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LIHEAP Energy Burden Evaluation Study

Final Report

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Figures and Tables

List of Acronyms and Abbreviations

ACF	Administration for Children and Families
CDD	Cooling Degree Days
CPI	Consumer Price Index
CPS	Current Population Survey
DEA	Office of Community Services' Division of Energy Assistance
DHLC	Design Heat Load Computation
EIA	Energy Information Agency
EL	Electricity
FO	Fuel Oil

FY	Fiscal Year
GPRA	Government Performances and Results Act
HDD	Heating Degree Days
HHS	U.S. Department of Health and Human Services
KE	Kerosene
LIHEAP	Low Income Home Energy Assistance Program
LIEAP	Low Income Energy Assistance Program
LPG	Liquefied Petroleum Gas
mmBTUs	Million British Thermal Units
NC	No cases in sample
NG	Natural Gas
OCS	Administration for Children and Families' Office of Community Services
RECS	Residential Energy Consumption Survey
SEPER	State Energy Price and Expenditures Report

Executive summary

The Low Income Home Energy Assistance Program (LIHEAP) is one of seven block grants originally authorized by the Omnibus Budget Reconciliation Act of 1981. LIHEAP is administered at the federal level by the Department of Health and Human Services (HHS) through the Office of Community Services (OCS) in the Administration for Children and Families (ACF). In 1994, the purpose of the LIHEAP statute was amended to clarify that the program is "to assist low income households, particularly those with the lowest income, that pay a high proportion of household income for home energy, primarily in meeting their immediate home energy needs." (The Human Services Amendments of 1994, Public Law 103-252, Sec. 2602(a) as amended.) Furthermore, Congressional Committees indicated in 1994 that LIHEAP grantees needed to reassess their LIHEAP benefit structures to ensure that they are targeting those low income households that have the highest energy costs or needs.[1]

Purpose of study

The purpose of this evaluation study is to assess to what extent the LIHEAP program is serving the lowest income households that have the highest energy burdens.[2] The study uses data from the 2001 Residential Energy Consumption Survey (RECS) to examine the distribution of income and energy burden for low income households and identify those that have the lowest incomes and highest energy burdens (i.e., high burden households). The study uses the 2001 RECS LIHEAP Supplement to measure the effectiveness of the FY 2001 LIHEAP program in serving high burden households. The study quantifies program effectiveness using targeting performance measures.[3] The study also identifies procedures for updating energy burden targeting performance statistics in the future.

Federal LIHEAP targeting performance

The Government Performance and Results Act (GPRA) of 1993 established a government-wide requirement for federal agencies to develop performance goals and measures for federal programs. OCS has responsibility under GPRA for developing the annual LIHEAP program performance plan and an annual report on LIHEAP program performance. The GPRA performance plan for LIHEAP must take into account that LIHEAP is a block grant whereby LIHEAP grantees have broad flexibility to design their programs, within very broad federal guidelines, to meet the needs of their citizens.

National LIHEAP program goal

The LIHEAP program does not have sufficient funds to serve all of the households that are income eligible under the federal maximum income eligibility standard. Given that limitation, the LIHEAP statute requires LIHEAP grantees to provide, in a timely manner, that the highest level of assistance will be furnished to those households that have the lowest incomes and the highest energy costs or

[1] In this regard, both the House and Senate Committees on Education and Labor urged that LIHEAP grantees use actual energy bills in determining energy burdens and designing their benefit structures (H. Report 103-483, Part I dated April 26, 1994, and S. Report 103-251, April 19, 1994).

[2] We would like to acknowledge the useful critique that Joel Eisenberg, Director of Oak Ridge National Laboratory's Washington D.C. office provided in reviewing an early draft of this report.

[3] The estimates in this report are based on data collected from the Energy Information Administration's Residential Energy Consumption Survey (including the experimental LIHEAP Supplement) and the Census Bureau's Annual Social and Economic Supplement to the Current Population Survey. As with all surveys, the estimates may differ from actual population values because of sampling variation and nonsampling errors associated with the surveys. Unless indicated otherwise, statements in this report about the differences have not been subjected to statistical tests for significance.

needs in relation to income, taking into account family size. The LIHEAP statute identifies two groups of low-income households as having the highest home energy needs: vulnerable households and high burden households. Vulnerable households are those with at least one member that is a young child, an individual with disabilities, or a frail older individual. High burden households are those households with the lowest incomes and highest home energy costs.

National LIHEAP performance goals

Based on the national LIHEAP program goals, OCS has focused its initial performance goals and measurement on targeting income eligible vulnerable households and income eligible high burden households. The current performance goals are:

- Increase the percent of LIHEAP recipient households having at least one member age 60 years or older.
- Increase the percent of LIHEAP recipient households having at least one member age 5 years or younger.
- Increase the percent of LIHEAP recipient households having the lowest incomes and the highest energy costs.

Baseline data for the elderly and young child targeting performance goals have been measured to provide a picture of the current status of recipiency targeting performance across the country.

Targeting performance for high burden households is part of the LIHEAP performance measurement plan. However, prior to the completion of the 2001 RECS LIHEAP Supplement, there were no data at the national level sufficient to develop performance measurement statistics for recipiency targeting for high burden households. The goals of this study are to develop baseline performance statistics for high burden household targeting and suggestions for updating these performance statistics over time.

Defining LIHEAP targeting indexes

Performance goals must be measurable in order to determine if the goals are being achieved. OCS has developed a set of performance indicators (i.e., targeting indexes) that provide for the collection of quantitative measures regarding the following aspects of LIHEAP targeting performance:

- The **recipiency targeting index** quantifies recipiency targeting performance. The "recipiency targeting index" for a specific group of households is computed by comparing the percent of LIHEAP households that are members of the target group to the percent of all income eligible households that are members of the target group.
- The **benefit targeting index** quantifies benefit targeting performance. The index is computed by comparing the mean LIHEAP benefit for a target group of recipients to the mean LIHEAP benefit for all recipient households.
- The **burden reduction targeting index** quantifies burden reduction targeting performance. The index is computed by comparing the percent reduction in the median individual energy burden for a target group of recipients to the percent reduction in the median individual energy burden for all recipients.

The LIHEAP performance measurement plan has established performance goals only for recipiency targeting performance. Further, baseline performance statistics have been developed only for targeting to vulnerable households. This study is focused on development of baseline performance

statistics for targeting to high burden households. In addition, this study presents information that will allow OCS to consider whether benefit and burden reduction targeting performance measurement statistics should be added to the LIHEAP performance measurement plan.

Analysis of energy burden

The LIHEAP statute identifies "households with the lowest incomes and highest home energy costs" as one of the groups with the "highest home energy needs." However, the statute does not furnish an operational definition that can be used to identify such households. This study uses energy burden as the statistic to classify households with respect to income and energy costs. This study further defines households as high burden if they have an energy burden that exceeds a threshold level. This section of the report describes how energy burden is computed and how the threshold level for high burden was selected.

Measurement of energy burden

Energy burden can be defined as the share of annual household income that is used to pay annual energy bills. For example, if a household has a gross annual energy bill of $1,000 and a gross annual income of $10,000, the household's gross energy burden is 10 percent of income. In the RECS study, responding households report gross annual income, but annual energy bills for a household are obtained from the household's energy suppliers.

The household's net energy burden is defined as the share of annual household income that is used to pay annual energy bills net of the household's LIHEAP grant. For example, if a household has a gross annual energy bill of $1,000 and LIHEAP benefit of $250, the household's net energy bill is $750. If the household's annual income is $10,000, the household's net energy burden is 7.5 percent of income. In the RECS LIHEAP Supplement, LIHEAP assistance amounts were obtained for households from state LIHEAP administrative data.

Defining high energy burden

Energy burden varies significantly between income groups. For example, households with incomes under $10,000 have average home energy burdens of 6.3 percent, while those with incomes above $50,000 have average home energy burdens of 0.9 percent. Lower income households tend to have higher energy burdens than higher income households.

Energy burden also varies significantly among income groups. One tenth of the households with incomes below $10,000 have a home energy burden less than 1.6 percent, while one tenth have a home energy burden greater than 22.2 percent. Energy burden is not simply a function of income, but is also affected by the size of the household's energy bill.

To categorize households as high burden, this study sets an energy burden threshold; i.e., households with an energy burden that exceeds a fixed percentage of income are defined as high burden households. This approach was selected over a population share approach (which defines a certain share of the population as having a high energy burden) and a variance approach (which defines high energy burden as lying one standard deviation above the mean). The threshold approach is preferred because it allows the number of high burden households to rise and fall as energy prices increase and decrease.

It is theoretically possible to develop an energy burden threshold that would be analytically meaningful in the context of energy affordability. However, the data needed for that study are not available and collecting such data is beyond the scope of this study. For this study, the high burden threshold makes use of research that has been conducted in the housing sector. Some housing

analysts have defined a housing burden of 50 percent of income as a severe burden. For low income households, since total residential energy costs are about 21.8 percent of shelter costs, high total residential energy burden is defined as energy burden greater than or equal to 10.9 percent of income. High home energy burden is defined as home energy burden greater than or equal to 4.3 percent of income.

However, it is important to understand that high energy burden is related to, but not the sole determinant of the need for energy assistance. Each household has a unique set of financial circumstances that determine whether they have the financial resources to pay for an adequate supply of energy (i.e., a supply of energy that keeps the household healthy and safe.) While states can use energy burden indicators to compare need among households, they also should consider other information that is available on the financial circumstances of the household.

Energy burden statistics

The most important findings from this study relate to the relationship between income and the characterization of households as having high home energy burden.

- Low income households (i.e., households with income at or below the LIHEAP federal maximum income standard) represent over 92 percent of all households that have a high home energy burden. Over 36 percent of low income households are categorized by this study as having a high home energy burden. Only about 1 percent of non low income households are categorized as having a high home energy burden.

- Households with incomes less than $20,000 per year represent over 95 percent of all households that have a high home energy burden. Almost two-thirds of households with incomes below $10,000 are characterized as having a high home energy burden.

The study also furnishes a number of other important findings with respect to the geographic and demographic distribution of high home energy burden.

- Elderly low income households are more likely to have high home energy burden than other types of low income households.

- Almost 40 percent of low income households that have a high home energy burden live in the South Census Region.

- Almost 40 percent of low income households that have a high home energy burden are one-person households.

- Renters and apartment dwellers are less likely to have high home energy burden than other types of households.

These statistics illustrate the challenge faced by the LIHEAP program. In 2001, about 13.4 million households were characterized by this study as having a high home energy burden. About 8.8 million high burden households have incomes below the HHS poverty guideline. About 7.0 million high burden households have incomes less than $10,000. About 5.0 million high burden households are elderly and almost 3 million have a young child.

LIHEAP targeting performance

This study presents energy burden statistics for LIHEAP recipient households and the resulting targeting performance measures for high burden households, including recipiency targeting, benefit targeting, and burden reduction targeting.

2001 RECS LIHEAP Supplement

The 2001 RECS LIHEAP Supplement was designed to furnish high quality data for LIHEAP recipient households. It achieved this by developing a LIHEAP recipient sample frame directly from state LIHEAP administrative records. The Supplement improves on the core RECS in two ways. The LIHEAP Supplement uses state administrative records to identify LIHEAP recipient households and furnish information on energy assistance benefits, rather than relying on respondent reports.

Energy burden statistics

There are a number of reasons that LIHEAP recipient households are expected to have higher energy bills and energy burdens than other LIHEAP eligible households. LIHEAP funds are allocated to geographic areas with higher energy bills. Households with higher energy burdens are more likely to have difficulty paying energy bills and have more incentive to apply for LIHEAP.

The statistics from this study confirm that LIHEAP recipients have higher energy bills and burdens than other LIHEAP eligible households. Median home energy expenditures for LIHEAP recipients are $613 and the median home energy burden is 5.6 percent. For eligible nonrecipients, median expenditures are $440 and median burden is 3.0 percent. About 62 percent of LIHEAP recipients have high home energy burden, while the rate for eligible nonrecipients is only 34 percent.

The LIHEAP program helps to make energy bills more affordable for LIHEAP recipients. In FY 2001, median home energy expenditures for LIHEAP recipients were $613 and the median LIHEAP benefit was $318, for a net home energy bill of about $295. While the median gross home energy burden was 5.6 percent of income, the median net home energy burden was 1.9 percent of income.

LIHEAP targeting performance measurement statistics for FY 2001

LIHEAP targeting performance measurement statistics help to quantify the effectiveness of LIHEAP targeting for FY 2001.

- Recipiency targeting – About 36 percent of eligible households have a high home energy burden, but over 62 percent of LIHEAP recipient households have a high home energy burden. The recipiency targeting index for high home energy burden households is 170 indicating that the program targets high burden households.

- Benefit targeting – The average LIHEAP benefit for all recipient households is $380, but the average LIHEAP benefit for high burden households is $411. The benefit targeting index is 108, indicating that the program targets higher benefits to high burden households.

- Burden reduction targeting – For the average LIHEAP recipient, home energy burden is reduced by 52 percent, from 8.0 percent of income to 3.8 percent of income. For high burden households, home energy burden is reduced by 51 percent, from 11.3 percent of income to 5.5 percent of income. The burden reduction targeting index is 98, indicating that the program does not achieve a higher level of burden reduction for high burden households.

The study shows that, in FY 2001, the LIHEAP program served high burden households at a higher rate than other households. In addition, the program gave high burden households higher benefits, but did not give them benefits that were high enough to match the burden reduction for recipient households that did not have high home energy burden.

Overall LIHEAP program performance

The national LIHEAP performance goals target increasing the percentage of LIHEAP recipients that are elderly, have a young child, and have a high home energy burden. The statistics from this study show that the program has already made substantial progress toward those three goals.

- About 60 percent of LIHEAP recipients have a high home energy burden.
- About 90 percent of LIHEAP recipients have an elderly member, have a young child, or have a high home energy burden.
- About 40 percent of LIHEAP recipients have a high home energy burden **and** also are in one of the other target groups.

Improving the performance of the LIHEAP program with respect to any of those goals would require increasing the percentage of households that fulfill more than one of the goals.

Conclusions

This study finds that the LIHEAP program targets LIHEAP benefits to the households with the highest home energy needs as defined by the LIHEAP statute (i.e., vulnerable households and high burden households). However, the program could further increase the rate at which it targets households that both are vulnerable and have a high home energy burden. In addition, the study finds that, on average, the program does not give higher benefits to the households that are in the greatest need.

Improving targeting performance

LIHEAP grantees can improve the performance of the LIHEAP program by placing a greater emphasis on serving and providing higher benefits to high burden households. The most accurate way to increase LIHEAP program targeting is to measure home energy burden for all application households, to give high burden households priority in receipt of energy assistance grants, and to furnish high burden households with higher program benefits. In the absence of procedures to measure home energy burden, grantees can serve higher burden households by prioritizing benefits for low income households and furnishing higher benefits to lower income households, since income is the best proxy for energy burden.

This study finds that the national performance goals set by the LIHEAP program are complimentary and that all three targeting indexes need to be tracked simultaneously. Until this study was conducted, the program was able to only furnish information on the serving elderly and young child households. By focusing on those goals, without information on the goal of serving households with high home energy burden, the program might move in the direction of serving fewer households with high home energy burden.

Within the limitations on federal LIHEAP administrative funds for grantees, a practical way to collect information on the performance of the LIHEAP program with respect to serving high burden households is through the RECS LIHEAP Supplement. However, to be more useful, the RECS

LIHEAP Supplement needs to be updated more often than the current schedule of administration once every four years.

Meeting the needs of low income high burden households

Neither the LIHEAP statute nor the federal government furnishes an operational definition of "high burden" households. This study developed an operational definition of high burden households in order to assess LIHEAP targeting performance for high burden households. The definition was derived from established standards for severe shelter burden. However, this definition has not been subjected to a thorough peer review from experts in the low income energy field. Moreover, since the need for energy assistance is dependent on the unique financial circumstances of individual households, grantees should continue to use procedures that account for such circumstances in their benefit determination procedures.

Using the definition proposed in this study, over 12 million low income households were categorized as having high home energy burden and over 7 million low income households were categorized as both vulnerable and having high home energy burden in FY 2001. In 2001, about 90 percent of the 4.4 million recipients were either vulnerable or high burden household, and about 40 percent were both vulnerable and high burden households. While these statistics demonstrate that the program is serving targeted households (i.e., households that are either vulnerable or high burden), the program might be able to further increase targeting to households with the highest home energy needs (i.e., those that are both vulnerable and high burden).

Energy researchers should consider whether this definition of "high burden" households is useful as an empirical analysis standard for analyzing LIHEAP performance. A next step in this research program is to solicit comments on the definition from experts in the low income energy field and should examine the implications of adopting this definition for analytical purposes.

I. Introduction

The Low Income Home Energy Assistance Program (LIHEAP) is one of seven block grants originally authorized by the Omnibus Budget Reconciliation Act of 1981. LIHEAP is administered at the federal level by the Department of Health and Human Services (HHS) through the Office of Community Services (OCS) in the Administration for Children and Families (ACF). In 1994, the purpose of the LIHEAP statute was amended to clarify that the program is "to assist low income households, particularly those with the lowest income, that pay a high proportion of household income for home energy, primarily in meeting their immediate home energy needs." [4] (The Human Services Amendments of 1994, Public Law 103-252, Sec. 2602(a) as amended.) Furthermore, Congressional Committees indicated in 1994 that LIHEAP grantees needed to reassess their LIHEAP benefit structures to ensure that they are targeting those low income households that have the highest energy costs or needs.[5]

Purpose of study

The purpose of this evaluation study is to assess to what extent the LIHEAP program is serving the lowest income households that have the highest energy burdens. The study uses data from the 2001 Residential Energy Consumption Survey (2001 RECS) to examine the distribution of income and energy burden for low income households and identify those that have the lowest incomes and highest energy burdens (i.e., high burden households). The study uses the 2001 RECS LIHEAP Supplement to measure the effectiveness of the FY 2001 LIHEAP program in serving high burden households. The study quantifies program effectiveness using targeting performance measures. The study also proposes procedures for updating the FY 2001 targeting energy burden performance statistics in the future.

The Government Performance and Results Act (GPRA) of 1993 established a government-wide requirement for federal agencies to develop performance goals and measures for federal programs. Beginning in FY 1999, GPRA required federal agencies to submit program performance plans and reports on an annual basis. OCS has responsibility under GPRA for developing the annual LIHEAP program performance plan and an annual report on LIHEAP program performance.

OCS has developed a GPRA performance measurement plan based on the legislative goals of LIHEAP. The plan calls for measurement of LIHEAP recipiency targeting rates that show the extent to which the LIHEAP program serves vulnerable households and the households with the lowest income and highest energy burdens (i.e., high burden households). OCS has developed baseline performance statistics for LIHEAP targeting to vulnerable households and has undertaken performance enhancement initiatives to increase the targeting of such households. Prior to the release of the 2001 RECS LIHEAP supplement, the available data sources were inadequate to develop recipiency performance statistics for LIHEAP targeting to high burden households.

OCS also has defined performance indicators relating to the targeting of LIHEAP benefits. Special studies of energy burden and benefit distribution data at the state level have demonstrated the

[4] The statutory intent of LIHEAP is to reduce home heating and cooling costs for low-income households. However, information on total residential energy costs is more accessible and more apparent to LIHEAP-recipient respondents. Moreover, any reduction in home heating and cooling costs leads to a direct reduction in total residential energy costs. Therefore, this report will sometimes refer to the broader measure of total residential energy costs.

[5] In this regard, both the House and Senate Committees on Education and Labor urged that LIHEAP grantees use actual energy bills in determining energy burdens and designing their benefit structures (H. Report 103-483, Part I dated April 26, 1994, and S. Report 103-251, April 19, 1994).

usefulness of benefit targeting and burden reduction targeting indexes as LIHEAP performance indicators. However, prior to the 2001 RECS LIHEAP Supplement, no data sources were available to examine benefit targeting at the national level.

Definition of terms

Table 1-1 furnishes the reader with definitions of special terms that are used throughout this study.

Table 1-1. Definition of special terms

Term	Definition
AIA Zones	Areas classified by the number of heating and cooling degree days.
Billing data	Energy expenditure and consumption data furnished by the household's energy supplier(s).
Cooling degree days (CDD)	Daily CDD are computed by comparing the mean temperature for a day to a base temperature (65 degrees Fahrenheit). If the mean temperature on a day is 70, the number of CDD for that day is 5 (70 minus 65). Annual CDD refers to the sum of all CDD experienced during a year.
Energy burden (gross)	The percentage of gross annual household income that is used to pay annual residential energy bills.
Energy end uses	The specific use of energy in the home for home heating, home cooling or ventilation, water heating, and appliances.
Fuel assistance	LIHEAP heating, cooling, and crisis assistance.
Household income (gross)	The total amount of income received by a household, before subtracting income taxes, payroll taxes, and certain work expenses.
Heating degree day (HDD)	Daily HDD are computed by comparing the mean temperature for a day to a base temperature (65 degrees Fahrenheit). If the mean temperature on a day is 60, the number of HDD for that day is 5 (65 minus 60). Annual HDD refers to the sum of all HDD experienced during a year.
High burden households	Households with the lowest incomes and highest energy expenditures.
Home energy burden	The share or percentage of annual household income that is used to pay annual home heating and home cooling expenditures.
Home energy expenditures	Expenditures for home space heating and home space cooling and ventilation.
LIHEAP income eligible households	Households with incomes below the federal maximum LIHEAP income standard, i.e., at or below the greater of 150 percent of the HHS poverty guidelines or 60 percent of state median income.
LIHEAP recipient households	Households that received home heating, cooling, or energy crisis benefits during FY 2001 according to state LIHEAP administrative records.
MmBTUs	A British Thermal Unit (BTU) is the amount of energy necessary to raise the temperature of one pound of water one degree Farenheit. MmBTUs refers to millions of BTUs. The average household uses about 100 mmBTUs of energy per year.
Net energy burden	The household's energy burden after the receipt of LIHEAP fuel assistance.
Residential energy burden	The percentage of annual household income that is used to pay for all residential energy used in the home.

Term	Definition
Residential energy expenditures	Energy expenditures for all residential uses, including home heating, home cooling or ventilation, water heating, refrigeration, lights, and appliances.
Vulnerable households	Households with at least one member who is 60 years of age or older or 5 years of age or younger.[6]

Organization of report

The remaining sections in this study are organized as follows.

- Section II – Federal LIHEAP Targeting Performance. This section describes the GPRA performance goals and performance measures in the LIHEAP annual performance plan.

- Section III – Analysis of Energy Burden. This section furnishes data and analyses on residential energy burden and home energy burden for CY 2001. Subsections include measurement of energy burden; defining high energy burden; energy burden by income group, by vulnerable group, by geography, by household characteristics, and by housing unit characteristics.

- Section IV –LIHEAP Targeting Performance. This section furnishes data and analysis that measures LIHEAP targeting performance for FY 2001. It furnishes baseline measures of recipiency targeting performance with respect to high burden households, baseline statistics on benefit and burden reduction targeting performance for high burden and vulnerable households, and an assessment of targeting performance on other geographic, demographic, and housing characteristics.

- Section V – Findings and Conclusions. This section furnishes findings and conclusions regarding the use of targeting performance measures that relate to targeting high burden households and the targeting of LIHEAP benefits.

- Appendix A – 2001 Residential Energy Consumption Survey. This appendix provides information on the 2001 RECS and how energy burden estimates were developed.

- Appendix B – 2001 RECS LIHEAP Supplement. This appendix provides information on the 2001 RECS LIHEAP Supplement and how energy burden estimates for LIHEAP recipients were developed.

- Appendix C – Map of US Census Regions

[6] The legislation also includes individuals with disabilities, but this study does not include those individuals due to limitations in the available data.

II. Federal LIHEAP targeting performance

GPRA focuses on program results to provide Congress with more objective information on the achievement of statutory objectives or program goals. The resulting performance data are to be used in making decision on budget and appropriation levels. The GPRA performance plan for LIHEAP must take into account that the federal government does not provide LIHEAP assistance to the public. Instead, the federal government provides funds to states, federal or state-recognized Indian tribes/tribal organizations, and insular areas to administer LIHEAP at the local level. LIHEAP grantees have broad flexibility to design their programs, within very broad federal guidelines, to meet the needs of their citizens.

National LIHEAP program goal

LIHEAP is not an entitlement program. The amount of LIHEAP funding varies by state. Therefore, the LIHEAP program is unable to serve all of the households that are income eligible under the federal maximum income eligibility standard.[7] In FY 2002, 13 percent of federally income eligible households received assistance with their heating costs. Given that limitation, the LIHEAP statute requires LIHEAP grantees to provide, in a timely manner, that the highest level of assistance will be furnished to those households that have the lowest incomes and the highest energy costs or needs in relation to income, taking into account family size. The LIHEAP statute identifies the following two groups[8] of low-income households as having the highest home energy needs:

- *Vulnerable Households*: Vulnerable households are those with at least one member that is a young child, an individual with disabilities, or a frail older individual. The statute does not define the terms "young children," "individuals with disabilities," and "frail older individuals." The primary concern is that such households face serious health risks if they do not have adequate heating or cooling in their homes. Health risks can include death from hypothermia or hyperthermia and increased susceptibility to other health conditions such as stroke and heart attacks**.**

- *High Burden Households*: High burden households are those households with the lowest incomes and highest home energy costs. The primary concern is that such households will face safety risks in trying to heat or cool their home if they cannot pay their heating or cooling bills**.** Safety risks can include use of makeshift heating sources or inoperative/faulty heating or cooling equipment that can lead to indoor fires, sickness, or asphyxiation**.**

The authorizing legislation requires states to design outreach procedures that target LIHEAP recipiency to income eligible vulnerable and high burden households, and to design benefit computation procedures that target higher LIHEAP benefits to higher burden households.

National LIHEAP performance goals

Based on the national LIHEAP program goals, OCS has focused its initial performance goals and measurement on targeting income eligible vulnerable households and income eligible high burden households. OCS's performance plan focuses the LIHEAP program on "increasing the availability of LIHEAP fuel assistance to vulnerable and high-energy burden households whose health and/or safety

[7] Not all income eligible households are eligible under state program rules.
[8] These groups are not mutually exclusive. A household can be in both groups at the same time.

are endangered by living in a home without sufficient heating or cooling." The current performance goals are:

- Increase the percent of LIHEAP recipient households having at least one member age 60 years or older.
- Increase the percent of LIHEAP recipient households having at least one member age 5 years or younger.
- Increase the percent of LIHEAP recipient households having the lowest incomes and the highest energy costs.

Baseline data for the elderly and young child targeting performance goals have been measured to provide a picture of the current status of recipiency targeting performance across the country. The baseline data serve as a starting point against which the degree of change in LIHEAP targeting can be measured, analyzed, and attributed to federal performance enhancement initiatives. The baseline data also provide a roadmap to set realistic recipiency performance standards (a quantitative statement of the degree of desired change) for those parts of the country in which recipiency targeting performance can be improved.

Targeting performance for high burden households is part of the LIHEAP performance measurement plan. However, prior to the completion of the 2001 RECS LIHEAP Supplement, there were no data at the national level sufficient to develop performance measurement statistics for recipiency targeting for high burden households.

Defining LIHEAP targeting indexes

Performance goals must be measurable in order to determine if the goals are being achieved. OCS has developed a set of performance indicators (i.e., targeting indexes) that provide for the collection of quantitative measures regarding the following aspects of LIHEAP targeting performance:

- The **recipiency targeting index** quantifies recipiency targeting performance. The index is computed for a specific group of households by comparing the percent of LIHEAP households that are members of the target group to the percent of all income eligible households that are members of the target group. For example, if 25 percent of LIHEAP recipients are high burden households and 20 percent of all income eligible households are high burden, the recipiency targeting index for high burden households is 125 (100 times 25 divided by 20).
- The **benefit targeting index** quantifies benefit targeting performance. The index is computed by comparing the mean LIHEAP benefit for a target group of recipients to the mean LIHEAP benefit for all recipient households. For example, if high burden household recipients have a mean benefit of $250 and the mean benefit for all households is $200, the benefit targeting index is 125 (100 times $250 divided by $200).
- The **burden reduction targeting index** quantifies burden reduction targeting performance. The index is computed by comparing the percent reduction in the median individual energy burden for a target group of recipients to the percent reduction in the median individual

energy burden for all recipients.[9] For example, if high burden recipients have their energy burden reduced by 25 percent (e.g., from 8 percent of income to 6 percent of income) and all recipient households have their energy burden reduced by 20 percent (e.g., from 5 percent of income to 4 percent of income), the burden reduction targeting index is 125 (100 times 25 divided by 20).

The development of these indexes facilitates tracking of recipiency, benefit, and burden reduction performance for vulnerable and high burden households.

- The recipiency performance data allow for outreach initiatives to improve recipiency targeting performance.

- The benefit and burden reduction performance data facilitate analysis of how different kinds of benefit determination procedures lead to different levels of benefit targeting performance.

The benefit targeting index and the burden reduction targeting index are both useful indicators, but they measure the different aspects of benefit targeting.

- The benefit targeting index requires fewer data elements; it is a simple measure of how benefits for a particular group of recipient households compare to benefits for all recipient households.

- The burden reduction index is more comprehensive; it accounts for differences in both energy costs and benefit levels for the group of recipient households compared to energy costs and benefit levels for all households.

The LIHEAP performance measurement plan has established performance goals only for recipiency targeting performance. Further, baseline performance statistics have been developed only for targeting to vulnerable households. This study is focused on development of baseline performance statistics for targeting to high burden households. In addition, this study presents information that will allow OCS to consider whether benefit and burden reduction targeting performance measurement procedures and statistics should be added to the LIHEAP performance measurement plan.

Interpreting targeting indexes

Recipiency targeting indexes can be used in the following ways to examine the effectiveness of outreach initiatives to households with vulnerable members:

- In absolute terms, if a group has a recipiency targeting index over 100, it means that the group receives benefits at a rate higher than the eligible household population.

- In relative terms, if a group of vulnerable households is served at a higher rate than are recipient households with no vulnerable members, that group has been targeted. For example, if the targeting index for elderly households is 90 and the index for households with no vulnerable members is 75, elderly households are served at a higher rate than are households with no vulnerable members.

[9] In general, the mean (or average) is preferred to the median (or midpoint), as it is more informative. The mean is the sum of all values divided by the number of values, or what is commonly called the average. The median is the value at the midpoint in the distribution of values. LIHEAP benefits are not highly skewed (or distorted) variables; therefore, mean benefits are used to compute the benefit targeting index. Because energy burden is a highly skewed statistic, the median energy burden, which is less affected by extreme values, is used to calculate the burden reduction index.

Benefit and burden reduction targeting indexes can be used in the following ways to examine the effectiveness of benefit determination procedures in serving households with vulnerable members and households with high energy burdens:

- In absolute terms, if a group has a benefit or burden reduction targeting index greater than 100, the group receives higher benefits (benefit targeting index) or experiences a greater burden reduction (burden reduction index) than the average for all recipient households. If a group has a benefit or burden reduction targeting index less than 100, the group receives lower benefits (benefit targeting index) or experiences a smaller burden reduction (burden reduction index) than the average for all recipient households. For example, if the benefit targeting index for elderly households is 125, this indicates that elderly households receive an average benefit that is 25 percent higher than the average for all recipients.

- In relative terms, if a group of vulnerable households has a higher targeting index than recipient households with no vulnerable members, that group has been targeted. For example, if the benefit targeting index for elderly households is 90 and the targeting index for recipient households with no vulnerable members is 75; this indicates that elderly households have higher benefits. If the burden reduction targeting index for elderly households is 90 and the targeting index for recipient households with no vulnerable members is 75, this indicates that elderly households have a greater percentage reduction in energy burden.

III. Analysis of energy burden

The purpose of this evaluation study is to assess to what extent the LIHEAP program is serving the lowest income households that have the highest energy costs. The purpose of this section of the study is to explain how energy burden is used to identify the lowest income households with the highest energy costs and to examine the geographic and demographic dimensions of energy burden. Information is presented on both residential energy burden (i.e., energy for all residential purposes) and home energy burden (i.e., energy for home space heating and home space cooling). Energy burden statistics are reported by income group, Census Region, Census Division, vulnerable group, household characteristics, and housing unit characteristics.

Measurement of energy burden

Energy burden can be defined as the share of annual household income that is used to pay annual energy bills.[10] Energy burden is characterized as "the percent of income spent on energy" and is computed for an individual household as:

Energy Burden = 100 * (Annual Energy Bill) ÷ (Annual Income)

For example, if a household has an annual energy bill of $1,000 and a gross annual income of $10,000, the energy burden is 10 percent.

This study examines both residential energy burden and home energy burden.[11]

- Residential energy burden refers to the share of income spent on energy for all residential uses, including home heating, home cooling or ventilation, water heating, refrigeration, lighting, and other household appliances.

- Home energy burden refers to the share of household income spent on energy for home space heating and home space cooling.

This study also examines gross energy burden and net energy burden.

- Gross energy burden, referred to as energy burden, is defined as annual energy expenditures as a share of annual household income.

- Net energy burden is defined as the household's energy burden after the receipt of a LIHEAP grant. Net energy burden for an individual household is computed as:

  Net Energy Burden = 100 * (Energy Bill – LIHEAP Benefit) ÷ (Annual Income)

  For example, if a household has an annual energy bill of $1,000, a LIHEAP benefit of $250, and a gross annual income of $10,000, the energy burden is 10 percent and the net energy

[10] See Appendix A for information on energy burden computation procedures.

[11] As previously noted, the statutory intent of LIHEAP is to reduce home heating and cooling costs for low-income households. However, information on total residential energy costs is more accessible and more apparent to LIHEAP-recipient respondents. Moreover, any reduction in home heating and cooling costs leads to a direct reduction in total residential energy costs.

burden is 7.5 percent. Net energy burden is used extensively in Section IV of the study to examine the impact of the LIHEAP program on households.

Energy burden can be used to compare energy expenditures among households and groups of households. For example, consider the case where one household has an energy bill of $1,000 and an income of $10,000 and a second household has an energy bill of $1,200 and an income of $24,000. While the first household has a lower energy bill ($1,000 for the first household compared to $1,200 for the second), the first household has a much higher energy burden (10 percent of income compared for the first household compared to 5 percent of income for the second). The LIHEAP program guidelines suggest that the first household has a greater need for LIHEAP benefits. In fact, the first household in the example would need a LIHEAP benefit of $500 to reduce its net energy burden to 5 percent of income, the energy burden experienced by the second household. Throughout this study energy burden and net energy burden are used to compare the need for energy assistance among groups of low income households.

In most cases, energy burden is calculated using gross annual income (i.e., the total amount of income received by the household). However, many state LIHEAP programs use net income when considering a household's need for energy assistance. These states may subtract income taxes, payroll taxes, excessive medical costs, and certain work expenses from income to compute net annual income. It might be valuable to examine energy burden statistics developed using net annual income. However, the 2001 RECS survey that was used for this study only collected data on gross annual income.

Variation in energy burden

Energy burden is a function of income and energy expenditures. Since residential energy expenditures increase more slowly than income, lower income households have higher energy burdens. For example, Table 3-1 shows the median residential energy expenditures and median residential energy burden by income group.[12] Median residential energy expenditures increase as income increases; median residential energy expenditures for households with income below $10,000 are $923 and median residential energy burden is 15.9 percent, compared to median expenditures of $1,688 and median burden of 2.3 percent for households with incomes of $50,000 or more. The median energy bill for households with incomes of $50,000 or more is almost twice the size of the median energy bill for households with income below $10,000. However, the energy burden for the highest income households is only about 15 percent of the energy burden for the lowest income households.

Table 3-2 shows the average home energy expenditures and average home energy burden by income group. Home energy expenditures increase more slowly than income; thus, households with lower incomes have higher home energy burdens. Median home energy expenditures for households with income below $10,000 are $350 and median home energy burden is 6.3 percent, compared to $684 and median energy burden of 0.9 percent for households with incomes of $50,000 or more.

[12] This report furnishes point estimates that are developed from the 2001 RECS and the 2001 RECS LIHEAP Supplement. Since these surveys have complex samples, special analysis procedures are required to develop confidence intervals for the statistics presented in this report. At the time that these statistics were developed, the data required to develop variance estimates were not available to the project team.

Table 3-1. Residential energy expenditures and residential energy burden by income group, United States, 2001

Income group	Number of households	Median residential energy expenditures	Median residential energy burden
$0-<10,000	11,035,000	$923	15.9%
$10,000-<20,000	16,580,000	$1141	7.4%
$20,000-<30,000	13,975,000	$1242	5.0%
$30,000-<40,000	13,902,000	$1291	3.7%
$40,000-<50,000	13,194,000	$1402	3.1%
$50,000 or more	38,303,000	$1688	2.3%

Source: 2001 RECS.

Table 3-2. Home energy expenditures and residential energy burden by income group, United States, 2001

Income group	Number of households	Median home energy expenditures	Median home energy burden
$0-<10,000	11,035,000	$350	6.3%
$10,000-<20,000	16,580,000	$446	2.9%
$20,000-<30,000	13,975,000	$505	2.0%
$30,000-<40,000	13,902,000	$532	1.5%
$40,000-<50,000	13,194,000	$570	1.3%
$50,000 or more	38,303,000	$684	0.9%

Source: 2001 RECS.

Energy burden varies significantly from household to household. For example, Table 3-3 shows that the median residential energy burden in 2001 for households with income less than $10,000 was 15.9 percent. However, 10 percent of households had residential energy burdens less than less than 5.7 percent (10th percentile) and 10 percent of households had residential energy burdens greater than 52.1 percent (90th percentile). Similarly, Table 3-4 shows that 10 percent of households with income less than $10,000 had home energy burdens less than 1.6 percent (10th percentile) and 10 percent had home energy burdens greater than 22.2 percent (90th percentile). These statistics show that energy burden and the need for energy assistance vary considerably even within the group of households with incomes less than $10,000.

Table 3-3. Distribution of residential energy burden for all households and for households with income less than $10,000, United States, 2001

Income group	Number of households	Mean energy burden	Median energy Burden	Energy burden 10th percentile	Energy burden 90th percentile
0-<$10,000	11,035,000	23.2%	15.9%	5.7%	52.1%
$10,000 or more	95,955,000	4.2%	3.3%	1.6%	8.1%

Source: 2001 RECS.

Table 3-4. Distribution of home energy burden for all households and for households with income less than $10,000, United States, 2001

Income group	Number of households	Mean energy burden	Median energy Burden	Energy burden 10th percentile	Energy burden 90th percentile
$0-<10,000	11,035,000	9.7%	6.3%	1.6%	22.2%
$10,000 or more	95,955,000	1.7%	1.3%	0.4%	3.5%

Source: 2001 RECS.

Defining high energy burden

Since this evaluation study is focused on energy burden as an indicator of need for LIHEAP benefits, it is useful to set levels for low, moderate, and high energy burden. Three main approaches have been used in existing research to define level of energy burden:

- The "variance" approach defines high energy burden as lying one standard deviation above the mean energy burden. For a normal statistical distribution, about two-thirds of households fall within one standard deviation of the mean. This implies that about one-sixth of the population would be categorized as high burden.

- The "absolute value" approach defines high energy burden as energy burden that is "unaffordable" due to being above a fixed percentage of income. It is challenging to define that fixed share – some studies have picked 6 percent of income while others have used 25 percent of income as a standard for high residential energy burden. However, using such an absolute standard would make tracking high burden households more consistent over time.

- The "population share" approach defines households with high energy burdens based upon a percentile distribution. For example, high burden households might be characterized as the 10 percent of households with the highest energy burden.

This study uses an absolute value approach because it furnishes more consistent information than the other two approaches.

- The variance approach makes the assumption that the statistic of interest has a statistically normal distribution. However, the distribution of energy expenditures is skewed by high values for a small number of households. As a result, the standard deviation is larger than for a normal distribution, causing the number of households included in the "high burden" group to be lower than expected.

- The population share is too rigid in its construction. It says that a certain percentage of low income households (e.g., 25 percent) have high burden. However, if energy prices rise rapidly as they did in 2001, the energy burden at which a household is categorized as high energy burden also rises. Alternatively, if prices fall significantly, the energy burden at which a household is categorized as high energy burden also falls.

The absolute value approach used for this study is based on the broader concept of housing burden. Some researchers have defined severe shelter burden as shelter costs greater than or equal to 50 percent of income.[13] This study defines high energy burden as the "energy share" of severe housing

[13] Cushing N. Dolbeare. 2001. "Housing Affordability: Challenge and Context." Cityscape: A Journal of Policy Development and Research, (5)2:111-130. A Publication of the U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

burden. The median total residential energy costs for households at or below 150 percent of the HHS poverty guidelines are 21.8 percent of shelter costs.[14] For households with shelter costs of 50 percent of income, residential energy costs would be about 10.9 percent of income (computed as 21.8 percent of 50 percent). Therefore, if residential energy costs for a household exceed 10.9 percent of income, it would help to push the household's shelter costs above 50 percent of income. So, this study defines a residential energy burden of 10.9 percent income as a high residential energy burden. Similarly, moderate shelter burden is defined as shelter costs at or greater than 30 percent of income but less than 50 percent of income. Therefore, moderate residential energy burden is defined as total residential energy costs above 6.5 percent of income and less than 10.9 percent of income.

Defining High Residential Energy Burden: The Absolute Value Approach

Severe Shelter Burden = 50% of income

Median residential energy costs for low income households = 21.8% of shelter costs

*High residential energy burden = 50% * 21.8% =* ***10.9% of income***

Moderate Shelter Burden = 30% of income

Median residential energy costs for low income households = 21.8% of shelter costs

*Moderate residential energy burden = 30% * 21.8% =* ***6.5% of income***

This study also defines total home energy burden in terms of severe shelter burden. Heating and cooling expenditures comprise 39.3 percent of total residential energy expenditures. Therefore, high home energy burden is defined as heating and cooling costs that exceed 4.3 percent of income. Moderate home energy burden is defined as heating and cooling costs above 2.6 percent of income but less than 4.3 percent of income.

However, it is important to understand that high energy burden is related to, but not the sole determinant of the need for energy assistance. Each household has a unique set of financial circumstances that determine whether they have the financial resources to pay for an adequate supply of energy (i.e., a supply of energy that keeps the household healthy and safe.) While states can use energy burden indicators to compare need among households, they also should consider other information that is available on the financial circumstances of the household.

Energy burden by income group

This evaluation study is focused on households that are income eligible for the LIHEAP program under the federal maximum income standard (i.e., low income households). Table 3-compares the distribution of residential energy burden for low income households to the distribution for households that are not LIHEAP eligible (i.e., non low income households). Table 3-6 compares the distribution of home energy burden for low income households to the distribution for non low income households.

These tables show that the median residential energy burden for low income households is almost three times the median for non low income households, and that the median home energy burden for low income households is almost three times the median for non low income households. Over one-third of low income households had high residential and home energy burdens, but very few non low income households had high residential energy burdens or high home energy burdens.

[14] Source: 2001 American Housing Survey.

Table 3-5. Distribution of residential energy burden for low income households, non low income households, and all households, United States, 2001

Household group	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%
Non low income	73,184,000	3.1%	2.8%	1.4%	5.3%	3.6%	0.4%
All households	106,989,000	6.1%	3.6%	1.6%	11.4%	11.5%	10.8%

Source: 2001 RECS.

Table 3-6. Distribution of home energy burden for low income households, non low income households, and all households, United States, 2001

Household group	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%
Non low income	73,184,000	1.3%	1.1%	0.4%	2.4%	7.1%	1.4%
All households	106,989,000	2.6%	1.4%	0.5%	5.0%	12.3%	12.5%

Source: 2001 RECS.

Tables 3-5 and 3-6 show that even among low income households, residential and home energy burden vary considerably. Tables 3-7 and 3-8 provide a more in-depth distribution of residential energy burden and home energy burden, respectively, for low income households by income level. About 67.6 percent of households with incomes below $10,000 and 24.0 percent of households with incomes between $10,000 and $20,000 have high residential energy burdens, compared to just 1.2 percent of households with incomes of $30,000 or more. About 63.8 percent of households with incomes below $10,000 and 31.7 percent of households with incomes between $10,000 and $20,000 have high home energy burdens, compared to 1.2 percent of households with incomes over $30,000.

Table 3-7. Distribution of residential energy burden for low income households by income level, United States, 2001

Income group	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
$0-<10,000	11,035,000	23.2%	15.9%	5.7%	52.1%	17.9%	67.6%
$10-<20,000	14,959,000	8.4%	7.9%	3.6%	13.5%	37.5%	24.0%
$20-<30,000	5,109,000	6.2%	5.9%	3.2%	9.3%	33.4%	4.4%
$30,000 or more	2,702,000	5.0%	5.0%	2.7%	7.5%	12.0%	1.2%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-8. Distribution of home energy burden for low income households by income level, United States, 2001

Income group	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
$0-<10,000	11,035,000	9.7%	6.3%	1.6%	22.2%	14.7%	63.8%
$10-<20,000	14,959,000	3.5%	3.1%	0.9%	6.5%	27.8%	31.7%
$20-<30,000	5,109,000	2.4%	2.2%	0.6%	4.2%	30.4%	9.8%
$30,000 or more	2,702,000	1.8%	1.8%	0.5%	3.2%	23.9%	1.2%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Tables 3-9 and 3-10 contain the distribution of residential energy burden and home energy burden, respectively, for low income households by income source. Low income households that receive public assistance benefits are more than twice as likely to have high residential energy burdens and home energy burdens as households with wage income. However, even among the households with wage income, more than 25 percent of households have high energy burden.

Table 3-9. Distribution of residential energy burden for low income households by income source, United States, 2001

Income source	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Wages	15,117,000	10.7%	7.2%	3.5%	20.0%	29.9%	25.4%
Retirement income	10,699,000	12.5%	9.2%	3.7%	22.1%	30.9%	38.2%
Public assistance	1,707,000	21.2%	12.9%	5.7%	56.0%	21.4%	60.3%
Other	6,281,000	15.0%	8.3%	3.8%	40.6%	22.8%	37.7%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-10. Distribution of home energy burden for low income households by income source, United States, 2001

Income source	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Wages	15,117,000	4.2%	2.7%	0.8%	9.2%	22.8%	28.5%
Retirement income	10,699,000	5.7%	3.9%	1.3%	10.9%	24.4%	44.5%
Public assistance	1,707,000	8.6%	4.5%	1.1%	17.5%	21.4%	51.7%
Other	6,281,000	6.0%	3.3%	0.9%	12.6%	24.8%	37.7%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Tables 3-11 and 3-12 show the distribution of residential energy burden and home energy burden, respectively, for low income households by poverty group.[15] Of households below the poverty line, 58.4 percent have high residential energy burdens. Even among low income households with incomes above 150 percent of poverty, 6.5 percent have high energy burdens and 26.8 percent have moderate income burdens.

Table 3-11. Distribution of residential energy burden for low income households by poverty group, United States, 2001

Percent of poverty group	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Less than 100%	14,975,000	19.5%	12.5%	5.2%	34.5%	22.6%	58.4%
100-<150%	11,476,000	7.8%	7.2%	3.2%	12.6%	37.1%	18.2%
150% or more	7,354,000	6.0%	5.7%	2.9%	9.5%	26.8%	6.5%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-12. Distribution of home energy burden for low income households by poverty group, United States, 2001

Percent of poverty group	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Less than 100%	14,975,000	8.0%	4.8%	1.0%	18.0%	17.5%	54.9%
100-<150%	11,476,000	3.3%	2.8%	0.8%	6.1%	28.5%	25.3%
150% or more	7,354,000	2.6%	2.3%	0.7%	5.0%	28.5%	16.2%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Energy burden by vulnerable group

Tables 3-13 and 3-14 show the distribution of residential energy burden and home energy burden, respectively, by vulnerable group. The Federal LIHEAP program has defined vulnerable households as those with a household member who is 60 or older, a household member who is 5 or younger, or a household member who is disabled. The 2001 RECS survey does not have response categories that match those definitions. For purposes of this study, vulnerable households are defined in the following way: an elderly household is one that has a household member who is 65 years of age or older, a frail elderly household is one that has a household member who is 75 years of age or older, and a child household is one that has a household member who is 12 years of age or younger. The RECS does not have information on disabled households. A nonvulnerable household is one that does not have a vulnerable member according to the RECS response categories. Since questions on disability are not

[15] FY 2001 HHS Poverty Guidelines

on the survey, households categorized as nonvulnerable may include those with disabled household members.[16]

Table 3-13 shows that low income households categorized by the RECS survey as nonvulnerable had the highest mean residential energy burden (14.7 percent) and the greatest share of high burden households (40.1 percent). However, Table 3-14 shows that, with respect to home energy burden, over 40 percent of nonvulnerable households, elderly households, and frail elderly households all had high energy burdens. For both residential energy and home energy, young child households had the lowest median energy burden and the smallest share of households with high energy burdens. However, even for the young child households, over 25 percent of the households had high energy burden.

Table 3-13. Distribution of residential energy burden for low income households by vulnerable group, United States, 2001[17]

Household group	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Elderly	12,088,000	12.0%	8.9%	3.7%	20.3%	32.2%	33.9%
Frail elderly	6,681,000	12.2%	9.1%	3.5%	21.2%	30.7%	36.4%
Child	11,314,000	11.1%	6.9%	3.5%	21.3%	26.7%	26.0%
Nonvulnerable	11,221,000	14.7%	9.0%	3.8%	37.1%	25.9%	40.1%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-14. Distribution of home energy burden for low income households by vulnerable group, United States, 2001[18]

Household group	Number of households	Mean `home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Elderly	12,088,000	5.3%	3.6%	1.0%	9.9%	25.9%	41.7%
Frail elderly	6,681,000	5.5%	3.7%	0.9%	11.1%	25.6%	43.4%
Child	11,314,000	4.2%	2.6%	0.7%	9.2%	24.4%	25.6%
Nonvulnerable	11,221,000	6.1%	3.4%	1.0%	14.4%	20.3%	41.2%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

[16] About 83.7 percent of the 5.6 million LIHEAP eligible disabled households also have a household member who is either 60 years or older or five years or younger. About 81.9 percent of the 2.8 million LIHEAP recipient disabled households also have a household member who is either 60 years or older or five years or younger. Source: 2001 Current Population Survey, March Supplement.

[17] The definition of vulnerable households for the 2001 RECS is limited to the response categories available. This definition of vulnerable households is not consistent with those used by OCS in other documents and reports.

[18] The definition of vulnerable households for the 2001 RECS is limited to the response categories available. This definition of vulnerable households is not consistent with those used by OCS in other documents and reports.

Another way of looking at these data is to assess the share of high burden low income households that are vulnerable. The 2001 RECS estimates that there were about 11.3 million low income households that had a high residential energy burden. About 4.1 million of those high burden households were elderly and about 2.9 million had a young child. The unduplicated count of households shows that 6.8 million of the high burden households were vulnerable. [Note: This undercounts the total share of high burden households that are vulnerable, since the 2001 RECS does not furnish information on disabled households.]

Energy burden by geography

Energy burden is affected by energy prices, weather, and income. Higher fuel prices increase expenditures and, as a result, energy burden. Extreme weather, especially colder winter weather, may cause consumption to increase, thereby increasing energy burden. Lower income for a given level of energy expenditures increases the level of energy burden. Tables 3-15 and 3-16 show that energy burden varies across Census Regions because of differences in energy prices, weather, and income. For example, 18.5 percent of low income households in the West have high residential energy burdens, compared to over 30 percent of low income households in the Northeast, Midwest, and South. The West also has the smallest proportion of low income households with high home energy burdens, 12.7 percent, compared to over 40 percent in all other regions. Low income households in the South had median home energy burden almost the same as for the Northeast and Midwest, and over 40 percent of low income households were categorized as high home energy burden.

Table 3-15. Distribution of residential energy burden for low income households by Census Region, 2001

Census Region	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Northeast	6,819,000	15.1%	9.0%	4.1%	39.5%	30.3%	38.6%
Midwest	7,438,000	12.5%	8.3%	4.2%	23.1%	28.2%	34.6%
South	12,085,000	13.8%	9.3%	4.6%	30.1%	32.5%	39.2%
West	7,463,000	8.4%	5.5%	2.6%	15.2%	20.4%	18.5%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-16. Distribution of home energy burden for low income households by Census Region, 2001

Census Region	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Northeast	6,819,000	6.8%	3.8%	1.2%	15.4%	23.6%	45.1%
Midwest	7,438,000	5.8%	3.5%	1.5%	11.2%	25.2%	43.2%
South	12,085,000	5.7%	3.6%	1.5%	12.3%	26.2%	42.1%
West	7,463,000	2.6%	1.5%	0.4%	5.3%	17.8%	12.7%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Tables 3-17 and 3-18 show the distribution of residential energy burden and home energy burden, respectively, for low income households by Census Division. The Pacific Division has the smallest proportion of low income households with high residential energy burdens (14.5 percent), while the West North Central and the East South Central Divisions have the largest proportions (42.8 and 43.1 percent, respectively). Of low income households in the Pacific Division, 6.5 percent have high home energy burdens, compared to 53.2 percent in the West North Central Division.

Table 3-17. Distribution of residential energy burden for low income households by Census Division, 2001

Census Division	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
New England	1,571,000	14.7%	8.9%	4.2%	28.6%	29.4%	39.6%
Middle Atlantic	5,248,000	15.3%	9.2%	4.1%	39.5%	30.6%	38.3%
East North Central	5,206,000	12.0%	7.7%	3.8%	21.6%	28.6%	31.1%
West North Central	2,232,000	13.7%	9.7%	5.1%	24.3%	27.3%	42.8%
South Atlantic	5,903,000	13.8%	9.0%	4.5%	30.1%	32.0%	35.9%
East South Central	2,324,000	14.3%	9.5%	5.2%	31.6%	35.4%	43.1%
West South Central	3,857,000	13.4%	9.8%	4.8%	28.1%	31.6%	41.8%
Mountain	2,496,000	11.2%	7.0%	3.2%	23.1%	29.2%	26.4%
Pacific	4,968,000	6.9%	4.8%	2.2%	13.1%	16.0%	14.5%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-18. Distribution of home energy burden for low income households by Census Division, 2001

Census Division	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
New England	1,571,000	7.0%	3.9%	1.6%	15.1%	27.2%	47.1%
Middle Atlantic	5,248,000	6.7%	3.8%	1.2%	15.4%	22.5%	44.5%
East North Central	5,206,000	5.5%	3.2%	1.3%	11.1%	25.5%	38.9%
West North Central	2,232,000	6.4%	4.3%	2.0%	12.3%	24.6%	53.2%
South Atlantic	5,903,000	5.5%	3.5%	1.4%	12.3%	23.2%	39.9%
East South Central	2,324,000	6.4%	4.0%	2.0%	13.7%	35.2%	43.2%

Census Division	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
West South Central	3,857,000	5.6%	3.9%	1.7%	10.4%	25.4%	44.9%
Mountain	2,496,000	4.3%	2.6%	0.9%	8.7%	25.6%	25.0%
Pacific	4,968,000	1.7%	1.1%	0.3%	3.6%	13.9%	6.5%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Energy burden by climate

Tables 3-19 and 3-20 show the distribution of residential energy burden and home energy burden, respectively, for low income households by AIA Zone. The AIA Zones classify geographic areas by the number of HDD and CDD. Zone 1 is the coldest and has the greatest number of HDD. Zone 5 is the warmest and has the fewest number of HDD. The median residential energy burden is similar for all zones. The home energy burden is slightly lower for Zone 4 than for other zones. While energy consumption does vary by AIA Zone, differences in the price of energy and the average income of households results in similar energy burdens across AIA Zones.

Table 3-19. Distribution of residential energy burden for low income households by climate zone, 2001

AIA Zone	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Zone 1	2,718,000	12.2%	8.7%	3.7%	23.1%	30.3%	33.9%
Zone 2	9,363,000	12.8%	8.0%	3.9%	28.4%	28.6%	32.0%
Zone 3	7,765,000	13.1%	8.0%	3.0%	24.3%	25.2%	33.9%
Zone 4	6,701,000	12.1%	7.9%	3.4%	27.6%	24.9%	34.5%
Zone 5	7,058,000	12.3%	8.9%	4.5%	24.5%	34.6%	33.9%
All low income	33,804,801	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-20. Distribution of home energy burden for low income households by climate zone, 2001

AIA Zone	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Zone 1	2,718,000	5.5%	3.6%	1.1%	11.4%	23.8%	40.9%
Zone 2	9,363,000	5.9%	3.5%	1.3%	11.6%	25.7%	39.3%
Zone 3	7,765,000	5.7%	3.2%	0.9%	12.3%	22.2%	37.7%
Zone 4	6,701,000	4.3%	2.6%	0.4%	9.9%	18.7%	31.1%

AIA Zone	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Zone 5	7,058,000	4.6%	3.1%	1.2%	9.3%	26.9%	34.7%
All low income	33,804,801	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Energy burden by household characteristics

The next set of tables furnishes information on how energy burden varies by household characteristics, including: household size, age of householder, race and ethnicity of householder, and tenure.

Tables 3-21 and 3-22 show the distribution of residential energy burden and home energy burden, respectively, for low income households by household size. Low income households with 2 or fewer members are more likely than households with 3 or more members to have high residential energy burdens. The trend is even more dramatic for home energy burden among low income households. About 45.4 percent of 1-person households and 43.5 percent of 2-person households have high home energy burdens, compared to 15.8 percent for households with five or more members. It appears that, as households get larger, a smaller share of income is used for energy and more is used for other household purposes.

Table 3-21. Distribution of residential energy burden for low income households by household size, 2001

Household Size	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
1 person	11,301,000	13.2%	9.2%	3.7%	29.0%	28.2%	39.5%
2 persons	7,788,000	13.3%	9.2%	4.1%	28.6%	31.2%	38.2%
3 persons	5,235,000	12.0%	7.7%	3.5%	21.6%	28.6%	29.6%
4 persons	4,274,000	13.4%	7.1%	3.1%	32.3%	23.7%	30.5%
5 or more	5,207,000	10.0%	6.5%	3.5%	14.8%	28.8%	19.8%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-22. Distribution of home energy burden for low income households by household size, 2001

Household Size	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
1 person	11,301,000	6.1%	3.9%	1.1%	12.6%	22.0%	45.4%
2 persons	7,788,000	5.7%	3.8%	12.3%	11.9%	25.2%	43.5%
3 persons	5,235,000	4.7%	2.9%	0.6%	8.5%	27.2%	30.1%

Household Size	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
4 persons	4,274,000	5.1%	2.6%	0.9%	10.4%	17.0%	32.8%
5 or more	5,207,000	3.5%	2.2%	0.6%	5.6%	26.5%	15.8%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Tables 3-23 and 3-24 show the distribution of residential energy burden and home energy burden, respectively, for low income households by age of householder. The tables show that younger households (i.e., householder less than 45) tend to be less likely to have high energy burden than older households.

Table 3-23. Distribution of residential energy burden for low income households by age of householder, 2001

Householder Age	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Under 25 years	2,788,000	13.9%	6.9%	3.4%	38.6%	24.4%	31.2%
25 to 34 years	5,143,000	11.5%	6.5%	3.5%	21.6%	26.5%	23.3%
35 to 44 years	5,945,000	11.6%	7.5%	3.5%	24.3%	26.2%	30.4%
45 to 59 years	6,436,000	14.4%	9.0%	3.9%	31.8%	26.8%	40.2%
60 years or older	13,492,000	13.5%	9.2%	3.8%	21.2%	31.8%	36.0%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-24. Distribution of home energy burden for low income households by age of householder, 2001

Householder Age	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Under 25 years	2,788,000	5.1%	2.8%	0.7%	13.7%	20.2%	32.3%
25 to 34 years	5,143,000	4.5%	2.4%	0.9%	8.5%	19.9%	24.6%
35 to 44 years	5,945,000	4.6%	2.9%	0.7%	9.9%	26.1%	29.3%
45 to 59 years	6,436,000	6.0%	3.4%	0.8%	13.7%	21.4%	40.9%
60 years or older	13,492,000	5.5%	3.8%	1.2%	10.0%	25.7%	42.9%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Tables 3-25 and 3-26 show the distribution of residential energy burden and home energy burden, respectively, for low income households by race of householder. Over half of low income households with African American householders have high residential and home energy burdens. About a third of low income households with White householders have high residential and home energy burdens.

In contrast, 6.3 percent of households with Asian or Pacific Islander householders have high residential energy burdens and 5.2 percent have high home energy burdens.

Table 3-25. Distribution of residential energy burden for low income households by race of householder, 2001

Householder Race	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
White	22,007,000	11.2%	8.2%	3.7%	21.2%	30.7%	31.8%
African American	5,726,000	21.3%	11.6%	5.2%	58.4%	26.7%	53.9%
Asian or Pacific Islander	1,122,000	6.4%	5.1%	2.0%	9.5%	11.8%	6.3%
Hispanic	3,343,000	9.8%	5.8%	3.0%	20.0%	24.4%	21.3%
Other	1,606,000	10.6%	6.6%	3.1%	24.5%	24.5%	27.7%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-26. Distribution of home energy burden for low income households by race of householder, 2001

Householder Race	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
White	22,007,000	4.7%	3.2%	1.1%	9.6%	26.3%	36.2%
African American	5,726,000	9.4%	5.0%	1.5%	22.3%	19.4%	55.9%
Asian or Pacific Islander	1,122,000	2.0%	1.3%	0.5%	3.4%	14.6%	5.2%
Hispanic	3,343,000	3.2%	1.8%	0.4%	6.3%	15.9%	20.0%
Other	1,606,000	3.9%	2.7%	0.7%	8.8%	24.3%	26.8%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Tables 3-27 and 3-28 show the distribution of residential energy burden and home energy burden, respectively, for low income households by Spanish descent of householder. About 23.5 percent of households with householders of Spanish descent have high residential energy burdens, and 21.5 percent have high home energy burdens. In comparison, 35.4 percent of households with householders who are not of Spanish descent have high residential energy burdens, and 39.4 percent have high home energy burdens. This may be related to the geographic distribution of households with householders who are of Spanish descent. A larger share of these household live in the West Region where households, in general, are less likely to have high energy burdens.

Table 3-27. Distribution of residential energy burden for low income households by Spanish descent of householder, 2001

Householder Descent	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Spanish descent	5,537,000	10.0%	6.0%	3.2%	20.7%	23.1%	23.5%
Not of Spanish descent	28,268,000	13.1%	8.6%	3.8%	27.5%	29.5%	35.4%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-28. Distribution of home energy burden for low income households by Spanish descent of householder, 2001

Householder Descent	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Spanish descent	5,537,000	3.3%	2.1%	0.4%	7.9%	16.3%	21.5%
Not of Spanish descent	28,268,000	5.6%	3.5%	1.1%	11.9%	25.0%	39.4%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Tables 3-29 and 3-30 show the distribution of residential energy burden and home energy burden, respectively, for low income households by household tenure. About 30.8 percent of low income households that rent their homes, compared to 42.5 percent who own their homes, have high home energy burdens. In the next part of this section, statistics are presented by housing unit type. Those statistics show that households in smaller units have lower energy burdens. The average housing unit size for renters explains the lower average energy burden.

Table 3-29. Distribution of residential energy burden for low income households by household tenure, 2001

Tenure	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Own	16,318,000	13.1%	9.0%	4.2%	24.3%	33.8%	35.2%
Rent	17,486,000	12.1%	7.3%	0.3%	28.4%	23.4%	31.9%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-30. Distribution of home energy burden for low income households by household tenure, 2001

Tenure	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Own	16,318,000	5.8%	3.7%	1.4%	10.9%	26.9%	42.5%
Rent	17,486,000	4.8%	2.7%	0.6%	11.1%	20.6%	30.8%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Energy burden by housing unit characteristics

The next set of tables furnishes information on how energy burden varies by housing unit characteristics, including: housing unit type, housing unit size, main heating fuel, and type of air conditioning.

Tables 3-31 and 3-32 show the distribution of residential energy burden and home energy burden, respectively, for low income households by type of housing unit. About one third of low income households that live in mobile homes, detached single family houses, attached single family houses, and units in building with 2 to 4 units have high residential energy burdens, compared to 19 percent of households that live in buildings with 5 or more units. About 13.9 percent of households that live in buildings with 5 or more units have high home energy burdens, compared to over 40 percent of households that live in other types of housing units.

Table 3-31. Distribution of residential energy burden for low income households by housing unit type, 2001

Housing Unit Type	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Mobile Home	3,324,000	12.2%	8.7%	4.9%	24.3%	38.5%	32.6%
Single Family	17,809,000	14.0%	9.3%	4.4%	28.1%	31.3%	39.4%
2-4 Units	4,331,000	14.2%	8.5%	4.3%	35.9%	25.4%	37.6%
5 or More Units	8,341,000	8.9%	5.6%	2.4%	17.7%	20.1%	19.0%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-32. Distribution of home energy burden for low income households by housing unit type, 2001

Housing Unit Type	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Mobile Home	3,324,000	4.9%	3.7%	1.7%	8.9%	33.0%	40.5%
Single Family	17,809,000	6.1%	3.8%	1.3%	12.3%	25.1%	44.9%

Housing Unit Type	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
2-4 Units	4,331,000	6.8%	3.5%	1.3%	17.5%	25.7%	42.1%
5 or More Units	8,341,000	2.7%	1.7%	0.4%	5.8%	15.5%	13.9%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Tables 3-33 and 3-34 show the distribution of residential energy burden and home energy burden, respectively, for low income households by size of housing unit. Households that live in housing units that are 2,000 square feet or larger are more likely than those households living in smaller housing units to have high residential energy burdens and high home energy burdens.

Table 3-33. Distribution of residential energy burden for low income households by housing unit size, 2001

Housing Unit Size (in sq. ft.)	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Less than 1000	12,777,000	10.7%	6.7%	2.8%	22.3%	25.2%	27.1%
1000 to 1999	13,356,000	13.1%	8.4%	4.1%	24.9%	28.8%	34.7%
2000 or more	7,671,000	14.9%	9.8%	4.7%	30.1%	33.2%	42.0%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-34. Distribution of home energy burden for low income households by housing unit size, 2001

Housing Unit Size (in sq. ft.)	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Less than 1000	12,777,000	4.0%	2.4%	0.6%	8.3%	18.7%	27.9%
1000 to 1999	13,356,000	5.5%	3.3%	1.1%	10.7%	27.1%	36.1%
2000 or more	7,671,000	6.9%	4.5%	1.6%	13.8%	25.7%	51.4%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Tables 3-35 and 3-36 show the distribution of residential energy burden and home energy burden by main heating fuel. Low income households that heat with bulk fuels (i.e., LPG, fuel oil, or kerosene) have the highest residential energy burdens and home energy burdens. Households that heat with electricity have the lowest burdens. However, those differences reflect the findings from tables 3-15 and 3-16. A large share of the households that use electricity as their main heating fuel live in the West where energy burdens are lower because energy usage is lower than for the other regions.

Table 3-35. Distribution of residential energy burden for low income households by main heating fuel, 2001

Main Heating Fuel	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Natural Gas	18,051,000	13.4%	8.7%	3.8%	27.5%	28.7%	34.7%
Electricity	10,365,000	10.7%	6.8%	3.1%	23.4%	25.5%	26.3%
Bulk Fuel	4,612,000	14.4%	9.9%	5.4%	27.5%	33.8%	46.0%
Other Fuel	604,000	10.5%	8.7%	3.6%	16.0%	31.3%	34.0%
Do not heat	172,000	5.5%	4.6%	3.2%	9.3%	30.9%	0.0%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-36. Distribution of home energy burden for low income households by main heating fuel, 2001

Main Heating Fuel	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Natural Gas	18,051,000	5.9%	3.4%	1.1%	12.3%	22.9%	40.3%
Electricity	10,365,000	4.0%	2.6%	0.7%	9.0%	23.8%	25.6%
Bulk Fuel	4,612,000	5.8%	4.3%	1.7%	11.9%	28.2%	50.4%
Other Fuel	604,000	2.0%	0.8%	0.0%	6.0%	13.8%	10.7%
Do not heat	172,000	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Tables 3-37 and 3-38 show the distribution of residential energy burden and home energy burden, respectively, for low income households by air conditioning type. About 28.4 percent of low income households that use a central air conditioning unit to cool their homes have high residential energy burdens, compared to 40 percent of households that use individual air conditioning units, and 33.2 percent of households that do not use air conditioning. Among the three groups, households that use individual air conditioning units are more likely to have high home energy burdens.

Table 3-37. Distribution of residential burden for low income households by AC type, 2001

Air conditioning type	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Central Air	12,925,000	10.9%	7.4%	4.1%	20.0%	30.6%	28.4%
Individual Units	10,516,000	13.9%	9.2%	3.8%	29.2%	27.3%	40.0%
None	10,364,000	13.3%	8.2%	3.1%	32.3%	26.9%	33.2%
All low income	33,805,000	12.6%	8.2%	3.6%	24.5%	28.5%	33.5%

Source: 2001 RECS.

Table 3-38. Distribution of home energy burden for low income households by AC type, 2001

Air Conditioning Type	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Central Air	12,925,000	4.7%	3.2%	1.3%	8.8%	31.0%	33.2%
Individual Units	10,516,000	5.8%	3.6%	1.1%	12.4%	19.9%	43.4%
None	10,364,000	5.3%	2.7%	0.4%	11.6%	18.1%	33.4%
All low income	33,805,000	5.2%	3.2%	0.9%	11.0%	23.6%	36.5%

Source: 2001 RECS.

Findings for LIHEAP eligible households

The statistics presented in this section show that energy burden varies widely among households. About 10 percent of all households have a home energy burden that is less than 0.5 percent of income, while 10 percent of all households have a residential energy burden that is above 5.0 percent of income. Even within the lowest income group (households with incomes less than $10,000), about 10 percent of households have a home energy burden that is less than 2 percent of income, while about 10 percent of households have a home energy burden that exceeds 22 percent of income.

The statistics presented in this section furnish some information on how energy burden varies among different types of households. As might be expected, energy burden is highest for the lowest income households. However, other findings from this section might be unexpected.

- The South has the warmest weather and comparatively low heating costs. However, almost 40 percent of the low income households that have a high home energy burden live in the South.

- Elderly households and one-person households use less energy than households with children. However, on average, elderly and one-person households are more likely to have a high home energy burden than families with children.

- Renters and apartment dwellers have lower income, on average, than homeowners. However, since they have lower energy consumption than homeowners, they are less likely to have high home energy burden.

The findings demonstrate that the best way to assess whether a household has high home energy burden is to directly measure household income and household energy costs. It is generally, but not universally true that lower income households have higher home energy burdens. However, it is difficult to use other geographic, demographic, or housing characteristics to accurately assess whether one group of households has higher home energy burden than another.

Neither the LIHEAP statute nor the federal government furnishes an operational definition of "high burden" households. This study developed an operational definition in order to assess LIHEAP targeting performance of high burden households. The definition was derived from established standards for severe shelter burden. However, this definition has not been subjected to a thorough peer review from experts in the low income energy field.

Using the proposed definition, this study estimates that over 13 million households have a high home energy burden. Of the high burden households, over 7 million of have annual incomes less than

$10,000 and over 8.8 million have annual incomes that are less than or equal to the HHS poverty guidelines.

The LIHEAP program also targets vulnerable households (i.e., households with an elderly member, a disabled member, or a young child). Using the proposed definition, the study found that there is a significant overlap between high burden households and vulnerable households. For example, the data show that over 5 million high burden households have an elderly member and almost 3 million high burden households have a young child.

IV. LIHEAP targeting performance

The purpose of this section of the study is to present energy burden statistics for LIHEAP recipient households and the resulting targeting performance measures, including recipiency targeting for high burden households, benefit targeting, and burden reduction targeting. Statistics on targeting performance are presented by income group, income source, main heating fuel type, and Census region.

The 2001 RECS LIHEAP Supplement furnishes the data to develop the energy burden statistics for LIHEAP recipient households. It furnishes statistics from a sample of households that is not biased by recipiency reporting error and includes information on LIHEAP benefits that is based on administrative data, rather than respondent reports. Using these data furnishes high quality estimates of gross and net energy burden for LIHEAP recipient households.

2001 RECS LIHEAP Supplement

The 2001 RECS LIHEAP Supplement was designed to furnish high quality data for LIHEAP recipient households. It achieved this by developing a LIHEAP recipient sample frame directly from state administrative records.

As discussed in Appendix A, the RECS survey furnishes high quality data on energy consumption and expenditures because energy billing data are collected directly from the energy suppliers for each responding household. The LIHEAP supplement uses a similar model to enhance the quality of data for LIHEAP recipients in two ways.

- Recipiency - In the main RECS survey, respondents are categorized as LIHEAP recipients if they report receipt of energy assistance benefits. The LIHEAP supplement is a sample of LIHEAP recipients from administrative records, thereby ensuring that all interviewed households are LIHEAP recipients.

- Assistance benefits - In the main RECS survey, respondents report on the amount of LIHEAP benefits they received. For the LIHEAP supplement, state LIHEAP offices furnished information on the value of LIHEAP benefits for each responding household thereby eliminating response error with respect to LIHEAP benefit amounts.

Appendix B furnishes more detailed information on the procedures for the 2001 RECS LIHEAP Supplement.

Energy burden for LIHEAP recipient households

There are a number of reasons that LIHEAP recipient households are expected to have higher energy burdens than other income eligible households. The LIHEAP statute requires that LIHEAP grantees provide, "in a timely manner, that the highest level of assistance will be furnished to those households which have the lowest incomes and the highest energy costs or needs in relation to income, taking in account family size." States are expected to target LIHEAP benefits to households that have higher energy burdens. Households that have high energy burdens are more likely to have difficulty in paying their energy bills and can be expected to have an incentive to apply for LIHEAP benefits.

Tables 4-1 and 4-2 compare the residential and home energy expenditures, respectively, for LIHEAP recipient households, LIHEAP income eligible nonrecipient households, non low income households,

and all households. Table 4-1 shows that LIHEAP recipients have higher residential energy expenditures than income eligible nonrecipients. Table 4-2 shows that home energy expenditures for LIHEAP recipient households are about 40 percent higher than those for eligible nonrecipients and that the median home energy burden for LIHEAP recipient households is five times the home energy burden for non low income households.

Table 4-1. Residential energy expenditures and residential energy burden for LIHEAP recipient households, income eligible nonrecipient households, non low income households, and all households, United States, 2001

Household group	Number of households	Median residential energy expenditures	Median residential energy burden
LIHEAP recipients	4,373,000	$1,399	12.4%
Eligible nonrecipients	29,703,000	$1,164	7.8%
Non low income	73,184,000	$1,458	2.8%
All households	106,989,000	$1,373	3.6%

Source: 2001 RECS.

Table 4-2. Home energy expenditures and home energy burden for LIHEAP recipient households, income eligible nonrecipient households, non low income households, and all households, United States, 2001

Household group	Number of households	Median home energy expenditures	Median home energy burden
LIHEAP recipients	4,373,000	$613	5.6%
Eligible nonrecipients	29,703,000	$440	3.0%
Non low income	73,184,000	$594	1.1%
All households	106,989,000	$552	1.4%

Source: 2001 RECS.

Tables 4-3 and 4-4 compare the distribution of residential and home energy burden, respectively, for LIHEAP recipient households, LIHEAP eligible nonrecipient households, non low income households, and all households. Table 4-3 shows that over 60 percent of LIHEAP recipients are categorized as having high residential energy burden and over 80 percent are categorized as having moderate or high residential energy burden. However, there are also a large number of eligible nonrecipients with high energy burden. About 30 percent of the households that were eligible for LIHEAP in FY 2001 but did not receive benefits were categorized as having high residential energy burden. Table 4-4 shows that the statistics for home energy burden are similar, with over 60 percent of LIHEAP recipient households having high home energy burden, and over 30 percent of income eligible nonrecipients having high home energy burden.

Table 4-3. Distribution of residential energy burden for LIHEAP recipient households, eligible nonrecipient households, non low income households, and all households, United States, 2001

Household group	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10^{th} percentile	Energy burden 90^{th} percentile	% Moderate energy burden	% High energy burden
LIHEAP recipients	4,373,000	17.4%	12.4%	5.1%	31.5%	20.6%	61.7%

Household group	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
Eligible nonrecipients	29,703,000	11.9%	7.9%	3.6%	22.7%	29.8%	30.0%
Non low income	73,184,000	3.1%	2.8%	1.4%	5.3%	3.6%	0.4%
All households	106,989,000	6.1%	3.6%	1.6%	11.4%	11.5%	10.8%

Source: 2001 RECS.

Table 4-4. Distribution of home energy burden for LIHEAP recipient households, eligible nonrecipient households, non low income households, and all households, United States, 2001

Household group	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
LIHEAP recipients	4,373,000	8.0%	5.6%	1.5%	16.1%	17.8%	62.2%
Eligible nonrecipients	29,703,000	4.9%	3.0%	0.9%	9.9%	23.9%	33.9%
Non low income	73,184,000	1.3%	1.1%	0.4%	2.4%	7.1%	1.4%
All households	106,989,000	2.6%	1.4%	0.5%	5.0%	12.3%	12.5%

Source: 2001 RECS.

Net energy burden for LIHEAP recipient households

LIHEAP recipient households have their annual energy bill reduced by the amount of their LIHEAP benefits. As discussed in Section III, a household's net energy burden is the share of income that is required to pay their net energy bill (energy bill minus LIHEAP benefits).

Table 4-5 compares residential energy expenditures and the residential energy burden for LIHEAP recipients to eligible nonrecipients. Median residential energy expenditures for LIHEAP recipients are about $235 higher than for eligible nonrecipients. That difference is more than offset by the median LIHEAP benefit of $318. However, since LIHEAP recipient households have a lower average income than eligible nonrecipients, the median net residential energy burden for LIHEAP recipients is still higher than the average for eligible nonrecipients.

Table 4-5. LIHEAP residential energy expenditures, gross residential energy burden, LIHEAP benefit, and net residential energy burden for LIHEAP recipients and eligible nonrecipients, United States, 2001

Household group	Number of households	Median residential energy expenditures	Median residential energy burden	Median LIHEAP benefit	Median net residential energy burden
LIHEAP recipients	4,373,000	$1,399	12.4%	$318	8.9%
Eligible nonrecipients	29,703,000	$1,164	7.9%	$0	7.9%

Source: 2001 RECS.

Table 4-6 compares home energy expenditures and the home energy burden for LIHEAP recipients and eligible nonrecipients. It shows that the LIHEAP benefit makes the median net home energy burden for LIHEAP recipients lower than the gross home energy burden for eligible nonrecipients.

Table 4-6. LIHEAP home energy expenditures, gross home energy burden, LIHEAP benefit, and net home energy burden for LIHEAP recipients and eligible nonrecipients, United States, 2001

Household group	Number of households	Median home energy expenditures	Median home energy burden	Median LIHEAP benefit	Median net home energy burden
LIHEAP recipients	4,373,000	$613	5.6%	$318	1.9%
Eligible nonrecipients	29,703,000	$440	3.0%	$0	3.0%

Source: 2001 RECS.

Tables 4-7 and 4-8 furnish more information on how the receipt of LIHEAP changes the distribution of residential and home energy burden, respectively for LIHEAP recipient households. These tables show two important things about the allocation of LIHEAP benefits:

- Receipt of LIHEAP makes the recipient population look more similar to the population of eligible nonrecipients (i.e., it lowers the average energy burden and the number of households with high energy burden).

- There are many eligible nonrecipient households that have substantially higher energy burdens than some of the recipient households.

For example, the 90th percentile column in Table 4-7 shows that 10 percent of eligible nonrecipients have a residential energy burden over 22.7 percent, while the same table shows that 10 percent of recipients had a net residential energy burden under 2.9 percent after the receipt of LIHEAP benefits. Table 4-8 also shows that the net home energy burden was reduced to 0 percent for at least 10 percent of LIHEAP recipient households.

Table 4-7. Distribution of gross and net residential energy burden for LIHEAP recipient households and gross residential energy burden for eligible nonrecipient households, United States, 2001

Household group	Number of households	Mean residential energy burden	Median residential energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
LIHEAP recipients *(gross burden)*	4,373,000	17.4%	12.4%	5.1%	31.5%	20.6%	61.7%
LIHEAP recipients *(net burden)*	4,373,000	12.6%	8.9%	2.9%	21.9%	29.1%	39.5%
Eligible nonrecipients *(gross burden)*	29,703,000	11.9%	7.9%	3.6%	22.7%	29.8%	30.0%

Source: 2001 RECS.

Table 4-8. Distribution of gross and net home energy burden for LIHEAP recipient households and gross home energy burden for eligible nonrecipient households, United States, 2001

Household group	Number of households	Mean home energy burden	Median home energy burden	Energy burden 10th percentile	Energy burden 90th percentile	% Moderate energy burden	% High energy burden
LIHEAP recipients *(gross burden)*	4,373,000	8.0%	5.6%	1.5%	16.1%	17.8%	62.2%
LIHEAP recipients *(net burden)*	4,373,000	3.8%	1.9%	0.0%	9.3%	14.5%	27.3%
Eligible nonrecipients *(gross burden)*	29,703,000	4.9%	3.0%	0.9%	9.9%	23.9%	33.9%

Source: 2001 RECS.

LIHEAP targeting performance

As described in Section II, OCS has developed a set of performance indicators that provide for the collection of quantitative information regarding LIHEAP recipiency, benefit, and burden reduction targeting performance. The recipiency targeting index assesses whether a particular group has been targeted for receipt of LIHEAP benefits, while the benefit targeting indexes indicate how benefits are targeted among LIHEAP recipients.

LIHEAP recipiency targeting for high burden households

Estimates of recipiency targeting performance for vulnerable groups have been developed using Current Population Survey data and state administrative reports. These measures are reported annually. However, prior to the implementation of the 2001 RECS LIHEAP Supplement, no data were available to develop recipiency targeting measures for high burden households.

The statistics from Tables 3-5 and 4-3 can be used to compute a recipiency targeting index for households with a high residential energy burden. The recipiency targeting index for high burden households is defined as: 100 times the percent of LIHEAP recipients that are high burden divided by the percent of LIHEAP eligibles that are high burden.

High Burden Household Targeting Performance (Residential Energy)

Index = 100 * Percent LIHEAP High Burden / Percent Eligible High Burden

Index = 100 * 61.7% / 33.5%

Index = 184

The statistics from Tables 3-6 and 4-4 can be used to compute a recipiency targeting index for households with a high home energy burden. The recipiency targeting index for high burden households is defined as: 100 times the percent of LIHEAP recipients that are high burden divided by the percent of LIHEAP eligibles that are high burden.

High Burden Household Targeting Performance (Home Energy)

Index = 100 * Percent LIHEAP High Burden / Percent Eligible High Burden

Index = 100 * 62.2% / 36.5%

Index = 170

The targeting statistics show that the LIHEAP program targets high burden households.

LIHEAP benefit targeting

OCS developed performance measures for the distribution of LIHEAP benefits - the benefit targeting index and the burden reduction targeting index. However, prior to the implementation of the 2001 RECS LIHEAP Supplement, these performance measures had only been used for analysis of state level data in states that had energy expenditure data for recipient households.

The benefit targeting index shows whether benefits are targeted to a specific group of recipients. The benefit targeting index is defined as: 100 times the average benefit for the target group divided by the average benefit for all LIHEAP households. Table 4-9 shows the mean residential energy expenditures, mean residential energy burden, the mean LIHEAP benefit, and the benefit targeting index for high burden recipients, elderly recipients, young child recipients, and all LIHEAP households. Table 4-10 shows a similar table that examines benefits with respect to home energy expenditures.

Table 4-9 shows that the average LIHEAP benefit for high burden LIHEAP recipients is $411, compared to the average of $380 for all recipients. The benefit targeting index for high burden households is 108; higher benefits are targeted to households with a high residential energy burden. However, while elderly recipients have an average residential energy burden of 18.5 percent, more than one percent higher than the average of 17.4 percent for LIHEAP recipients, the average LIHEAP benefit for elderly recipients is $304, about $75 lower than the average for all recipients.

Table 4-10 furnishes benefit targeting indexes for LIHEAP recipients with high home energy burdens. The benefit targeting index for high home energy burdens households is 108, which shows that higher LIHEAP benefits are targeted to recipient households with higher home energy burdens.

Table 4-9. LIHEAP residential energy benefit targeting statistics for high burden households, elderly households, young child households, and all recipient households, United States, 2001

Household group	Number of households	Mean residential energy expenditures	Mean residential energy burden	Mean LIHEAP benefit	Benefit targeting index
High burden recipients	2,697,000	$1,567	23.9%	$411	108
Elderly recipients	1,395,000	$1,342	18.5%	$304	80
Young child recipients	1,633,000	$1,652	16.2%	$424	111
All LIHEAP recipients	4,373,000	$1,451	17.4%	$380	100

Source: 2001 RECS.

Table 4-10. LIHEAP home energy benefit targeting statistics for high burden households, elderly households, young child households, and all recipient households, United States, 2001

Household group	Number of households	Mean home energy expenditures	Mean home energy burden	Mean LIHEAP benefit	Benefit targeting index
High burden recipients	2,718,000	$786	11.4%	$411	108
Elderly recipients	1,395,000	$638	8.8%	$304	80
Young child recipients	1,633,000	$694	7.0%	$424	111
All LIHEAP recipients	4,373,000	$655	8.0%	$380	100

Source: 2001 RECS.

LIHEAP burden reduction targeting

The burden reduction targeting index shows whether burden reduction is targeted to a specific group of recipients. The burden reduction targeting index is defined as: 100 times the average reduction in energy burden for the target group divided by the average burden reduction for all LIHEAP households.

Table 4-11 furnishes the mean residential energy expenditures, the mean LIHEAP benefit, the mean gross home energy burden, the mean net residential energy burden, the burden reduction percentage, and the burden reduction targeting index for high burden recipients, elderly recipients, young child recipients, and all LIHEAP households.

Table 4-11 shows that the average reduction in residential energy burden for LIHEAP recipients is about 28.9 percent (i.e., the net residential energy burden is 28.9 percent less than the gross residential energy burden). The average reduction in residential energy burden for the three target groups in this analysis, high burden households, elderly households, and young child households, are all measured to have a slightly smaller reduction in residential energy burden than the average for all recipients.

Table 4-12 shows that the same finding holds true for the reduction in home energy burden for the target groups.

Table 4-11. LIHEAP residential energy burden reduction targeting statistics for high burden households, elderly households, young child households, and all recipient households, United States, 2001

Household group	Number of households	Mean LIHEAP benefit	Mean residential energy burden	Mean net residential energy burden	Burden reduction percentage	Burden reduction targeting index
High burden recipients	2,697,000	$411	23.9%	17.4%	28.1%	97
Elderly recipients	1,395,000	$304	18.5%	14.3%	26.5%	92
Young child recipients	1,633,000	$424	16.2%	11.7%	26.5%	92
All LIHEAP recipients	4,373,000	$380	17.4%	12.6%	28.9%	100

Source: 2001 RECS.

Table 4-12. LIHEAP home energy burden reduction targeting statistics for high burden households, elderly households, young child households, and all recipient households, United States, 2001

Household group	Number of households	Mean LIHEAP benefit	Mean home energy burden	Mean net home energy burden	Burden reduction percentage	Burden reduction targeting index
High burden recipients	2,718,000	$414	11.3%	5.5%	27.8%	96
Elderly recipients	1,395,000	$304	8.8%	5.0%	26.5%	92
Young child recipients	1,633,000	$424	7.0%	3.0%	26.5%	92
All LIHEAP recipients	4,373,000	$380	8.0%	3.8%	28.9%	100

Source: 2001 RECS.

The statistics presented in this part of the study show that the LIHEAP program has mixed results in targeting to high burden households, given the following:

- Households with a high energy burden are more likely to receive benefits than households that have a moderate or low energy burden, though some recipient households have relatively low energy burdens.

- The average benefit received by high burden households is slightly higher than the benefit received by other types of households.

- The average reduction in burden for high burden households is slightly lower than the burden reduction for other types of income eligible households.

These statistics show that the LIHEAP program does a good job of ensuring that high burden households receive LIHEAP. However, the program could do a better job of ensuring that the highest burden households receive the highest LIHEAP benefits.

Targeting performance analysis

Recipiency targeting performance by income

The tables in Section III of this report show that the majority of high burden households are in the lowest income groups. Further, the analysis of LIHEAP Supplement data shows that the LIHEAP program serves the lowest income households at a high rate. This, in part, accounts for successful performance of the LIHEAP program with respect to serving households with high home energy burdens. For example:

- About one third of low income households (11.0 million) have incomes below $10,000. (Table 3-8)

- Over one third of low income households (12.3 million) are defined by this study as having high home energy burden. (Table 3-6)

- Over 7.0 million of the 12.3 million high burden households have incomes below $10,000.

- By delivering about half of its benefits to households with income below $10,000, the LIHEAP program is effective in reaching households with high home energy burdens.

However, it is not just by serving the lowest income households that the LIHEAP program is able to reach households with high home energy burdens. Households with a high energy burden are more likely to be served by LIHEAP, even after accounting for income. For example:

- About 64 percent of households with incomes below $10,000 have a high home energy burden. (Table 3-8)

- About 83 percent of the LIHEAP recipients with incomes below $10,000 have a high home energy burden.

But, whenever the program serves higher income households, it is challenging to ensure that those households have high home energy burdens. For example:

- Only 10 percent of low income households with incomes between $20,000 and $30,000 have a high home energy burden. (Table 3-8)

- About 18 percent of LIHEAP recipient households with incomes between $20,000 and $30,000 have a high home energy burden.

Though LIHEAP recipients in the $20,000 to $30,000 income group are more likely to have a high home energy burden than nonrecipients, LIHEAP recipients in this income group are much less likely to have a high home energy burden than LIHEAP recipients with incomes below $10,000. Whenever the LIHEAP program serves households in high income or poverty groups, it appears to be more difficult to ensure that the program is targeted to the households with high home energy burdens.

Recipiency targeting performance by vulnerable group

It is important to consider whether targeting high burden households conflicts with the goal of serving vulnerable households (i.e. households with an elderly member, a disabled member, or a young child). In Section III, the analysis shows that a large number of vulnerable households have a high home energy burden. However, the LIHEAP program strives to serve vulnerable households, even if they don't have a high home energy burden. However, statistics show that households with a high home energy burden are served at a high rate for all vulnerable groups. For example:

- About 42 percent of low income elderly households have a high home energy burden (Table 3-14), but 67 percent of LIHEAP recipient elderly households have a high home energy burden.

- About 43 percent of low income frail elderly households have a high home energy burden (Table 3-14), but 78 percent of LIHEAP recipient frail elderly households have a high home energy burden.

- About 26 percent of low income young child households have a high home energy burden (Table 3-14), but 56 percent of LIHEAP recipient young child households have a high home energy burden.

For FY 2001, the LIHEAP program was successful at targeting households that were vulnerable and that had a high home energy burden. Of the estimated 4.4 million LIHEAP recipient households, the RECS LIHEAP Supplement shows that at least 2.9 million had vulnerable household members and about 2.7 million had high home energy burden. At least 1.8 million LIHEAP recipients had vulnerable members and had high home energy burden. Only about 0.5 million LIHEAP recipients were neither vulnerable nor had a high energy burden. The LIHEAP program was successful in furnishing almost 90 percent of its benefits to targeted households.[19]

Recipiency targeting performance by geography

The analysis in Section III shows that the West has the lowest incidence of households with high home energy burden (Table 3-16). Only 13 percent of low income households in the West had high home energy burdens in FY 2001, while over 40 percent of low income households in the other regions had high burdens. However, statistics from the 2001 RECS LIHEAP Supplement show that LIHEAP grantees in all regions were successful in targeting high burden households.

[19] The number of vulnerable households is understated because the 2001 RECS did not have information on disabled households.

- In the Northeast, 45 percent of low-income households had a high home energy burden, while 73 percent of LIHEAP recipient households had a high burden.

- In the Midwest, 43 percent of low-income households had a high home energy burden, while 57 percent of LIHEAP recipient households had a high burden.

- In the South, 42 percent of low-income households had a high home energy burden, while 65 percent of LIHEAP recipient households had a high burden.

- In the West, 13 percent of low-income households had a high home energy burden, while 37 percent of LIHEAP recipient households had a high burden.

For all regions except the West, more than half of LIHEAP recipients had a high home energy burden in FY 2001. In the West region, the incidence of high burden among LIHEAP recipients was almost three times the incidence of high burden in the LIHEAP eligible population.

Benefit targeting performance

The LIHEAP program benefit targeting analysis shows that, in FY 2001, LIHEAP benefits were slightly higher for high burden households than for other recipient households, and that energy burden reduction was slightly smaller for high burden households than for other recipient households. In this study, detailed analysis of benefit targeting statistics show that those findings are consistent across income groups, vulnerable household groups, and geography. For example:

- For the overall LIHEAP program, the benefit targeting index for high burden households was 108, indicating that high burden households received slightly higher benefits than other recipient households.

- The benefit targeting statistics by income group show that high burden households with income at or below 100 percent of poverty had a benefit targeting index of 107 and that high burden households with incomes between 100 and 150 percent of poverty had a benefit targeting index of 111.

- The benefit targeting statistics by vulnerable group show that vulnerable high burden households had benefit targeting indexes that ranged from 107 to 111.

- The benefit targeting statistics by region show that the benefit targeting indexes for high burden households ranged from 103 to 115.

These statistics show that there was no group for whom significantly higher benefits were made available when the household had a high energy burden. Even thought the program serves high burden households at a higher rate than other types of households, it does not offer those high burden households significantly higher LIHEAP benefits.

V. Findings and conclusions

The purpose of this evaluation study is to assess under GRPA to what extent the LIHEAP program is serving the lowest income households that have the highest energy burdens. This section of the study summarizes the statistics that lead to those findings and suggests what would be required for the LIHEAP program to improve targeting performance. This section of the study also furnishes conclusions regarding the usefulness of LIHEAP recipiency, benefit, and burden reduction targeting performance measures in analyzing LIHEAP targeting performance.

LIHEAP targeting performance measurement findings

The study finds that the LIHEAP program is effective in targeting the highest burden households for receipt of LIHEAP benefits. However, the program is not as successful in furnishing higher benefits to high burden and vulnerable households. Further, the program does not furnish high burden and vulnerable households with the largest percentage reduction in energy burden.

LIHEAP recipiency targeting

The primary LIHEAP performance measure used in this analysis is the recipiency targeting index for households with high energy burden. This index measures to what extent LIHEAP is serving the lowest income households that have the highest energy burdens.

- The recipiency targeting index for high burden households is 184 for residential energy burden and 170 for home energy burden. This index shows that LIHEAP is serving the lowest income households with the highest home energy burdens at a significantly higher rate than households that have a moderate or low energy burden.

However, the LIHEAP program is concerned with serving both vulnerable and high energy burden households. Income eligible households can be vulnerable households only, high energy burden households only, can be both vulnerable and high energy burden households, or can be neither vulnerable nor high energy burden households.

- The LIHEAP program was successful in targeting over 90 percent of LIHEAP benefits to income eligible households that fall into at least one of the target groups (i.e., vulnerable households or high energy burden households.

- However, the statistics developed in this report show that there are at least 7 million income eligible households that have both a high home energy burden and a vulnerable household member. In FY 2001, the program only served about 2 million of those households.

More detailed analysis of targeting shows that the LIHEAP program is successful in targeting benefits to high burden households, even after controlling for income, vulnerable household status, and geography. For example:

- About 64 percent of households with incomes below $10,000 had a high home energy burden in FY 2001, while 83 percent of LIHEAP recipient households with incomes below $10,000 had a high home energy burden.

- About 42 percent of low income elderly households had a high home energy burden in FY 2001, while 67 percent of LIHEAP recipient elderly households had a high burden.

- About 45 percent of low income households in the Northeast had a high home energy burden in FY 2001, while 73 percent of LIHEAP recipient households in the Northeast had a high home energy burden.

Moreover, after accounting for both vulnerability status and high energy burden, only about 10 percent of LIHEAP recipient households were not a member of at least one of the target groups, and over 40 percent of LIHEAP recipient households were both a member of a vulnerable group and had a high home energy burden.

LIHEAP benefit targeting

The LIHEAP benefit targeting index is used to assess the extent to which the highest LIHEAP benefits are given to the highest burden LIHEAP recipients. The LIHEAP benefit targeting index for high burden households is 108, showing that high burden households receive slightly higher benefits than other types of LIHEAP recipients.

LIHEAP burden reduction targeting

The LIHEAP burden reduction targeting index is used to assess the extent to which LIHEAP benefits reduce energy burden by the greatest percentage for the highest burden LIHEAP recipients. The burden reduction targeting index for high burden households is 97, indicating that high burden LIHEAP recipients have a slightly smaller burden reduction percentage than other types of LIHEAP recipients.

Conclusions

The findings from this study show that grantees target LIHEAP benefits, but that targeting could be further improved. However, such improvements would require changes in LIHEAP intake and benefit determination procedures.

- Recipiency Targeting – The program has successfully targeted the two groups that have been identified as having the highest home energy needs. However, the program could attempt to increase targeting so that a greater percentage of recipients are both vulnerable and have high energy burden by placing a greater emphasis on identifying and serving high burden households. However, many grantees do not have procedures in place that allow them to measure energy burden for LIHEAP recipients.

- Benefit Targeting – The program does not give significantly higher benefits to high burden households. The best way to increase targeting would be to measure energy burden for LIHEAP recipients and give higher benefits to households that have higher energy burden. However, many grantees do not have procedures in place that allow them to measure energy burden for LIHEAP recipients.

- Burden Reduction Targeting – The program does not target the highest burden households with the greatest level of burden reduction. The best way to increase targeting would be to measure energy burden for LIHEAP recipients and give higher benefits to households that have higher energy burden. However, many grantees do not have procedures in place that allow them to measure energy burden for LIHEAP recipients.

With limits on LIHEAP administrative funds, it is not clear that grantees have the resources to make the changes that are required to improve recipiency and benefit targeting.

Strategies for targeting high burden households

The most direct way to target high burden households is to measure energy burden for applicant households, give priority for awarding grants to the highest burden households, and furnish higher benefits to higher burden households. However, given the current structure of the LIHEAP program, there are important barriers to the implementation of such a system. First, a number of LIHEAP programs operate on a continuous basis during the heating season, that is, they give grants to households as they apply, making it difficult to prioritize applications for benefits. Second, only a few grantees have mechanisms in place that allow them to assess the energy burden for households. While some grantees obtain information from energy suppliers regarding the household's energy bill in the last 12 months, most grantees believe that such a system would be too costly to implement.

However, this evaluation study furnishes information that suggests a strategy to move the program in the direction of furnishing higher benefits to higher burden households. The study shows that the single most important indicator of energy burden is income, rather than the household's energy bill. By giving priority to the lowest income households and giving higher benefits to lower income households, grantees would, in most cases, improve their targeting to high burden households.

Usefulness of LIHEAP targeting performance measures

The LIHEAP program assists low income households in meeting their immediate home energy needs. The LIHEAP statute mandates that grantees furnish the highest level of assistance to those households that have the lowest incomes and the highest energy costs or needs, in relation to income, taking into account family size. The national LIHEAP performance goals under GPRA focus on "increasing the availability of LIHEAP fuel assistance to vulnerable and high energy burden households whose health and/or safety are endangered by living in a home without sufficient heating or cooling." The current performance goals are:

- Increase the percent of LIHEAP recipient households having at least one member age 60 years or older.

- Increase the percent of LIHEAP recipient households having at least one member age 5 years or younger.

- Increase the percent of LIHEAP recipient households having the lowest income and highest energy costs.

Previous evaluation studies have examined the performance of the LIHEAP program in meeting the first two performance goals outlined above. However, prior to this evaluation study, research had not been conducted on performance with respect to the goal of serving households with the lowest income and highest energy costs. The study shows that the majority of nonvulnerable households served by the program have high home energy burdens. Therefore, all three goals are important and are complimentary, and a failure to measure information on energy burden would push the program in the direction of serving vulnerable households at the expense of high burden households.

This evaluation study also measured benefit and burden reduction targeting indexes at the national level for the first time. The study shows that these are important targeting measures that OCS should consider adding to the LIHEAP performance plan. While the evaluation study shows that the LIHEAP program is effective in targeting receipt of LIHEAP benefits to high burden households, it is not as effective in furnishing the highest level of benefits to the recipients with the lowest gross household incomes and the highest energy needs. High burden households receive benefits that are only slightly higher that the average for all LIHEAP recipients and have a lower average reduction in energy burden than other recipient households. The benefit targeting index and the burden reduction

targeting index help to quantify the extent to which the highest benefits are targeted to those low income households with the highest energy needs and allow the LIHEAP program to set goals for improving the targeting of program benefits.

Data for LIHEAP performance measurement

Computation of the LIHEAP performance measures used in this evaluation study – the recipiency targeting index for high burden households, the benefit targeting index, and the burden reduction targeting index – require OCS to have a data source with the following items available:

- LIHEAP recipiency
- Household demographic characteristics
- Household income
- Residential and home energy costs
- LIHEAP benefits

There are two data sources that could potentially furnish these data items – annual state administrative reports and the periodic Residential Energy Consumption Survey. Each of these requires a special supplement to furnish the required data.

- State reports: In order for the states to furnish these data as part of their annual LIHEAP reports, they would need to collect information on energy expenditures for recipients from energy suppliers. A number of states, including Maine, Wisconsin, and Washington, have procedures in place to capture these data. However, most states do not collect these data as part of their information processing systems.

  The alternative of increasing requirements for annual state reports is not recommended. Most states do not have a system in place that could capture and report on LIHEAP recipient energy expenditures. It is expected that the costs of implementing such a system for all states would be considerably more expensive than the RECS alternative.

- RECS: In order for the RECS to furnish these data, it must include a supplemental sample of LIHEAP recipients. As part of the supplement, data on LIHEAP benefits must be obtained from state administrative records.

  The 2001 RECS LIHEAP Supplement successfully met the targeting information requirements for 2001. The next RECS survey will be conducted in 2005. A LIHEAP Supplement is planned for the 2005 RECS.

The RECS Supplemental sample could be modified to furnish additional data for LIHEAP performance measurement while reducing the variance of estimates for LIHEAP recipient households and updating performance measurement findings annually.

- Energy data collection: As part of the RECS survey implementation, energy data for an additional sample of LIHEAP recipients could be gathered as part of the RECS Energy Supplier Survey.
- Energy data updates: As a follow-up to the 2005 RECS, energy data could be gathered for responding households annually.

The evaluation study finds that LIHEAP performance measurement should include measures of targeting to high burden households, as well as measure of benefit and burden reduction targeting. The evaluation study further finds that the RECS LIHEAP supplement is required to develop these targeting performance measures. Finally, it recommends enhancing the RECS Supplemental sample to increase the sample size and increase the frequency of the data collection, thereby further improving these performance measures.

Appendix A: 2001 Residential Energy Consumption Survey

Appendix A provides information on how home energy burden estimates were derived from the 2001 Residential Energy Consumption Survey (RECS). The following topics are covered in this Appendix.

- Description of RECS.
- Strengths and Limitations of RECS data.
- Estimates of energy burden.

Appendix B provides information on how home energy burden estimates were derived from the 2001 RECS LIHEAP Supplement.

Description of RECS

RECS is a national household sample survey that provides information on residential energy use. It has been conducted by the Energy Information Administration (EIA) of the U.S. Department of Energy since 1978. It is designed to provide reliable data at the national and Census regional level. RECS includes information on energy consumption and expenditures, household demographics, housing characteristics, weatherization/conservation practices, home appliances, and type of heating and cooling equipment. Currently, this survey is conducted every four years.

The survey consists of three parts:

- EIA interviews households for information about fuels used, how fuels are used, energy-using appliances, structural features, energy-efficiency measures taken, demographic characteristics of the household, heating interruptions, and receipt of energy assistance.
- EIA interviews rental agents for those households whose rent includes some portion of their energy bill. This information augments information from those households that may not be knowledgeable about the fuels used for space heating or water heating.
- After obtaining permission from respondents, EIA mails questionnaires to their energy suppliers to collect the actual billing data on energy consumption and expenditures. This fuel supplier survey eliminates the inaccuracy of self-reported data. When a household does not consent or when fuel consumption records are unusable or nonexistent, regression analysis is used to impute missing data.[20]

[20]Regression analysis is a statistical tool for evaluating the relationship of one or more independent variables to a single continuous dependent variable. Formulas developed from regression analysis are used to predict the value of the dependent variable under varying conditions of the independent variable(s).

The 2001 RECS is the eleventh survey in the series of surveys.[21] For the 2001 RECS, approximately 4,822 households were interviewed in the core sample. In addition, a supplemental sample of 496 LIHEAP recipient households was interviewed for the first time as part of the RECS.[22]

Strengths and limitations of RECS data

RECS provides the most recent, comprehensive data on home energy consumption and expenditures. The strengths of using RECS to derive home energy estimates are as follows.

- RECS uses a representative national household sample, providing statistically reliable estimates for all, non low income, and low income households.
- The 2001 RECS included a supplemental sample of LIHEAP recipient households that is representative of the population of LIHEAP heating and cooling assistance recipients.
- RECS includes use of all residential fuels.
- Energy suppliers provide information on actual residential energy consumption and expenditures of RECS sample households.
- Regression analyses of RECS data provide estimates of the amounts of fuels going to various end uses, including home heating and cooling.

While the updated 2001 RECS data provide the most current and comprehensive data on residential energy use by low income households, several significant limitations must be addressed:[23]

- The household is a basic reporting unit for RECS and LIHEAP. RECS employs the Bureau of the Census' definition of household, i.e., a household includes all individuals living in a housing unit, whether related or not, who (1) share a common direct access entry to the unit from outside the building or from a hallway, and (2) do not normally eat their meals with members of other units in the building. A household does not include temporary visitors or household members away at college or in the military. LIHEAP defines a household as one or more individuals living together as an economic unit who purchase energy in common or make undesignated payments for energy in their rent. Some variation in the count of households, particularly those containing renters or boarders, may result from the difference in definitions.
- Households are asked to report gross income for the last twelve months. While households are instructed to include income from all sources, it appears that households focus only on income from earnings and underreport income from other sources. From that perspective, the RECS overestimates the number of low income households.
- In LIHEAP analyses conducted through 2001, households were categorized as LIHEAP recipients if they reported incomes at or below the LIHEAP federal maximum income standard and they reported receiving energy assistance. An analysis of the 2001 RECS

[21]For information about the RECS sample design, see Energy Information Administration, *Sample Design for the Residential Energy Consumption Survey*, DOE/EIA-0555 (94)/1, Washington, DC, August 1994.

[22]The data collected from the 2001 RECS are available on the EIA website: *RECS homepage,* Energy Information Administration, March 9, 2004, http://www.eia.doe.gov/emeu/recs/contents.html.

[23]Information about the quality of RECS data is available on the EIA website: Energy Information Administration, March 9, 2004, http://www.eia.doe.gov/emeu/recs/contents.html.

LIHEAP Supplement resulted in a change in this procedure. All of the households in the sample for the LIHEAP Supplement received LIHEAP benefits during FY 2001. However, about 8 percent of the survey respondents reported annual incomes that were above the federal maximum standard. Since state LIHEAP programs often use one-month or three-month accounting periods to determine income eligibility, it is expected that, for a small percentage of households, annual income might be higher than the eligibility standard. For this study households in the core RECS survey are categorized as LIHEAP recipients if they reported receiving energy assistance. All households in the RECS LIHEAP supplement are categorized as LIHEAP recipients.

Energy burden

Energy burden is an important statistic for policymakers who are considering the need for energy assistance. Energy burden can be defined broadly as the burden placed on household incomes by the cost of energy. However, there are different ways to compute energy burden and different interpretations of the energy burden statistics. The purpose of this section is to examine alternative energy burden statistics and discuss the interpretation of each.[24]

Computational procedures

There are two ways to compute mean energy burden for households.[25] The first is the "mean individual" approach, and the second is the "mean group" approach. While these approaches appear to be similar, they give quite different values.

Using the "mean individual burden" approach, energy burden is computed as follows: First, the ratio of energy expenditures to annual income for each household in a specified population is computed. Then, the mean of these energy burden ratios is computed for the population.[26] For example, consider the situation where there are four households with energy burdens of 4, 5, 7, and 8 percent. The mean of these energy burdens is calculated by adding the percentages (24 percentage points) and dividing by the number of households (four households), resulting in a mean individual burden of 6 percent.

Using the "mean group burden" approach, energy burden is computed as follows. First, total energy expenditures for households and total annual income for households in a specified population are computed. Then, the ratio of total energy expenditures to total income is computed for the specified population. For example, consider the situation where a group consists of four households that have a total income of $100,000 and a total energy bill of $4,000. Dividing the $4,000 in total energy bills by $100,000 in total income results in a mean group burden of 4 percent.

Using the 2001 RECS, the mean residential energy burden for LIHEAP eligible households using the first approach is 19.1 percent and using the second approach is 11.8 percent. The disparity between the two statistics is because the lowest income households spend a greater share of their income on residential energy than do higher income households.[27] If the relationship between income and

[24]More detailed information is available in the Division of Energy Assistance's technical report, *Characterizing the Impact of Energy Expenditures on Low Income Households: An Analysis of Alternative Energy Burden Statistics,* (November, 1994).

[25]The mean is the sum of all values divided by the number of values. The mean is also referred to as the average.

[26]For some households, residential energy expenditures appear to exceed income. Elderly households living on their savings are an example of such households. For such households, the energy burden has been limited to 100 percent.

[27]For example, 2001 RECS households with incomes of $10,000 or less had average residential energy expenditures of $1042, while those with incomes between $20,000 - $35,000 had average residential energy expenditures of $1,315. Thus, households which had more than twice as much income spent only 26 percent more on energy.

residential energy expenditures is linear (i.e., a 10 percent increase in income is associated with a 10 percent increase in residential energy expenditures), the two statistics would be equal. However, since a number of low income households spend a large share of their income on energy, the relationship between income and residential energy expenditures is not linear (i.e., a 10 percent increase in income is associated with a considerably smaller increase in energy expenditures). Therefore, there is a substantial difference between the two statistics.

Statistical measures

Different "measures of central tendency" can be used to describe energy burden. The most commonly used measures are the mean and the median. As previously noted, the mean is computed as the sum of all values divided by the number of values. The median is computed as the value that is at the center of the distribution of values (i.e., 50 percent of the values are greater than the median and 50 percent are less).

In the discussion of computational procedures, the "mean individual burden" was examined. It is also possible to look at the "median individual burden." As noted above for LIHEAP eligible households, the mean residential energy burden computed as the "mean individual burden" was 19.1 percent. The median of the distribution of residential energy burdens from the 2001 RECS survey was 12.6 percent. The disparity between these two statistics is the result of the skewed distribution of energy burden ratios.

Data interpretations

The statistic used to describe energy burden depends on the question being asked. Each statistic offers some data on energy burden while not telling the whole story by itself.

The key difference between "mean individual burden" and "mean group burden" is that the first statistic focuses on the experience of individual households and the second on the experience of a group of households. The "mean individual burden" furnishes more information on how individual households are affected by energy burden (i.e., it computes a mean by using each household's burden). The "mean group burden" furnishes more information on group burden (i.e., it computes the share of all income earned by LIHEAP eligible households that goes to pay for energy). Both statistics are useful, though the individual burden statistic puts more emphasis on the experience of individual households, and the group burden puts more emphasis on the share of group income that is used for energy.

The key difference between the "mean individual burden" and the "median individual burden" is that the first statistic furnishes information on all LIHEAP eligible households at the expense of "overstating" what is happening to the "average" LIHEAP eligible household. The second statistic furnishes information on the "average" LIHEAP eligible household at the expense of disregarding what is happening to households at either end of the distribution.

Since targeting decisions are being examined in this study, individual household energy burdens are used in order to examine how individual households are affected by LIHEAP targeting. In tables that compare groups of households, mean individual burden and median individual burden are presented.

Appendix B: 2001 RECS LIHEAP Supplement

Appendix B provides information on how home energy burden estimates for LIHEAP recipient households were derived from the 2001 RECS LIHEAP Supplement. The following topics are covered in this Appendix.

- Description of the 2001 RECS LIHEAP Supplement.
- Strengths and Limitations of RECS LIHEAP Supplement data.
- Estimates of energy burden.

Appendix A provides information on how home energy burden estimates were derived for all households from the 2001 RECS.

Description of the 2001 RECS LIHEAP Supplement

The 2001 RECS LIHEAP Supplement was conducted as part of the 2001 RECS. (See Appendix A for more information on the basis RECS study procedures.) The RECS Supplement differs from the RECS core sample in terms of the sampling procedures and the inclusion of administrative data.

- Sampling procedures – The sample for 2001 RECS LIHEAP Supplement was restricted to the PSUs in which the core RECS was being administered. Within each PSU, state LIHEAP directors furnished information on the number of LIHEAP recipients by ZIP code. A sample of ZIP codes was selected and then, with the selected ZIP code, a sample of LIHEAP recipients was selected.
- Administrative data – In addition to the information collected through the Household Survey and the Energy Supplier Survey, information also was collected from state administrative records. The data obtained from those records included the type and amount of benefits received by the household.

The 2001 RECS LIHEAP Supplement was the first supplement to interview a sample of LIHEAP recipients. Previously, the RECS had included a low income supplement that included both LIHEAP recipients and nonrecipients. The 2001 RECS LIHEAP Supplement included 496 LIHEAP recipient households.

Strengths and limitations of RECS LIHEAP Supplement data

The RECS LIHEAP Supplement enhances the RECS data in the following ways.

- Recipiency – In the RECS Supplement, LIHEAP recipiency is obtained directly from administrative records. This is an improvement over self-reports that have been shown to furnish biased estimates of the characteristics of LIHEAP recipient households.
- Benefits – In the RECS Supplement, LIHEAP benefits are obtained directly from administrative records. This is an improvement over self-reports where a significant number of respondents are unable to recall the receipt of benefits and the amount of benefits. In addition, respondent reports also might income other types of energy benefits.

While the 2001 RECS LIHEAP Supplement data provide the most current and comprehensive data on residential energy use by LIHEAP recipient households, several significant limitations must be addressed:

- Households are asked to report gross income for the last twelve months. While households are instructed to include income from all sources, it appears that households focus only on income from earnings and underreport income from other sources. From that perspective, the RECS LIHEAP Supplement may overstate energy burden for LIHEAP recipients.

- The 2001 RECS LIHEAP Supplement is a survey and is subject to variance in the estimates due to sampling. The true population value for statistics may vary from those presented in this report.

Net energy burden

Energy burden is an important statistic for policymakers who are considering the need for energy assistance. Energy burden can be defined broadly as the burden placed on household incomes by the cost of energy. However, there are different ways to compute energy burden and different interpretations of the energy burden statistics. In Appendix A, information is presented on alternative energy burden statistics and the interpretation of each is discussed. In this section, the concept of net energy burden is discussed.

Energy burden can be defined as the share of annual household income that is used to pay annual energy bills. Energy burden is characterized as "the percent of income spent on energy" and is computed as:

$$\text{Energy Burden} = 100 * (\text{Annual Energy Bill}) \div (\text{Annual Income})$$

For example, if a household has an annual energy bill of $1,000 and a gross annual income of $10,000, the energy burden is 10 percent.

The LIHEAP program is concerned with two energy burden statistics: residential and home energy burden, and gross and net energy burden. Residential energy burden refers to the share of income spent on energy for all residential uses, including home heating, home cooling or ventilation, water heating, refrigeration, lighting, and other household appliances. Home energy burden refers to the share of household income spent on energy for home space heating and home space cooling.

The LIHEAP program also is concerned with gross and net energy burden. Gross energy burden, referred to as energy burden, is defined as annual energy expenditures as a share of annual household income. Net energy burden is defined as the household's energy burden after the receipt of a LIHEAP grant. Net energy burden is computed as:

$$\text{Net Energy Burden} = 100 * (\text{Energy Bill} - \text{LIHEAP Benefit}) \div (\text{Annual Income}).$$

For example, if a household has an annual energy bill of $1,000, a LIHEAP benefit of $250, and a gross annual income of $10,000, the energy burden is 10 percent and the net energy burden is 7.5 percent. Net energy burden is used extensively in Section IV of the study to examine the impact of the LIHEAP program on households.

Energy burden can be used to compare energy expenditures among households and groups of households. For example, consider the case where one household has an energy bill of $1,000 and an income of $10,000, and a second household has an energy bill of $1,200 and an income of $24,000.

While the first household has a lower energy bill ($1,000 for the first household compared to $1,200 for the second), the first household has a much higher energy burden (10 percent of income compared for the first household compared to 5 percent of income for the second). The LIHEAP program guidelines suggest that the first household has a greater need for LIHEAP benefits. In fact, the first household in the example would need a LIHEAP benefit of $500 to reduce its net energy burden to 5 percent of income, the energy burden experienced by the second household. Throughout this study energy burden and net energy burden are used to compare the need for energy assistance among groups of low income households.

In most cases, energy burden is calculated using gross annual income (i.e., the total amount of income received by the household). However, a number of state LIHEAP programs use net income when considering a household's need for energy assistance. Such states may subtract income taxes, payroll taxes, and certain work expenses from income to compute net annual income. It might be valuable to examine energy burden statistics developed using net annual income. However, the 2001 RECS survey that was used for this study only collected data on gross annual income.

Appendix C: U.S. Census Regions