energy conservation programs	.44

Comparing the Underlying Dimensions and Differential Effects on Total Monthly Energy Costs and Implications

The results of the discriminant analyses reveal the underlying effects and characteristics of the two sample populations that differentiate the respondents' levels of total monthly energy costs. These factors are identified by the nature and the power of the discriminating variables as indicated by their coefficients on the discriminant functions (see Tables 5.3 thru 5.6). In other words, the results of these analyses indicate how the levels' total monthly energy costs for the respondents in the two samples are differentially affected by the discriminating variables.

As indicated by the results of the analyses, several factors most significantly affect the total monthly energy costs of the respondents in both the female and elderly population of Mississippi and the general population of the state. These effects can be classified as socioeconomic and demographic (function 1), energy using characteristics and attitudes and beliefs about certain energy policies and programs (function 2) for both population samples. However, the dimensions of these effects have slight differences for the two samples. For example, the racial differences of respondents have reverse effects within the two samples on total monthly energy costs. In the total population sample race has a negative effect on energy cost discrimination, whereas in the female and elderly sample race has a positive discriminating effect. According to the coding of the racial variable, this result implies that for the larger population a larger number of black respondents are in the lower level groups on total monthly energy costs while in the female and elderly sample a relatively larger proportion of black respondents are in the higher level groups on total monthly energy costs.

Household income is one variable that helps to discriminate on total monthly energy costs for the total population sample, but does not hlep to discriminate between the groups or level of total monthly energy costs for the female and elderly household sample. The analysis of this result has two perspectives. First, the variance in household incomes in the groups for the female and elderly households sample is very small compared to the variance in household incomes for the total population sample. Secondly, in simpler terms, there is little or insignificant differences in household incomes for the female and elderly respondents regardless to their levels of total monthly energy costs. Thus, household income has no effects on differential energy costs for respondents in the female and elderly households sample. However, for the larger population, household income plays a major role in helping to determine the household's level of total monthly spending on energy.

Similarly, tenancy status (own or rent dwelling) plays a significant role in helping to discriminate between levels of energy costs for respondents in the female and elderly households sample; yet, this variable does not appear in the analysis for the total population sample. In this instance the implication is that female and elderly respondents that own their dwellings are positively affected in their total monthly energy costs. This does not specifically imply that female and elderly headed households are better-off overall if they own their dwellings. Nevertheless, it is implied that they are adversely affected in their total monthly energy costs by renting their dwelling units. The obvious interpretation of this finding is that female and elderly headed households overwhelming occupy lower quality housing, especially when they rent their dwelling units. Thus, their dwellings are less energy efficient and lead to higher energy costs.

This finding is further substantiated when comparing the effects of type of dwelling unit on the levels of total monthly energy costs for the two samples. Again, a reverse relationship if found for the variable on the main discriminant functions for the two groups — negative for the female and elderly and positive for the total population sample. The meaning in this instance is that occupation of multiple family dwelling units adversely affects the level of total monthly energy costs for the female and elderly headed households, thus increasing their energy cost levels.

The interpretations of the remaining variables on the two major discriminant functions for the two samples can be interpreted similarly depending upon the signs of their coefficients on the functions. Thus, it is seen that in several other instances (Tables 5.4 and 5.5) the same variable has different effects on determining the levels of total monthly energy costs for the respondents in the two samples. Among these variables, the number of bathrooms in the dwelling unit, the number of children in the household, the education level of the respondents, the use of supplementary heating and cooling, air conditioning, and participation or non-participation in energy conservation and weatherization programs are those that have differential effects on the two population samples similar to those effects described above.

The education level of respondents is important for explanation of its effects on total monthly energy costs. This factor (years of schooling) has a negative effect on discriminating between levels of energy costs for the total population sample, but has no effects on the female and elderly household sample. For the total population sample this effect is such that the higher the level of education for the respondents, the lower is their relative level of total monthly energy costs. Again, the variance in this variable is less for the female and elderly sample, thus eliminating its effect on their level of total monthly energy costs.

The total number of single energy conservation actions taken by respondents to reduce energy costs by improving the energy efficiency of their dwellings also affects the total monthly energy costs of the respondents in the two population samples differentially. Overall, the female and elderly households had not performed significantly more single conservation actions than the total population sample respondents. However, the effects of their actions had more positive results since the more single actions taken by respondents in this sample had the effects of lowering their level of total monthly energy costs.

Certain aspects of the respondents' attitudes toward specific energy policies and their beliefs in particular aspects of the severity of the energy crisis and policy alternatives likewise have differential effects on their levels of total monthly energy costs for the respondents in the two sample. Specifically, some aspects of the total population sample's respondents attitudes and beliefs are major discriminators in their levels of total monthly energy costs whereas these affects appear mainly at the secondary level (function 2) for the female and elderly sample. For the total population sample, the belief that energy conservation laws are mainly for the poor, attitude toward gasoline rationing, and the belief that energy prices are too low are major discriminating factors on their levels of total monthly energy costs. However, respondents' attitude toward gasoline rationing is the only one of these aspects that is a major discriminator for the female and elderly sample. On the other hand, for the female and elderly sample, belief in the energy crisis as a major national probelm, belief that energy conservation should be a major national goal, and a 100% tax deduction for energy conservation expenditures as a policy alternative are major discriminators at the secondary level and contribute substantially to differentiating the respondents within this sample population on their levels of total monthly energy costs at the secondary discrimination level.

Similarly, participation in formal energy conservation and weatherization programs has had more significant impact in differentiating levels of total monthly energy costs for the total population sample and only secondary effects on the female and elderly sample respondents. The implication from this finding is that while the female and elderly households may have participated in these programs more vigorously, the net effects of their participation have been to less avail. This is probably due to their being unable to follow thru on their learning from these programs because of the potential costs that would be incurred if they actually sought to implement the recommended actions that these programs prescribed for improving the energy efficiency of their dwellings. On the other hand, undoubtedly, more respondents in the total population sample are financially able to carry out these actions in improving their dwelling units' energy efficiency. Also, participation in such programs by female and elderly headed households for the most part has meant direct subsidization of their energy bills during peak seasons rather than as an educational process. Thus, the effects of these programs in actually reducing their energy costs per se have been for all practical purposes virtually nil as indicated by the results of these analyses.

Policy Implications

The real significance of the results of the findings from these research analyses lie in their implications for public policy; probably more so than the interpretations of their quantitative significances. Thus, it is important to examine and explain the findings in a common sense manner and review their interpretations in light of practical economics and the needs for feasible and effective policymaking.

In review, the premise that these analyses sought to decipher was the underlying reasons for significantly different total monthly energy costs between the two sample populations, whereby the total population sample respondents were paying significantly larger amounts in absolute energy costs, but relatively less in percentage of disposable incomes for total monthly energy costs. An important underlying factor that was not previously discussed, but has significance regarding this finding is that the variances of total monthly energy costs for the two sample populations were not significantly different. This result implies that respondents in the two samples are paying energy costs in absolutely direct proportions to their household incomes. That is, in both samples as household income increases so does the amount spent on household energy costs. By comparing the relative proportions of disposable incomes, this factor is not exposed. Subsequently, this implies that in Mississippi, households, regardless to their social status or socio-economic conditions, have adjusted their energy consumption and energy expenditures in accordance to what they can afford rather than in accordance to any specific energy policies or in response to any specific energy conservation programs.

The obvious question that arises is what does this mean for energy policy development and implementation. In order to answer this question, let us again examine the research findings. Energy conservation and weatherization programs have been developed over the past few years as a matter of expediency as an attempt to reduce the nation's total level of energy consumption. For example, the U.S. Department of Energy, the Department of Health and Human Services (formerly HEW), local utility companies (i.e. Mississippi Power and Light Company), Community Action Agencies, and social welfare agencies have all established these programs in pursuit of this national goal as a matter of public policy. While these programs were aimed at the total population, their primary focus was the economically and socially disadvantaged segments of the population (e.g., the female and elderly headed households and minorities) who could less afford to pay the ever increasing costs of household energy. Yet, in Mississippi, where we have the poorest of the poor, it is found that these programs have had little if any significant impact in reducing the total energy costs for these segments of the population. In fact, the data show that the real impacts of these programs have been more significant on other segments of the population than for those for whom the programs were designed to benefit.

The subsequent question that arises is should these programs be discontinued as a matter of public policy. In order to answer this question again let us review the research findings. The type of dwelling unit and the various conditional aspects of dwelling units consistently appear as major factors that affect energy costs for families regardless to their social status, socioeconomic conditions or other intrinsic characteristics. This suggests that the nation's energy problem as it relates to wasteful energy consumption at the household level is directly and explicably related to the nation's problem of poor quality housing; especially the quality of housing occupied by and provided for the poor, the elderly, minorities and other socially and economically disadvantaged segments of the population. The findings from this research emphatically support this fact. Therefore, any national policies that are to be developed that have as their major objective the reduction of household energy consumption must inevitably include some aspects that deal with housing quality standards.

It has been shown from this research and its data analyses that the socially and economically disadvantaged segment of Mississippi's population (as represented by the female and elderly households sample) overwhelmingly occupy rented housing when compared to the larger population. It has also been shown that their housing quality effects have more significant impacts on their total household energy costs. Thus, it must be concluded that the poor quality of rented housing, which is not maintained at levels comparable to owner-occupied housing, contributes substantially to excessive energy consumption, and to household energy costs. However, the effect of housing quality on energy consumption is not peculiar to the poor and socially disadvantaged. Hence, these effects of housing quality are indicated for the larger population, but not as significantly and not as extensively.

What this means is that national policies are needed that would require energy efficiency standards for rental housing. Such standards would be effective policy in two regards. First, it would aid in accomplishing the national goal of energy conservation by helping to reduce wasteful energy consumption. Secondly, it could aid in reducing energy costs for those who can least afford increased energy costs. Along with this policy should be one that would require better energy efficiency for newly built housing such as those standards that were implemented by the Federal Housing Administration for its E-3 housing several years ago. These standards would ensure the most efficient use of household energy for all builders and purchasers of new homes.

Another finding of these research results lends to public policy implications. These implications are derived from the noticeable impacts of the numbers and kinds of energy using features in households on the levels of total energy costs. Specifically, the kinds of energy using features (i.e. air conditioning, clothes dryer, automatic dishwasher) per se had relatively as much impacts individually as the total number of energy features. This finding implies that certain energy using features represent increased energy inefficiency, and therefore increased energy costs more so than a large number of energy using features in a household. The policy implication here is that increased energy efficiency standards on certain appliances and energy using features should become a matter of public policy. For example, the data overwhelmingly indicate that electrical appliances and cooling, and electric water heating add substantially to household energy costs. In Mississippi where electrical rates are among the highest in the nation and also where total electric homes were vigorously promoted for many years, this has become a serious problem for household energy consumers. Thus, some national standards are needed to ensure improved efficiency of such appliances with stringent regulations.

Energy programs designed to aid the poor and disadvantaged by subsidizing their energy bills during peak seasons cannot be considered as long range solutions to their energy problems. Also, energy conservation and weatherization programs designed to educate the disadvantaged segments of the population about ways of improving their energy efficiency are useless if these segments are not able financially to put into practice what they have learned as indicated by this study. Thus, it is seriously recommended that the continuation of such programs as a matter of public policy should be carefully reviewed in light of the findings of this and similar research. Perhaps an alternative policy or program consideration would be to establish a program to subsidize retrofitting and weatherization either through direct payments or low interest loans to the disadvantaged or to the owners of rental housing and requiring such retrofitting be done to rental housing occupied by energy subsidized occupants.

Further, it seems inevitable that low absolute prices for energy are rapidly becoming an historical fact rather than a potential for the future. It would take radically political and drastic policy actions to substantially reduce the absolute costs of energy to the public consumers. In an era of constrained fiscal stability it is highly unlikely that such measures as would be needed to control the spiralling increased in energy costs will be even seriously debated at most policymaking levels.

Chapter 6

Assessing the Racial Differences in Energy Using Features and Conservation Acts

by

James C. Smith

Traditionally, the impact of higher energy costs has been evaluated in terms of macroeconomic effects on the economy's performance. However, a macro approach cannot address the distributional incidence of energy using features, total repeated conservation actions, total conservation actions, and policy preferences among groups of people. Certainly, the effects of energy changes can be expected to vary from one income group to another, among racial groups, between those who believe that an energy crisis exists, and those who do not, and between single and elderly heads of households and the larger population.

This chapter evaluates energy using features and conservation actions among households headed by single and elderly blacks and whites, by way of comparison with the larger population. Consideration is given to demographics, as well as to how the energy crisis has affected leisure activities, belief in the energy crisis, and attitude toward energy conservation among the above groups. Participation in energy conservation programs and type of fuel for heating and cooling are also examined within the context of this chapter. Estimates for black and white households are based upon two sets of data.

The first part of this chapter presents a distribution analysis of total energy using features, total repeated actions and total single actions for both samples. Next we estimate discriminant functions using these and additional variables as the discriminating variable by racial grouping. Finally, the policy implications of the findings are examined.

Energy Using Features and Conservation Actions

In order to determine the prevalence of certain energy using appliances and conservation actions among the sample populations, first we compare total energy using features, total repeated actions, and total single actions for the larger population (1981 data) and the elderly and single female heads of households (1982 data). Total energy using features consist of the following items: air conditioning, washing machine, automatic dishwasher, clothes dryer, stove/range, refrigerator, separate deep freezer and television.

Table 6.1: Total Energy Using Features in the Respondents' Homes

Number of Energy Using Features in the Home	Large Population		Single and Elderly Population	
	Number	% of Total	Number	% of Total
1	1	0.1	5	0.4
2	23	1.8	34	2.9
3	81	6.3	162	14.0
4	165	12.6	271	23.4
5	225	17.4	275	23.8
6	229	23.1	192	16.6
7	304	23.5	127	11.0
8	191	14.7	54	4.7
None	6	0.5	36	3.1
Totals	1,295	100	1,156	100

Table 6.1 indicates that though discrepancies are present in the sub-samples, substantial percentages for all the groups indicate a pervasiveness of the most common appliances among the families. From Table 6.1 we see that a greater percent of female and elderly heads of households had five or six

energy using features than respondents in the larger population. However, the larger population had about an equal percentage of seven or eight energy using features. For the most part, more energy using features are prevalent among the larger population. In the larger population 23.5 percent of the respondents had eight energy using features, while only 11 percent of single and elderly heads of households had eight energy using features. The maximum number of energy using features (9); 14.7 percent of respondents in the larger population had nine features compared to 4.7 percent of the single and elderly population.

Next we compare conservation measures among the populations. Conservation measures adopted by the respondents are divided into single action measures which are also referred to as technical and repeated actions or behavioral measures which are enacted frequently or routinely.

First, we compare total repeated actions for the larger population and the single and elderly heads of households. These consist of the following actions: (1) turn off lights; (2) close drapes at night in winter; (3) close drapes during the day in summer; (4) five minute showers rather than baths; (5) adjust thermostat in the night; (6) adjust thermostat during the day; (7) adjust thermostat when the family is away; (8) turn dishwasher off before the drying cycle stops; (9) wash dishes and clothes with a full load; (10) wash clothes in warm and/or cold water and rinse in cold water; (11) dry clothes on clothes wire; (12) change/clean furnace filters; (13) reduce the use of electricity appliances/equipment; (14) limit the hours of television watching; (15) close off unused rooms; (16) reduce the hours of cooking; (17) drive within 55 mph.

Table 6.2: Total Repeated Conservation Actions

Actions	Larger Population		Single and Elderly Population	
	Total	% of Total	Total	% of Total
1	27	2.1	22	1.9
2	30	2.3	33	2.9
3	30	2.3	50	4.3
4	41	3.2	56	4.8
5	55	4.2	60	5.2
6	65	5.0	77	6.7
7	71	5.5	105	9.1
8	71	5.5	82	7.1
9	102	7.9	103	8.9
10	113	8.7	104	9.0
11	124	9.6	96	8.3
12	125	9.7	76	6.6
13	110	8.5	66	5.7
14	60	4.6	39	3.4
15	55	4.2	26	2.2
16	41	3.2	17	1.5
17	131	10.1	32	2.8
None	44	3.4	112	9.7
Totals	1,295	100	1,156	100

Table 6.2 shows there is little difference in the distribution of total repeated actions by the larger population and the single and elderly heads of households. However, 99.7 percent of the female single heads of households have implemented or repeated conservation actions.

Finally, we examine total single actions among the larger population and the single and elderly heads of households. The following repeated actions are analyzed: (1) insulated ceiling; (2) insulated the wall; (3) insulated both ceiling and wall; (4) insulated ducts and/or pipes; (5) insulated cover on water heater; (6) storm door for all doors; (7) storm door for some doors; (8) weather stripping for all doors; (9) weather stripping for some doors; (10) storm windows or insulated glass for all windows; (11) storm windows or insulated glass for some windows; (12) weather stripping for windows; (13) flow restrictor on showers; (14) lower wattage bulbs; (15) lower temperature on water heater.

Table 6.3: Total Single Conservation Actions

Repeated Conservation Actions	Larger Population		Single and Elderly Population	
	Total	% of Total	Total	% of Total
1	59	4.6	121	10.5
2	66	5.3	123	10.6
3	56	4.3	69	6.0
4	71	5.5	62	5.4
5	70	5.4	73	6.3
6	63	4.9	63	5.4
7	102	7.9	64	5.5
8	83	6.4	50	4.3
9	84	6.5	55	4.8
10	80	6.2	42	3.6
11	90	6.9	38	3.3
12	96	7.4	36	3.1
13	88	6.8	24	2.1
14	53	4.1	24	2.1
15	74	5.7	22	1.9
None	158	12.2	290	25.1
Total	1,295	100%	1,156	100%

In Table 6.3, on the one hand, about an equal number of the single and elderly heads of households have undertaken only one or two single actions toward conservation. The percent distribution are 10.5 percent and 10.6 percent respectively. In contrast, for the larger population the greatest percent (7.9) of the respondents have undertaken a total of seven single actions. An almost equal percent of the respondents in the larger population have undertaken eight to thirteen single actions. Nevertheless, the greatest distribution for both samples occurred in the no actions category.

The housing conditions of the elderly are in general worse than those of the population at large. Any assessment of the condition of a dwelling with reference to single conservation action is indeed a subjective measurement, but one can look at such factors as the age of the dwelling unit which relates directly to condition. In the present study we examined the relationship between the age of the respondents and the age of the dwelling unit; there is a Pearson's R of +.25 for the larger population and a Pearson's R of -.10 for the female and elderly heads of households. In both cases this indicates that the elderly occupy older dwelling units. In many ways this suggests that greater attention should be directed toward encouraging human behavior toward energy conservation by educating the masses and reimbursing low income families for cost associated with single actions.

Given the fact that for both single and repeated conservation actions the greatest percentage of respondents have undertaken no actions, the question remains if there exists a division among racial groups with regard to conservation measures. Therefore, the remainder of this chapter is concerned with energy using features and conservation actions and their differential effects among racial groups.

Estimation of Racial Discriminant Functions

In order to evaluate the difference in the population by energy using features, total repeated conservation actions, and total single conservation actions, a list of forty variables was provided for the larger population and for the single headed and elderly households. In the present study our concern is: what combination of variables is more important in determining racial differences? For the larger population air conditioning (VAR070) showed the greatest within group variation; (Wilk's Lambda .92) and turning off the dishwasher before the drying cycle ends showed the least within group variation. However, for single and elderly heads of households the type of cooling system (VAR038) showed the greatest within group variation (Wilk's Lambda .94) and reducing the number of cooking hours showed the least within group variation (Wilk's Lambda .70).

Of course, our chief concern is not with the cohesiveness of racial groups but with the difference in such groups. In order to statistically determine the difference between black and white single and elderly heads of households we estimate two discriminant functions.

First, we will define the functions on the basis of the variable that has the greatest discriminating power. Table 6.4 shows the definition of the functions using the standardized canonical discriminant function coefficients. When the sign on the standardized discriminant function coefficient is ignored, each coefficient represents the relative contribution of its associated variable to the function. The sign denotes whether the contribution of the variable is positive or negative.

For function I, participation in one energy program showed the greatest division between blacks and whites within the sample. For those persons participating in energy assistance programs the standardized canonical discrimi-

Table 6.4: Racial Standardized Canonical Discriminant Function Coefficients for Single and Elderly Heads of Households Sample

Variables	Function I Participation in one energy program	Function II Participation in more than one energy program
Age	+.12	+.17
Number of children	-.23	-.07
Employment status	+.24	+.29
Household income	+.15	+.20
Years of schooling	-.26	-.13
Type of dwelling unit	-.10	-.19
Number of rooms	-.12	-.01
Number of bedrooms	+.11	-.00
Number of bathrooms	+.12	.04
Type of cooling system	-.20	-.06
Use of fans	+.13	-.04
Type of cooking fuel	+.17	+.09
Washing machine	+.17	.09
Clothes dryer	+.14	-.09
Stove-Range	+.17	-.13
Refrigerator	-.17	+.04
Turn off light	-.25	+.05
5 min. showers	+.03	-.30
Adjust thermostat when not at home	-.16	-.27
Full load washing dishes and clothes	+.16	-.08
Reduce use of appliances	-.05	+.27
Reduce hours of cooking	-.11	-.05
Vacation plans	+.02	-.51
Recreation plans	-.23	+.27
Usual hobbies	+.30	-.30
Drinking for pleasure	.06	+.55
Other	-.23	-.05
Really no energy crisis	+.15	-.13
Policy action result from pressure	-.10	-.13

Table 6.4 (Cont'd)

Variables	Function I Participation in one energy program	Function II Participation in more than one energy program
Policy enactments not beneficial	-.12	-.00
Impose government control	+.26	+.03
Conservation vital goal	-.08	+.04
Nationalize energy companies	-.24	-.08
Special tax	+.19	+.18
Tax deductions	+.08	+.21
Total single actions	-.20	-.26
Total repeated actions	+.30	-.30
Participation in one program	-.37	+.69
Participation in more than one program	-.25	-.98
Eigenvalue	.36	.05
Canonical correlation^2	.27	.05
Wilk's Lambda	.70	.95
Chi-squared	399.2	56.8
D.F.	78	38
Significance	.00	.03
% Classification 71.28		

nant function coefficient is -.37. The next most significant variable in separating blacks and whites in the sample of single and elderly heads of households was total repeated conservation actions with a standardized discriminant function coefficient of +.30. Other relatively, significant variables were: the belief that the government should impose controls on the energy industry (+.26); years of schooling (-.26); and employment status (+.24).

For function II, participation in more than one energy program (-.98) provides the greatest separation between blacks and whites among single heads and elderly households. The variable contribution to the next division in function II is participation in one program (+.69). What is interesting about the two program participation variables is the difference in the signs. Participation in two or more energy programs made a negative contribution to function II, while participating in one energy program made a positive contribution. This indicates that there is very little difference among black and white single and elderly heads of households who participate in two or more programs, while for those who participate in one energy program there is greater separation.

The variables contributing the next greatest separation are those associated with the effects of the energy crisis on leisure activities. For instance, drinking for pleasure has a standardized discriminant function coefficient of +.55 and vacation plans has a coefficient of -.51.

By examining the canonical correlation squared we are able to determine the proportion of variance in the discriminant function explained by the discriminating variables. In Table 6.4, 27 percent of variance among black and white single and elderly heads of households is explained by the variables in function I, participation in one energy program. However, the variables in function II, participation in two or more energy programs explained only

.05% of the variance.

In the case of the larger population, the variable that shows the greatest discriminating power for racial groups in function I is cooking appliance (stove/range) and household income. Table 6.5 shows the standardized canonical discriminant function coefficients for the entire population using racial groups (black, white, and other). The standardized discriminant coefficient for cooking appliance (stove/range) is -.30 and for household income the coefficient is -.30. This is interesting in that household income and the type of cooking appliance (stove/range) moves in the same direction with equal discriminating power. Substantively, this suggests that lower income families have fewer energy consuming cooking appliances.

Age and income play a large role in influencing energy consumption patterns. With regard to income status, the older you are the more likely it is that you will be poor. For example, in 1973 only 11 percent of the total population was below the poverty level; 16 percent of the elderly was below the poverty level. In referring to function I, participation in one energy program, in Table 6.4 stove/range has a standardized coefficient of +.17 which suggests a significant difference in black and white female and elderly heads of households.

For function I the next greatest discriminating power is in the single conservation action — turning off lights. The coefficient for turning off lights is +.27 which is the inverse for single and elderly heads of households participating in one energy program. The coefficient for single and elderly heads of households is -.25. However, total repeated actions were next in line with a coefficient of -.26. In contrast, closing drapes at night in winter is +.20. With reference to demographic variables, the number of children had the greatest discriminating power with a standardized coefficient of +.21, while the greatest discriminating energy using feature was clothes dryers with

Table 6.5: Racial Standardized Canonical Discriminant Function Coefficients For the Total Population Sample

Variables	Function I Cooking Appliance	Function II Type of Cooling System
Total energy cost 1981	+.17	-.09
Marital status	+.03	+.19
Number of children	+.21	+.07
Household income	-.30	-.13
Years of schooling	+.15	-.07
Construction material	+.11	-.11
Ownership	-.14	-.18
Number of bathrooms	-.09	-.43
Primary heating system	-.15	-.18
Cooling system	-.12	+.54
Use of supplementary system	+.08	+.18
Type of fuel for cooling	-.20	-.01
Type of cooking fuel	-.01	-.20
Air conditioning	-.07	-.07
Clothes dryer	-.21	-.16
Stove-range	-.30	+.03
Separate deep freezer	+.11	+.11
Television	+.11	+.02
Turn off lights	+.27	+.11
Close drapes at night in winter	+.20	+.10
Close drapes during the day in summer	-.12	+.14
Adjust thermostat during the day	-.09	-.13
Turn dishwasher off before drying cycle stops	+.06	-.16
Wash full load of dishes and clothes	+.12	-.08
Change furnace filters	+.15	-.20
Close off unused rooms	-.06	-.18
Usual hobbies	-.11	-.38
Drinking for pleasure	-.09	+.20
Driving for pleasure	-.17	+.28

Table 6.5 (cont'd)

Variable	Function I Cooking Appliance	Function II Type of Cooling System
Conservation as a national goal	+.19	+.19
Stricter regulations to use less energy	-.11	+.25
Stricter regulations to use less fuel	-.16	-.23
Special tax on low mileage automobiles	+.10	-.21
Nationalizing gas and oil	+.16	+.12
Special tax on big automobiles	-.16	+.16
Tax deductions for car pooling	-.12	+.23
100% deduction for conservation cost	+.14	-.15
Total single actions	+.11	+.03
Total repeated actions	-.26	-.10
Participation in one energy program	-.03	-.40
Eigen	.35	.07
Canonical correlation[2]	.26	.06
Wilk's Lambda	.69	.93
Chi-squared	473	88
D.F.	88	39
Significance	.00	.00
% Classification 73.04		

a coefficient of -.21.

For function II, type of cooling system provides the greatest separation between blacks and whites. The variable's coefficient for this function is +.54. The next best variable for discriminating separation between blacks and whites in function II is the number of bathrooms, with participation in one energy program (-.40) providing the third greatest discrimination.

With regard to the impact of the energy crisis upon leisure activities, function II provided the greatest separation; usual hobbies has a coefficient of -.38; drinking for pleasure +.20 and driving for pleasure +.28.

When we consider our ability to discriminate between the canonical discriminant functions, function I, cooking appliance, explains the greatest between group variation to within group variance (Wilk's Lambda). The canonical correlation squared for function I, cooking appliance, is .26, and the Wilk's Lambda is .69, while the canonical correlation squared for function II, type of cooling system, is .06 and the Wilk's Lambda is .93. The chi-squared test for the level of significance of the Wilk's Lambda is significant at the .00 level.

Policy Implications

We have seen how single and elderly heads of households compare to the larger population along several dimensions: total energy using features, repeated and single conservation actions. From the results of the discriminant functions, differences in black and white households depend on participation in energy assistance programs and types of energy using features. For the single and elderly heads of households, participation in energy programs is most prevalent; compared to the larger population, energy using features are most prevalent.

From a policy perspective this suggests that participation in energy programs is skewed along racial lines, as well as social status lines (single and elderly). However, it is of relatively little importance to ascertain the effects of the energy crisis on single and elderly heads of households if no federal or local government agency is willing to provide assistance to lessen the impact on this target group. In making recommendations for the future for single and elderly heads of households, the following are considered to be realistic policy alternatives:

1. Develop an agreement with the State Allocation Office that will provide for reorganizing and dealing with the special needs of single and elderly persons.

2. Make representations before the Public Utility Commission designed to lead to the development of regulations that would assure equitable utility rates for older persons.

3. Work for the development of an agreement with the Public Service Commission to assure that services will not be arbitrarily cut off for those persons unable to pay for such services.

4. Develop a program utilizing existing public and private resources to assist in the insulation of single and elderly persons' homes.

In order to devise the most effective, efficient, and equitable energy program, it is imperative that we look at other alternatives to energy conservation in conjunction with tax policy. The isolated and interrelated effects of these alternatives should be assessed not only with regard to the objective of energy conservation, but also with regard to other objectives such as minimizing the recessionary impacts and minimizing adverse effects on low income groups. In particular, the potential impacts upon single and elderly heads of households should be taken into account along with other considerations.

For the larger population, it is evident that high saturation of major energy equipment is more prevalent among the larger population. The largest gaps in ownership of appliances for the larger population are dishwashers, clothes dryers, color television, and air conditioning. Nevertheless, the poor have little advantage to conserve energy by cutting back on lighting or the use of luxury appliances.

Certainly, a policy alternative which would provide assistance to both the larger population and single and elderly heads of households, in addition to encouraging energy conservation would require a restructuring of utility rates. The "declining block" rate structure rewards intensive consumers of electricity and places a burden on consumers of smaller quantities, often single and elderly heads of households. Utility rates could be entirely restructured to provide for an increase in the average price of kilowatt hours for larger blocks of electricity consumption. Hence, the typical declining block rate structure would be inverted to become an inclining block rate structure.

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To The Respondent:

The Research Institute for Socio-Technical Problems at Jackson State University is conducting a study on the Socio-Economic Impact of the Restrictive Energy Economy on the families in Mississippi. The project is funded by the U. S. Department of Energy. Here to date there has been little available comprehensive data on the impact of energy crisis on the families in Mississippi. The over-all goal of this study is to examine the comparative needs and problems faced by families in coping with the energy crisis. These data will be helpful in suggesting policies to the Government through the U. S. Department of Energy.

Hence we solicit your full cooperation in completing this questionnaire. All the information will be strictly confidential and no names or personal identity will be revealed. We would appreciate your taking time off to respond to these questions.

Thank you

I.D. No. ______

Interviewer:

RESTRICTIVE ENERGY IMPACT SURVEY

Department of Sociology
Jackson State University

Interview Schedule

I. Topography

1. Population (If inside the city limit indicate population and name of the city and if rural indicate route number and density.)

		Name of the City	Route No.	Density
1. Less than 2,500	____			
2. 2,500 - 5,000	____			
3. Above 5,000	____			

2. Name the County ______________

3. Type of County
   1. Urban ____
   2. Rural ____
   3. Other Specify ____________

4. Non-White Composition of the County
   1. More than 60% ____
   2. 40-59% ____
   3. 39% or less ____

5. Climate of the County.

	Winter	Summer
1. Average diurnal range for	____	____
2. Average monthly temperature	____	____

II. Personal Background of the Respondent

6. Sex: 1. Male ____
   2. Female ____

7. Race: White 1. ____
   Black 2. ____
   Other, Non-White Specify ______________

8. Age:
Less than 24 yrs. 1._____
25 - 29 yrs. 2._____
30 - 34 yrs. 3._____
35 - 49 yrs. 4._____
50 - 54 yrs. 5 _____
55 - 59 yrs. 6._____
60 - 64 yrs. 7._____
65 and above 8. _____

9. Marital Status:
Never Married 1._____
Married 2._____
Widowed 3 _____
Divorced 4._____
Separated 5._____

10. Head of the Household
1. One person _____
2. Two person _____

11. Number of children living with the respondent and their age:
1. None
2. Under 6 yrs. old _____
3. 6 - 13 yrs. old _____
4. 14 - 17 yrs. old _____
5. 18 yrs. old and over _____

12. Employment Status

1. Employed _____
2. Unemployed _____
3. Retired _____
4. Laid-Off _____

If employed, what is your present work. If not employed now what is/was your usual work when employed? Be specific:(Check from the following list)

White Collar:
1. Professional and technical _____
2. Managers and administrators, except farm _____
3. Sales worker _____
4. Clerical Worker _____

Blue Collar:
5. Craft and kindred worker _____
6. Operatives - except transport _____
7. Transport equipment operative _____
8. Non-farm laborer _____

Service Workers:
9. Private household _____
10. Farm worker _____
11. Other, Specify ____________________

13. If your spouse is employed what is her/his occupation? Write the number from the above mentioned categories.____________________

14. What is your household annual income, after tax? (Include income from all sources).
   1. less that $ 5,000 ______
   2. $ 5,000 - $ 7,999 ______
   3. $ 8,000 - $10,999 ______
   4. $11,000 - $13,999 ______
   5. $14,000 - $16,999 ______
   6. $17,000 - $19,999 ______
   7. $20,000 - $22,999 ______
   8. $23,000 - $25,999 ______
   9 $26,000 and above ______

15. How many years of schooling you have completed?
   1. No schooling ____
   2. Elementary (1-6 yrs.) ____
   3. Junior High (7 - 8 yrs.) ____
   4. Senior High, Vocational, Diploma (9-12 yrs.) ____
   5. Junior College (1 -2 yrs. of college) ____
   6. Senior College (4 yrs. of college) ____
   7. Beyond 4 yrs. of college ____

16. How many years of schooling has your spouse completed? (Write the number from the list for Q. 15) ________

III. Type of Housing

17. Of what type is your dwelling unit?
   1. Apartment ____
   2. Duplex ____
   3. Single dwelling unit ____
   4. Mobile home ______
   5. Other, Specify ______

18. Type of construction material (Check appropriate responses)
   1. Brick ____
   2. Cinder block ____
   3. Wood frame and siding ____
   4. Masonite ____
   5. Asbesotos Siding ____
   6. Metal siding ____

19. What type of roof do you have?
   1. Asphalt shingles ____
   2. Tin ____
   3. Fiber glass sheets ____
   4. Wood shingle ____
   5. Asphalt and Gravel ____
   6. Other, Specify ______

20. Do you own or rent your dwelling unit?
   1. Own ___
   2. Rent ___

21. If you rent, do you pay your own utilities?
   1. Yes ____ Not Applicable ____
   2. No ____

22. If yes, how much on an average do you pay per month for the following utilities?
   1. Gas $______
   2. Electricity $______
   3. Not applicable ____

23. What is the approximate size of your house (heating area)
1. Under 500 sq. ft. _____
2. 501 - 1000 sq. ft. _____
3. 1001-1999 sq. ft. _____
4. 2000 sq. ft. or more _____

24. How many rooms do you have including bathroom and kitchen?

Rooms	Bedrooms	Bathrooms
1. 1_____	1_____	1_____
2. 2_____	2_____	2_____
3. 3_____	3_____	3_____
4. 4_____	4_____	4 or more__
5. 5_____	5_____	
6. 6 or more_____		

25. How old is the house or the apartment complex you live in? (If you are not sure try to make an approximate guess?)
1. less that 2 yrs. _____
2. 2-3 yrs. 11 mths. _____
3. 4-5 yrs. 11 mths. _____
4. 6-7 yrs. 11 mths. _____
5. 8-9 yrs. 11 mths. _____
6. 10 yrs. or older _____

26. What is your primary heating system (check all appropriate responses)
1. Central system by vent _____
2. Heating in individual rooms by flue _____
3. Heating in individual rooms by portable space heaters or stoves _____
4. No regular heating system _____
5. Use supplementary room heaters _____
6. Fireplace or wood heater _____
7. Floor furnance _____

27. What type of cooling system do you have? (Check all appropriate responses)
1. Central air-conditioning system _____
2. Cooling in individual rooms by window air conditioners _____
3. Use fans _____
4. Other, Specify _____________

28. Do you use supplementary fans or heaters?

1. Use fan/s in summer _____
2. Use heater/s in winter _____
3. Use both _____
4. Use neither fan nor heater _____

29. What is the type of fuel you use for space heating and cooling?

	Heating	Cooling
1. Natural gas	______	______
2. Bottled, tank, or LP gas	______	______
3. Wood	______	______
4. Electricity	______	______
5. Other (Kerosene, coal, coke, fuel oil, other)	______	______
6. Do not use any fuel at all	______	______

30. What type of water heater do you presently have?

1. Electric ______
2. Natural gas ______
3. LP ______
4. Butane ______
5. Other, Specify ______

31. How many water heaters do you have?

1. None ______
2. 1 ______
3. 2 ______
4. More than 2 ______

32. What type of fuel do you use for cooking?

1. Natural gas ______
2. Electricity ______
3. Butane ______
4. LP gas ______
5. Wood ______
6. Other, Specify ______

33. On the average how much do you pay for the following energy sources per month.

	Amount	Not Applicable
1. Electricity	$______	______
2. Natural gas or other fuel	$______	______
3. Gasoline	$______	______

34. On the average how much did you pay per month for the following energy sources in 1976 and 1980?

	1976	1980	Not applicable
1. Electricity	$______	$______	______
2. Natural gas or other fuel	$______	$______	______
3. Gasoline	$______	$______	______

35. On the average how much did you pay per month on these energy sources in 1980:

	Summer/Fall	Winter/Spring	Not applicable
1. Electricity	$______	$______	______
2. Natural gas or other fuel	$______	$______	______
3. Gasoline	$______	$______	______

36. On the average how much did you spend per month in 1976 and 1980 on the following:

	1976	1980	Not applicable
1. Food	$____	$____	____
2. Shelter (payment toward the house)	$____	$____	____

37. On the average how much did you spend per year on the following in 1976 and 1980?

	1976	1980	Not applicable
1. Clothing	$____	$____	____
2. Medical expenses	$____	$____	____

IV. Energy Using Features in the House:

38. From a list of major appliances below check those that you have:

a 1. Central air-conditioning ____
2. Window air-conditioning ____

b 3. Automatic washing machine ____
4. Wringer washing machine ____

c 5. Automatic dishwater ____

d 6. Gas clothes dryer ____
7. Electric clothes dryer ____

e 8. Gas range or stove ____
9. Electric range or stove ____

f 10. Electric Refrigeration (frost free) ____
11. Requires defrosting ____
12. Gas Refrigeration ____
13. Separate (deep or upright) food freezer ____

g 14. Black and White TV ____
15. Color TV ____

V. Single Actions or Measures Taken Once:

This section contains two lists of action that people take to save energy in their home. The first list contains action that are usually done once, while the second list contains actions that are done frequently. Please indicate the actions by choosing the number of the most appropriate response.

Don't know	= 1
Have not done it and do not plant to	= 2
Have not done it yet but will do it soon	= 3
Was already done	= 4
(You) have already done it	= 5
Not applicable	= 6

39. Insulation						
1. Ceiling insulation	1	2	3	4	5	6
2. Wall insulation	1	2	3	4	5	6
3. Ceiling and wall insulation	1	2	3	4	5	6
4. Insulating heating ducts and/or hot water pipes	1	2	3	4	5	6
5. Putting an insulated cover on the hot water heater	1	2	3	4	5	6
40. All doors to outside:						
1. Storm doors for all doors	1	2	3	4	5	6
2. Storm doors for some doors	1	2	3	4	5	6
41. Weather Stripping on doors						
1. Weather stripping for all doors	1	2	3	4	5	6
2. Weather stripping for some doors	1	2	3	4	5	6
42. Windows:						
1. Storm windows or insulated glass for all windows	1	2	3	4	5	6
2. Storm windows or insulated glass for some windows	1	2	3	4	5	6
43. Weather stripping on Windows						
1. Weather stripping for windows	1	2	3	4	5	6
44. Miscellaneous						
1. Installing flow restricter in shower/s	1	2	3	4	5	6
2. Replacing bulbs with one of lower wattage	1	2	3	4	5	6
3. Lowering the temperature in water heater	1	2	3	4	5	6

VI. Repeated Action to Save Energy:

How frequently do you do each action?

Almost Never = 1
Occasionally = 2
Frequently = 3
Almost always = 4
Not applicable = 5

45.	Turn off lights when room is not in use	1	2	3	4	5
46.	Close drapes at night in winter	1	2	3	4	5
47.	Close drapes during the day in summer	1	2	3	4	5
48.	Take 5 minutes shower rather than baths	1	2	3	4	5
49.	Adjust the thermostat at night.	1	2	3	4	5
50.	Adjust the thermostat during the day	1	2	3	4	5
51.	Adjust the thermostat when all the family is away	1	2	3	4	5
52.	Turn dishwasher off before the drying cycle and open the door	1	2	3	4	5
53.	Wash dishes and clothes with a full load	1	2	3	4	5
54.	Wash clothes in warm and/or cold water and rinse in cold water	1	2	3	4	5
55.	Dry clothes on clothes line rather than in dryer in summer	1	2	3	4	5
56.	Change or clean furnace filters	1	2	3	4	5
57.	Reduce the use of electrical appliances/ equipments	1	2	3	4	5
58.	Limit the hours of TV watching	1	2	3	4	5
59.	Close off unused rooms	1	2	3	4	5
60.	Reduce the hours of cooking	1	2	3	4	5
61.	Drive within 55 MPH speed limit	1	2	3	4	5
62.	Try to use car pool when possible	1	2	3	4	5

63. What temperature do you maintain on your thermostat during the day and at night in winter?

	Day	Night
1. Under 65 degree	____	____
2. 65 - 67 degree	____	____
3. 68 - 70 degree	____	____
4. 71 - 73 degree	____	____
5. 74 - 76 degree	____	____
6. More than 76 degree	____	____
7. Not applicable	____	____

64. What temperature do you maintain on the thermostat during the day and at night in the summer?

	Day	Night
1. Under 65 degrees	____	____
2. 65 - 67 degrees	____	____
3. 68 - 70 degrees	____	____
4. 71 - 73 degrees	____	____
5. 74 - 76 degrees	____	____
6. More than 76 degrees	____	____
7. Not applicable	____	____

VII. Awareness and Participation in weatherization programs:

65. Are you aware of the DOE's (Department of Energy) Weatherization Assistance Program?
1. Yes ____
2. No ____

66. What is the source of your information?
1. Radio ____
2. TV ____
3. Community Programs ____
4. Newspaper
5. Friends, relatives and neighbors ____
6. Other, Specify ____________

67. Have you participated or participating in that Program?
1. Yes ____
2. No ____

68. Are you aware of HEW/HHS (Health and Human Services) Energy Assistance Program?

1. Yes ____
2. No ____

(If the answer is 'No' go to Q. 69)

69. If yes, what is your source of information
1. Radio ____
2. TV ____
3. Community Programs ____
4. Newspaper ____
5. Friends, relatives, neighbors ____
6. Other, Specify ____________________

70. Have you participated or participating in that Program?
1. Yes ____
2. No ____

71. Does your utility company have energy conservation and weatherization program?

1. Yes ____
2. No ____
3. Don't know ____

(If the answer is 'don't know' go to Q. 74)

72. What is the source of your information?

1. Radio ____
2. TV ____
3. Community Programs ____
4. Newspaper ____
5. Advertisement through mail ____
6. Friends, relatives, neighbors ____
7. Other, Specify ____

73. Have you participated or participating in this program?

1. Yes ____
2. No ____

74. What is the approximate cost that you incurred on the weatherization and energy conservation program over the last few years?

1. Less than $100 ____
2. $201 - $400 ____
3. $401 - $600 ____
4. $601 - $800 ____
5. $801 - $1000 ____
6. $1001 and above ____
7. Not applicable ____

75. On the average what percentage of the cost have you saved on energy because of the weatherization and energy conservation measures?

1. Less that 10% ____
2. 11 - 15% ____
3. 16 - 20% ____
4. 21 - 25% ____
5. 26% or more ____
6. Not applicable ____

76. Are you aware that tax exemption can be claimed for expenses incurred in weatherizing your home?

1. Yes ____
2. No ____

77. If yes, have you claimed such exemptions during the last four years?

1. Yes ____
2. No ____
3. Not applicable ____

III. Effect of Energy Shortage On: (Since 1976)

78. Educational Plans:

	Yes	No	Not Applicable
1. Did you or any other member of your family have to drop academic courses or classes on account of increased energy cost in your budget and/or commuting problems?	____	____	____
2. Was the academic performance of any of your family members affected because of energy shortage like lighting facilities, high utility bills, etc.	____	____	____
3. Did you or any member of your family had to postpone educational improvement plans due to increased energy cost in your budget?	____	____	____

79. Employment Impacts: (Since 1976)

	Yes	No	Not Applicable
1. Have any members of your family been laid off their job as a result of energy shortage?	____	____	____
2. If yes, how many?____________			
3. Have working hours or wages of any members of your family been reduced as a result of the energy crises?	____	____	____
4. If yes, for how many members?__________			
5. Have you or any members of your family been affected in job improvment as a result of the energy shortage?	____	____	____
6. If yes, for how many?____________			
7. Have you or any member of your family attempted or have gained employment closer to your home because of energy shortage?	____	____	____

8. How do you travel to your place of work?
   1. Car pool ____
   2. Public transportation ____
   3. Own car ____
   4. Walk or use bicycle ____

90. Health or Medical Impact: (Since 1976)

	Yes	No	Not Applicable
1. Have you or any member of your family cut down on the number of visits to your doctor, dentist because of increase in the price of energy or inflation in general?			
2. Has the quantity and/or quality of food that you cook been affected on account of increase in energy cost?			
3. Have you or any member of your family postponed treatment of any illness on account of higher cost of living?			
4. Have you or any member of your family experienced a higher incidence of illness because of energy conservation: i.e., colds, influenza, arthritis, bursitis, etc.			

91. Leisure Activities

Has the increased cost of energy and gasoline affected your: (Circle the appropriat number since 1976. The meaning of these numbers is as follows:)

Very rarely = 1
Rarely = 2
Sometimes = 3
Most of the time = 4
All of the time = 5
Not applicable = 6

1.	Holiday plans	5	4	3	2	1
2.	Vacation plans	5	4	3	2	1
3.	Recreation plans	5	4	3	2	1
4.	Usual hobby/ies	5	4	3	2	1
5.	Drinking for pleasure	5	4	3	2	1
6.	Driving for pleasure	5	4	3	2	1
7.	Other, Specify ______________					

Probe (ask for details, if any of the activities have been affected)

____

____

____

92. Social Relations:

1. On account of increased cost of energy and gasoline have you cut down the number of visits to your: (check yes or no)

	Yes	No	Not applicable
a. Friends	____	____	______
b. Neighbors	____	____	______
c. Relatives	____	____	______

2. To save energy have you cut down your social gatherings, get togethers, etc. with your: (Check yes or no)

	Yes	No	Not applicable
a. Friends	____	____	______
b. Neighbors	____	____	______
c. Relatives	____	____	______

3. How often do you take help from friends or neighbors to transport your child/children to or from school, scouts, leagues, etc., because of high energy cost? (Check one response)

1. Friends	Almost never	____
	Occasionally	____
	Frequently	____
	Always	____
2. Relatives	Almost never	____
	Occasionally	____
	Frequently	____
	Always	____

IX. Belief in Energy Crisis:

At present energy shortage has become a common word and every person is feeling the pinch of this shortage. Please circle the correct number as a response to various statements made below:

Strongly disagree = 1
Disagree = 2
No opinion = 3
Agree = 4
Strongly agree = 5

93.	There is really no energy crisis in the way of shortages. The crisis is just made up by oil companies so they can increase price.	1	2	3	4	5
94.	Policy actions directed toward the energy situation are made in response to pressure from lobbies in Washington and not because of real energy shortage.	1	2	3	4	5
95.	The energy policy enactments are not beneficial to the common man. (eg. driving within 55 mph. etc.)	1	2	3	4	5
96.	The law related to energy conservation are meant for the poor to obey and the rich to ignore.	1	2	3	4	5
97.	The main problem that our country faces today is the energy crisis.	1	2	3	4	5
98.	The only way to get families to conserve energy is by imposing government control.	1	2	3	4	5
99.	The price of energy is too low when considering that most energy resources cannot be replaced.	1	2	3	4	5
100.	Greater energy conservation must be a vital goal for Americans for the rest of this century.	1	2	3	4	5

X. Attitude Toward Energy Conservation:

Taking into account the seriousness of energy shortage the government should take some measures to save energy. Below are some statements pertaining to it. Please indicate your opinion by circling the correct number.

Strongly disagree = 1
Disagree = 2
No opinion = 3
Agree = 4
Strongly agree = 5

101.	There should be stricter regulations to make sure people use less energy.	1	2	3	4	5
102.	There should be stricter regulations to make sure industries use less fuel.	1	2	3	4	5
103.	The automobile manufacturers should be made to pay a special tax for producing cars that get poor gas mileage.	1	2	3	4	5
104.	The schools, factories, offices should observe four-day week to conserve energy.	1	2	3	4	5
105.	There should be rationing of gasoline.	1	2	3	4	5
106.	The government should put oil and gasoline companies under national control.	1	2	3	4	5
107.	Consumers should be made to pay a special tax for buying bigger car's that give poor mileage.	1	2	3	4	5
108.	Special tax reductions should be given to persons participating in car pools to their place of work.	1	2	3	4	5
109.	All expenditures on housing conservation measures like storm doors, windows, additional insulation etc. should be one hundred percent deductible.	1	2	3	4	5

XI. Automobile Information:

110. How many cars do you have in your household?
1_____
2_____
3_____
4+_____

111. What types of car/s and/or truck/s do you own?

1. Small ____
2. Subcompact ____
3. Compact ____
4. Intermediate ____
5. Standard ____
6. Luxury ____
7. Pick-up truck, trailer, etc. ____
8. Other, specify ________

112. How many miles did you travel on an average per year

		Not Applicable			Not Applicable
1976	____	______	1978	____	______
1977	____	______	1979	____	______
			1980	____	______

113. What are the three most important reasons for using your car? Write your priority as 1, 2, and 3.
1. Shopping ____
2. Visit to the doctor or dentist ____
3. Visit friends, relatives ____
4. Recreation or social activities ____
5. Going to religious activities ____
6. Going to work ____
7. Other, specify ____

114. On an average how many separate trips are made by your household per day (Place of work, shopping, schools, etc.)

1_____
2_____
3_____
4 or more_____

Needed Elderly Sample In Counties*

				White Elderly			Black Elderly		
County	Total Elderly Population	% Total Sample	Total Sample Size	Total White Elderly	% County Sample	Needed Sample Size	Total Black Elderly	% County Elderly	Needed Sample Size
Bolivar	3251	12.8	79	1065	33	26	2186	67	53
Desoto	1493	5.9	37	798	53	20	695	47	17
Hinds	10082	39.6	246	6293	62	153	3789	38	93
Lauderdale	4689	18.4	114	3230	69	79	1459	31	35
Leake	1461	5.7	35	1031	71	25	430	29	10
Marshall	1333	5.2	32	577	43	14	756	57	18
Pike	1669	10.5	65	1747	66	43	922	34	22
Stone	477	1.9	12	374	78	93	103	22	3
Totals	25455	100	620	15115		329	10249		251

*Based on required sample size of 1000. Total obtained sample equals 1156 for combined female and elderly households.

Needed Female-Headed Households In Counties*

				White Female Heads			Black Female Heads		
County	Total Female-Headed Households	% Total Sample	Total Sample Size	Total White Female-Heads	% County Sample	Needed Sample Size	Total Black Female-Heads	% County Sample	Needed Sample Size
Bolivar	1964	12.6	48	394	20	10	1570	80	38
Desoto	7757	4.8	18	336	44	8	421	56	10
Hinds	7784	49.9	190	3021	39	74	4763	61	116
Lauderdale	2479	15.9	60	1206	49	29	1273	51	31
Leake	5526	3.4	13	247	47	6	279	53	7
Marshall	714	4.5	17	180	25	4	534	75	13
Pike	1208	7.7	29	475	39	11	733	61	18
Stone	194	1.2	5	116	60	3	78	40	2
Totals	15626	100	3800	5975		145	9617		235

*Based on required sample size of 1000. Total obtained sample equals 1156 for combined female and elderly households.