RESEARCH REPORT

THE ESTIMATION OF CORE HOUSING
NEED USING THE 1999 SURVEY OF
HOUSEHOLD SPENDING MICRO DATA FILE

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The Estimation of
Core Housing Need
Using the 1999
Survey of Household Spending
Micro Data File

A Report to
Canada Mortgage and Housing Corporation
Under the
External Research Program
6585-F047-4

By
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Glossary

Acronyms

FAMEX	Family Expenditure Survey
HFE	Household Facilities and Equipment Survey
HIFE	Household Income, Facilities and Equipment micro data file
PUMF	Public use micro data file of the Survey of Household Spending
RMS	CMHC's Annual Rental Market Survey of rents and vacancies
SCF	Survey of Consumer Finances
SHS	Survey of Household Spending
SLID	Survey of Labour and Income Dynamics
STIR	Shelter Cost-to-Income Ratio

CMHC Housing Standards — Measure

CMHC Housing Standards	Measure
Affordability	Less than 30% of pre-tax household income devoted to shelter
Adequacy	Not in need of major repair and having a full bathroom
Suitability	Meeting the National Occupancy Standard
National Occupancy Standard (NOS)	A method to determine the number of bedrooms a household requires given the age, gender and interrelationships between the household members
Norm Rent Income	The income required to pay the median rent of an adequate unsubsidized rental unit of the appropriate size for the household such that less than 30% of the household's pre-tax income is devoted to shelter.

Terminology

Size of area of residence	The term is used in this report to indicate the sub-provincial geo-statistical community in which the household lives. It could be a city, town or village or a Census Metropolitan Area/ Agglomeration as applicable.
Economic Family	A group of individuals related by blood, marriage, adoption or common-law relationship who share a dwelling
Family Households	A household with a married or common law couple, with or without never married children or a lone parent with never married child(ren)
Internal File	The Statistics Canada working version of the SHS micro data file
Masked Records	Records for which the location (province or size of area of residence) has been suppressed to avoid inadvertent disclosure.
Micro data file	A file containing individual records, as opposed to summary or tabular data.
Stratum/a	Sub-provincial geographic grouping(s) of areas of residence by size category

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Abstract

Title: The Estimation of Core Housing Need Using the 1999 Survey of Household Spending Micro Data File

External Research Program # 6585-F047-4

Paddy Fuller

The objective of the project was to test the feasibility of implementing the core housing need methodology on the 1999 Survey of Household Spending (SHS) micro data file. The Household Facilities and Equipment micro data file that CMHC had used in the past for developing inter-censal estimates of core housing need was no longer available and CMHC wanted to explore other sources of inter-censal information on housing need. The Survey of Household Spending contains much of the same data content as HIFE as well as the expenditure items that had been previously collected by the Family Expenditure Survey. However, the SHS sample is considerably smaller than HIFE. This limited both the ability to develop norm rent incomes for sub-provincial areas and to produce detailed cross-tabulations of core housing need by socio-economic characteristics at lower levels of geography. The project used two versions of the file – the publicly released version and a non-released working version held within Statistics Canada. As a result of this project, the publicly released version will in future contain a revised size of area of residence breakdown that distinguishes metropolitan areas and makes the file more suitable for housing need analysis. While SHS contains the necessary content for the application of the core housing need methodology, the sample size constrains the use of the file in both deriving norm rents and detailed analysis of households in core housing need. It does contain detailed expenditures and income for the same time period, which makes is a good platform for expenditure analysis.

Executive Summary

The objective of the project was to test the feasibility of implementing the core housing need methodology on the 1999 Survey of Household Spending (SHS) micro data file. The core housing need methodology had previously been applied to the census and the Household Income, Facilities and Equipment (HIFE) micro data file. The SHS micro data file is based on a sample survey, as was the case with HIFE. However, the SHS sample is considerably smaller than the sample on which HIFE was based, so issues of sample size and reliability had to be considered in using the SHS file.

On the plus side, the SHS file contains income and shelter expenditure information for the same time period – the reference year 1999. Housing need had never before been estimated using an annual expenditure file.

The core housing need methodology was first applied to the publicly released version of the file (known by the acronym PUMF). The coding of the size of area of residence variable on this file has 30,000 as the highest population level identified - so all of the communities above that size were lumped together. Since this included communities with widely different housing costs, it was hypothesized that the PUMF file could lead to an underestimation of the incidence of housing need. Therefore, to test for this possibility, the core housing need methodology was applied a second time to a working version of the SHS micro data file at Statistics Canada (Internal File). The size of area of residence variable on the Internal File included a code for areas of residence with populations of 100,000 and above (i.e., Census Metropolitan Areas). The level of housing need using this file was as much as one percentage point higher than the level estimated using the PUMF file.

Estimates of core housing need on the SHS 1999 micro data file were between 13.2% and 14.2%, depending on the version of the file and the method used. This was less than the level observed on the 1996 Census. However, core housing need is generally lower on sample survey files such as HIFE than on the census. The level of core housing need among renters on SHS 1999 is comparable to the renter incidence on HIFE 1996. (It was not possible to estimate owner need using the HIFE 1996 file because the shelter costs of owners were not collected.)

The sample size of SHS was a limitation in the estimation of core housing need. On the PUMF version, for half of the provinces, norm rent incomes had to be based on rental units in the province as a whole. In the others, norm rent incomes could be calculated for communities of above/below the 30,000-population level.

The sample size also limited the analysis of core housing need. Only two variables could be examined at the same time (e.g., province and household type, or tenure and size of area of residence range). Simultaneously splitting the data by more than two variables resulted in cells with less than 30 households, which is the minimum reliability threshold recommended by Statistics Canada.

In conclusion, the SHS file can be used for the estimation of core housing need, although the smaller sample size limits the level of analysis as compared to the HIFE file previously used for inter-censal monitoring of housing need. The PUMF version of the SHS file could be improved,

from a housing point of view, by substituting 100,000 as the cut-off for the largest size of area of residence instead of 30,000, as used on the 1999 version.

Résumé

L'étude avait pour objectif de vérifier la faisabilité de l'application de la méthode d'évaluation des besoins impérieux de logement au fichier de microdonnées de l'Enquête sur les dépenses des ménages (EDM) de 1999. Cette méthode avait été appliquée précédemment aux données du recensement et au fichier de microdonnées de l'Enquête sur les revenus des ménages et l'équipement ménager (ERMEM). Ce fichier de microdonnées est tiré d'une enquête par échantillonnage, tout comme c'est le cas pour l'EDM. Toutefois, la taille de l'échantillon de l'EDM étant considérablement plus petite que celle de l'ERMEM, il a fallu tenir compte des questions de taille d'échantillonnage et de fiabilité avant d'utiliser le fichier de l'EDM.

Le fichier de l'EDM a l'avantage de renfermer des informations sur les revenus et les dépenses de logement pour la même période – l'année de référence 1999. Les besoins impérieux de logement n'avaient pas, jusqu'à présent, été évalués à l'aide d'un fichier de dépenses annuelles.

La méthode d'évaluation des besoins impérieux de logement a d'abord été appliquée à la version publique du fichier Profils de la demande de logements de secteur à haute densité (ci-après Profils). La taille maximale de la variable « taille de la région de résidence » était de 30 000 de population, ce qui fait que toutes les collectivités plus grandes que ce nombre étaient regroupées. Puisque cela comprenait des collectivités dont les coûts de logement étaient très variables, on a supposé que l'analyse du fichier Profils pourrait mener à une sous-estimation de l'incidence des besoins impérieux de logement. Par conséquent, afin de vérifier cette hypothèse, la méthode d'évaluation des besoins impérieux de logement a été appliquée une seconde fois à une version de travail du fichier de microdonnées de l'EDM (fichier interne) à Statistique Canada. La variable « taille de la région de résidence » dans le fichier interne comprenait un code précisant la population des régions de résidence de 100 000 et plus (c.-à-d. les Régions métropolitaines de recensement). Le niveau des besoins impérieux de logement constaté à l'aide de ce fichier atteignait jusqu'à un pour cent de plus que le niveau donné par l'analyse du fichier Profils.

Les besoins impérieux de logement évalués au moyen du fichier de microdonnées de l'EDM de 1999 sont 13,2 % et de 14,2 %, selon la version du fichier et la méthode employées. Ce nombre est inférieur à celui résultant des données du recensement de 1996. Cependant, le niveau des besoins impérieux de logement est de manière générale plus faible dans les fichiers d'enquêtes par échantillonnage comme l'ERMEM que dans le recensement. Le niveau des besoins impérieux de logement parmi les locataires compris dans l'EDM de 1999 est comparable à celui de l'ERMEM de 1996. (Il n'a pas été possible d'évaluer le niveau des besoins impérieux de logement des propriétaires à l'aide du fichier de données de l'ERMEM de 1996 parce que les frais de logement des propriétaires n'y sont pas consignés.)

La taille d'échantillonnage du fichier de l'EDM était un obstacle à l'estimation des besoins impérieux de logement. En ce qui a trait à la version Profils, pour la moitié des provinces, les revenus fondés sur les loyers normatifs ont été évalués sur l'ensemble des logements locatifs de la province. Autrement dit, les revenus fondés sur les loyers normatifs pouvaient être calculés pour les collectivités ayant une population inférieure ou supérieure à 30 000 habitants.

La taille d'échantillon a également limité l'analyse des besoins impérieux de logement. On n'a pu étudier que deux variables à la fois (c.-à-d. province et type de ménage ou mode d'occupation et fourchette de taille de région de résidence). La division simultanée des données en plus de deux variables engendre des cellules ayant moins de 30 ménages, ce qui constitue le seuil minimal de fiabilité recommandé par Statistique Canada.

Pour conclure, on peut employer le fichier de l'EDM pour évaluer les besoins impérieux de logement, même si la faible taille de l'échantillon limite le niveau d'analyse, comparativement au fichier de l'ERMEM, employé antérieurement pour la vérification interrecensement des besoins impérieux de logement. La version Profils du fichier de l'EDM pourrait être améliorée, du point de vue de l'habitation, en substituant le nombre de 100 000 à 30 000 comme limite supérieure de la taille de région de résidence, comme c'est le cas de la version de 1999.

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Introduction

The objective of the project was to test the feasibility of implementing the core housing need methodology on the 1999 Survey of Household Spending (SHS) micro data file. This overall goal was broken into more detailed tasks as follows:

- Develop a methodological framework to test the application of the core housing need indicator to the Survey of Household Spending (SHS) file:
- Program the algorithms for the estimation of core housing need on the 1999 SHS micro data file and document the logic and computer programs in a final report; and
- Produce detailed core housing need estimates by household type, tenure and geography and assess the feasibility of using the SHS to measure core housing need.

The intended database for the project was to be the publicly released version of the file, generally referred to by the acronym PUMF for *public use micro data file*. This file contains all of the completed usable responses to the survey without, of course, any information that could in any way serve to identify the respondents. Information on the location of the respondents, for example, is limited to the province and the size of the area of residence (city, town or village) where they lived. There is, however, another version of the SHS file within Statistics Canada with more detailed responses to the questions and the size of area of residence. This will be referred to as the Internal File, to distinguish it from the PUMF or publicly released version. Because of the limited size of area of residence categories on the PUMF version, CMHC sought and obtained from Statistics Canada access by this researcher, to the Internal File to estimate, with more precision, the geographic distribution of core housing need.

ORGANIZATION OF THE REPORT

The report begins with an introduction to the core housing need methodology. The characteristics of the statistical data sources - census, HIFE, etc - that are used for core housing need estimation are then reviewed. The following section examines the Survey of Household Spending database, including its evolution, size, strengths and possible weaknesses for core housing need analysis. The process of using the SHS as the basis for core housing need estimation is then described and the results presented. Along with the PUMF version of the SHS, the project also used another version of the file at Statistics Canada and the lessons to be drawn from that exercise are provided. This is followed by a discussion of the sample limitations of SHS and how they might have affected the core housing need estimates. Finally, some conclusions are drawn and recommendations presented.

Assessing Housing Conditions and Measuring Need[*]

Most Canadian households live in dwellings that are **adequate** in condition, **affordable** in relation to their income and **suitable** in size.

o An **adequate** dwelling does not, in the assessment of the occupants, require major repairs and has a full bathroom and running hot water.

o To be **affordable**, the shelter cost of a dwelling must be less than 30% of pre-tax household income;

Shelter cost for owners includes principal, interest, property taxes, condominium charges (if applicable) and utility payments (water, fuel and electricity). For renters, the shelter payment includes rent and utilities (if the latter are not included in the rent).

o A **suitable** dwelling has enough bedrooms for the size and composition of the occupying household as determined by the National Occupancy Standard.

The elements of the National Occupancy Standard are as follows:

- Children under five years of age are expected to share a bedroom with one other sibling, regardless of gender;
- From five through 17 years of age, children are expected to share a bedroom with one other sibling of the same gender;
- Each adult (18 years of age and older) is allotted his/her own bedroom, unless they are part of a married or common law relationship, in which case they would be expected to share a bedroom with his/her spouse/partner.

Some households live in dwellings that do not meet one or more of these standards. In some cases, these households could afford to rent housing which meets all three standards; in other cases they could not. A household is said to be in core housing need if its housing falls below at least one of the adequacy, affordability or suitability standards **and** it would have to spend 30 percent or more if its pre-tax income to pay the median rent of alternative market housing that meets all three standards.

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[*] This description of core housing need is based on CMHC's Research Highlights Socio-Economic Series, Issue 55-1

Statistical Vehicles Used for Housing Need Estimation

The census is the most comprehensive data source for the assessment of housing conditions and the estimation of core housing need. The large sample size allows housing need to be calculated down to the level of the municipality. One fifth of all households complete the "long form" on which the detailed housing and income variables are collected. The census also collects complete demographic information on all of the household members, allowing an assessment of how well the dwelling can accommodate the privacy and space needs of the household, taking into account the age, gender and the interrelationships among the occupants.

Sample surveys have been used to monitor housing need between censuses, although not to the same geographic detail because of the limitations imposed by their smaller sample sizes. In the past, inter-censal estimates were based on surveys piggybacked onto the Labour Force Survey and assembled into the Household Income, Facilities and Equipment (HIFE) micro data file. This file included the information gathered on the Household Facilities and Equipment Survey, the Survey of Consumer Finances (for the income data) as well as the rent schedule (used for the Consumer Price Index), with additional questions added by CMHC on household mobility and the need for repair of the dwelling. Since the shelter costs of homeowners were not normally gathered, the HIFE file could only be used for the examination of renter need. In 1988 and 1991, CMHC in partnership with the provinces collected homeowner shelter costs on the survey, which facilitated the estimation of core housing need for owners as well as for renters, for those years.

In the mid-1990s, Statistics Canada implemented significant changes to its sample survey program. The Survey of Labour and Income Dynamics replaced the Survey of Consumer Finances as the main source of inter-censal income information. This effectively meant that the HIFE file, on which CMHC had relied for inter-censal estimates of housing need, would no longer be available. In 1997, the Survey of Household Spending (SHS) replaced the Family Expenditure Survey (FAMEX). With the addition of the dwelling stock and household facilities items to this survey, it became the logical successor, in terms of content, to the HIFE suite of surveys, albeit with a smaller sample.

Table 1: HIFE and SHS Sample by Province		
Province	HIFE 1994	SHS 99
Province Masked	N/A	154
Newfoundland	1,674	1,477
Prince Edward Island	894	600
Nova Scotia	2,501	1,526
New Brunswick	2,154	1,417
Quebec	7,337	2,030
Ontario	10,481	2,214
Manitoba	2,451	1,609
Saskatchewan	2,855	1,441
Alberta	3,354	1,873
British Columbia	3,296	2,032
Yukon/NWT/Nunuvut	N/A	832
Canada	36,997	17,205

As was the case with FAMEX, the SHS expenditure survey is undertaken to provide the basis for weighting the Consumer Price Index expenditure basket. SHS is also used to distribute the tax revenue between the provincial and federal governments for those jurisdictions where the sales taxes have been harmonized. SHS collects household income (uniquely among Statistics Canada surveys) for the same reference period as the expenditure items. This is a major advantage for the accurate assessment of affordability. In other surveys, the household income refers to the most recent complete year while housing expenditures are for the month preceding the survey. From a housing viewpoint, SHS is a replacement for both FAMEX and HIFE.

SHS has the data content for the estimation of core housing need, particularly as CMHC added its questions on need for repair and mobility, previously added to the HIFE set of surveys.

A major issue going into this project concerned the limitations that would be imposed by the sample size of SHS. To meet CMHC's needs, a survey database should be capable of producing core housing need estimates to the same level of geography as the Household Income, Facilities & Equipment (HIFE) micro data file. From HIFE, it was possible to produce statistically reliable estimates of need at the provincial level.

According to Statistics Canada's guideline, a minimum cell count of 30 is required to ensure statistical reliability of any output from the SHS. That guidance comes into play in two ways when estimating housing need. Firstly, there is the need to establish norm rent incomes for rental units by number of bedrooms. These are based on unsubsidized rents for adequate units for which annual shelter cost is available. To implement the NOS, it is necessary to calculate the norm rent incomes for bachelor, one, two and three and more bedroom units to provide norm rent incomes for households of different sizes. These can then be used to test the capacity of households of different sizes to access adequate and affordable and suitable dwellings.

To test the capacity of a household to access an adequate and suitable dwelling for less than 30% of that household's income, the norm rent income used should be as representative as possible of the market where the household resides. Ideally, 30 unsubsidized rental units should be available for bachelor, one, two and three and more bedrooms units for each of the geographic entities for which needs estimates are to be produced (i.e., a province or a grouping of communities within a province). In the case of the census, it is possible to establish market rents for very specific locations. The much smaller sample size of SHS, however, limits the number of "markets" for which norm rent incomes can be derived. A higher level of geographic aggregation has to be used in the calculation of norm rent incomes. Instead of individual communities, communities have to be grouped within each province. With HIFE, it was possible in most provinces to derive norm rent incomes within provinces, by communities above and below 100,000 in population. However, the SHS 1999 sample was less than half the sample size of the HIFE file and this clearly affected the usability of the file for lower levels of geography.

The minimum cell size of 30 also comes into play on the output side. Core housing need is a relatively rare characteristic (<20% of all households). It is also correlated with tenure and type of household. A cross-tabulation subdivides the sample into sub-categories for each of the variables included in the analysis. If each variable has four categories, the cross-tabulation results in 16 cells. To ensure the reliability of cross-tabulations of housing need, there would have to be at least 30 households in each cell (i.e., for every combination of characteristics in the table). This limits the number of variables and number of categories within variables by which the overall population can be sub-divided. An analysis variable could be geographic - province or size of area of residence- or demographic (e.g., household type). The number of variables as well as the number of categories within a dimension can stretch the sample to the point where individual cells fall below the 30 record minimum. To maintain the validity of the analysis the number of variables or categories has to be reduced to maintain at least the minimum number of records in each cell.

The Survey of Household Spending Public Use Micro data File

The public use micro data file for the 1999 Survey of Household Spending was to be the main data source for the project. Although the micro data file contains all of the completed records from the survey, Statistics Canada had to protect individual records on the file against the possibility of inadvertent disclosure of identifiable cases.

GEOGRAPHY

- The main protective measure used by Statistics Canada was to "mask" the province to which the record belonged. According to the documentation:

> 154 records had their province codes set to 0 due to exceedingly high or low expenditure values or due to high-income values.

Given the absence of any location information, these records cannot be used to assess core housing need.

- The SHS PUMF includes a variable that identifies the size of area of residence in ranges. This variable was "masked" if the province had only one community within the size category.

0. Size of area of residence Masked
1. 30,000 and over
2. Under 30,000
3. Rural

According to the 1996 Census, approximately 60 to 65 per cent of the population of Canada lived in urban communities of 30,000 and more population. On the SHS, the remaining 35% is split into two geographic categories - urban areas of less than 30,000 population and rural areas. The Census reported that about 22% of the population lived in rural areas.

Table 2: SHS Sample and Census Population by Community Size

Size of Area of Residence	SHS Sample		1996 Census of Population*
	Number	Percent	
Variable Masked	2,791	16.22	N/A
30,000 & over	8,173	47.50	60-65%
Under 30,000	2,375	13.80	13-17%
Rural	3,866	22.47	22%
Total	17,205	100.00	N/A

That would leave 13% of the population in urban areas of less than 30,000. This uneven splitting of the population on the SHS PUMF created obstacles for the estimation of core housing need as most of the population resides in communities with 30,000 or more population. Insufficient rental stock is left for the derivation of norm rent incomes using the minimum cell size of 30 in communities with less than 30,000 population. It would also not be possible to analyze housing need in the under 30,000 category without falling below the minimum cell size requirement. From a housing need point of view, a size of area of residence breakdown of

above and below 100,000 would be both more in line with the distribution of the population and divide the rental stock into more homogenous groupings since rents in the largest centres are higher, as a general tendency, than in smaller centres.

The second test for core housing need compares the incomes of households with the median rents for adequate rental dwellings of the requisite size. Norm rent incomes are calculated for bachelor units and units with one, two and three and more bedrooms. In subdividing provinces into size of area of residence groupings for the calculation of norm rent income, for any geographic segment to be usable it would have to have at least 30 adequate, unsubsidized rental units in each bedroom category (i.e., bachelor, one, two and three and more bedrooms).

To gauge whether or not the household can access adequate and suitable accommodation for less than 30% of their pre-tax income, household income should be compared to market rents where the household resides. In a sample survey the size of SHS, the individual communities are not identified to protect the confidentiality of the respondents. For the norm rent income calculation, larger geographical units must be formed. In order to maintain homogeneity from a rent level point of view, it would be desirable to form these groupings with communities of comparable size in the same province. The size of area of residence categories of the PUMF limited the groupings that could be formed. By having to pool all urban areas of more than 30,000 within a single category, the norm rent income of households in the largest centres would be underestimated, reducing the observed incidence of core housing need overall. On the other hand, being grouped with the larger centres would raise the median rents in smaller centres. The net effect of this combination would depend on the relative size of the sample and the differential in rents.

The size of area of residence breakdown on the PUMF at 30,000 for urban areas is not the ideal break from a housing markets point of view. Most provinces do not have sufficient rental stock in urban areas with less than 30,000 in population to support housing need analysis. CMHC therefore approached Statistics Canada for access to its Internal File, which has a finer size of area of residence breakdown. Access was provided to the contractor under strictly controlled conditions at Statistics Canada. The core housing need methodology was implemented on this file and the results bore out the hypothesis that a 100,000 breakpoint would provide more market sensitive housing need estimates than grouping all urban areas in excess of 30,000.

EXCLUSIONS

Not all of the records from the SHS survey are useable for core housing need analysis. The methodology requires that the household have a positive income (see Appendix B for the definition of income on the SHS file), since otherwise it is not possible to calculate a shelter cost-to-income ratio. Also, households with a shelter cost equal to or in excess of their entire income are excluded from the analysis. CMHC applies this rule to both sample survey files such HIFE and the census. For those data sources, the reference year for household income is the most recent completed year whereas the shelter cost information is for the month preceding the survey collection month. A shelter cost in excess of income could mean that there had been a change in the household circumstances in the current year. For instance, a household could have moved as a result of a change in employment, or marriage, divorce or a change in household membership also could have changed its income status, making last year's income

no longer appropriate to compare to this year's shelter expenditures.

The SHS collects the income and expenditure information for the same time period – the reference year of the survey, in this case 1999. High shelter cost-to-income ratios can still occur either because the household is "dis-saving" or because someone not a member of the household is underwriting the shelter cost, in whole or in part. Examples of the latter could include a student being supported by a parent, an immigrant receiving remittances from abroad or adult children providing for an elderly parent. On the SHS 1999 micro data file, there were 24 records with zero incomes and 134 with shelter cost-to-income ratios in excess of 100%. These records were excluded from the analysis of core housing need.

There is an issue with the SHS that does not arise with the census or other sample survey files. The census and other sample surveys collect monthly rent, which is then multiplied by 12 to get the annual total. The purpose of the SHS is to collect income and expenditure information for a household for a complete calendar year. Information on households that move or have other significant changes during the year cannot easily be put on an annualized basis. Households may form during the SHS survey reference period by marriage or by individuals leaving a parental home or other household. Newly formed households would not have annual expenditures for the same group of persons in the same dwelling. For the purposes of this project, "part year" households have been excluded. On the SHS, part-year households are defined as follows:

> Part-year households are comprised entirely of persons who were members of other households for part of the survey year.
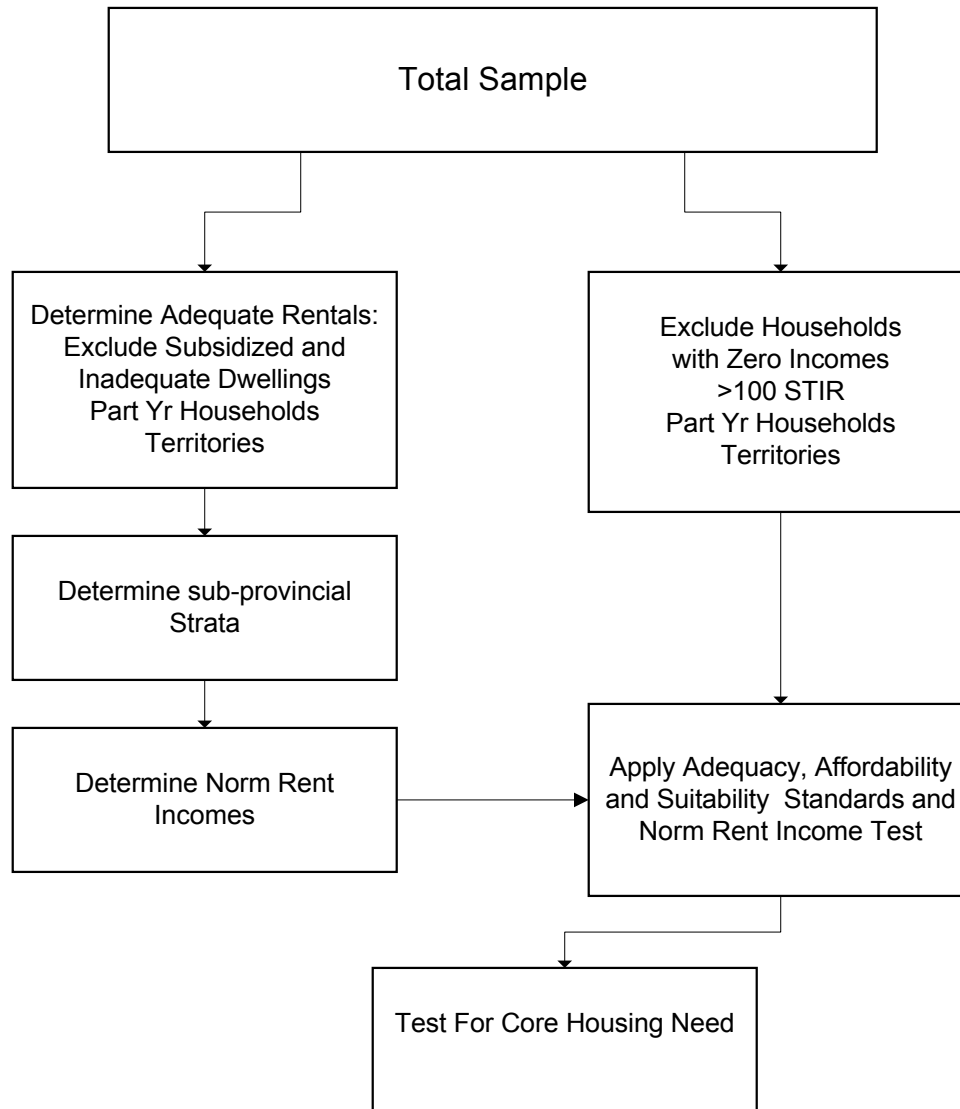
The Territories were not included in the HIFE database. They are also excluded from this SHS based analysis because the sample for each territory would be too small to develop norm rent incomes, not to mention the detailed incidence of need.

As was mentioned above, the SHS PUMF file also masks the province code for certain records to reduce the possibility of revealing individual cases. Records with very high expenditures have their province codes suppressed. Without the province, the household record cannot be tested for core housing need since there would be no applicable norm rent income.

In all, 1,642 household records were excluded from the database leaving a working sample of 15,563 households. The process of sub-dividing the file is shown graphically in Figure 1.

The above discussion applies to the publicly available public use micro data file. Statistics Canada also has another version of the file referred to here as the Internal File. Since this file is not publicly released, not all of the protections applied to the PUMF are required. More importantly from the point of view of this project, a more detailed breakdown of size of area of residence is available on the Internal File. With access to the Internal File, it was possible to use more of the household records and a more refined size of area of residence categorization that made better use of all of the records. The above and below 100,000 size of area of residence breakdown, as opposed to the above and below 30,000 available on the PUMF facilitated the development of more market-specific norm rent incomes and a more even split of the rental universe.

Figure 1: Applying the Core Housing Need Methodology to the SHS

Total Sample

Determine Adequate Rentals:
Exclude Subsidized and
Inadequate Dwellings
Part Yr Households
Territories

Exclude Households
with Zero Incomes
>100 STIR
Part Yr Households
Territories

Determine sub-provincial Strata

Determine Norm Rent Incomes

Apply Adequacy, Affordability and Suitability Standards and Norm Rent Income Test

Test For Core Housing Need

The National Occupancy Standard (NOS) is used to determine the number of bedrooms a household requires to provide space and privacy for its members. This in turn determines the appropriate norm rent income for that size of household. Although the SHS file had information on the number of children from five through 17 years of age, the gender breakdown was not provided. The following procedure was employed to deal with the missing information required by the NOS. Where there was more than one child, it was assumed that in half the cases the siblings were the same gender. The record number was used as a proxy for a pseudo random number. If it was an even number, the children were assumed to be of different genders and two bedrooms were allocated. Otherwise, they were allotted one bedroom.

The number of bedrooms required by a household was then

The number of adults (18 years of age or older) minus one if there was a marriage or common law relationship in the household +
(Number of children < 5) ÷ 2 +
(Number of girls 5-17) ÷ 2 +
(Number of boys 5-17) ÷ 2

If the numbers of children < 5 or the number of boys 5-17 or girls 5-17, was not an even number an additional bedroom was allocated. The NOS does allow children under five to share with an older sibling regardless of gender.

Norm Rent Incomes

The norm rent income is the income a household requires to rent suitable, adequate housing without spending 30% or more of its pre-tax income. It is based on the median rents for all rental units that are:

o   Unsubsidized - no part of the rent is reduced because of a contribution by government, an employer or in return for services provided by the tenant to the landlord;
o   Purely residential i.e., excludes any part of the unit used for business purposes;
o   In adequate condition (i.e., are not in need of major repair and have a full bathroom);
o   Occupied by the household for a full year - to get a full year's shelter cost;

Norm rent incomes are required for bachelor, one, two and three and more bedroom units to provide for households of different sizes. Dividing the annual median rents by .3 produces the norm rent incomes.

BACHELOR UNITS

Bachelor units are relatively rare in the rental stock and the SHS sample does not contain enough units to support the estimation of norm rent incomes specifically for these units. The norm rent income methodology requires a sufficient sample of units of each bedroom size category for each size of area of residence stratum in each province. If this criterion were to include bachelor units, it would severely restrict the use of the SHS file for norm rent income estimation. There are only 217 bachelor unit records in total on the file. Moreover, this gross number of bachelor units was greatly reduced once the other qualifications (such as full year households) for the calculation of norm rent incomes were applied. This was also a problem with the HIFE file.

Under the core housing need methodology, it is necessary to have norm rent incomes for bachelor units as a means test for single person households. The scarcity of such units in the rental stock would suggest that even if these persons had more income, they would not be able to access bachelor units. The approach adopted with HIFE was to use a blended median rent between bachelor and one bedroom records as the norm rent incomes for bachelor units. This approach implicitly recognised that single person households, if they had sufficient income, would probably have to compete for one bedroom units with two person households, given the relative shortage of apartments of the smaller size category.

Since virtually all the bachelor units were in the >30,000 population stratum on the PUMF, it was not possible to calculate a blended median rent for bachelor and one bedroom units in the under 30,000 size of area of residence size stratum. However, the sample of one, two and three and more bedroom units was more than sufficient at the provincial level.

One approach to overcoming the shortage of bachelor units in the sample would be to take the differential in the rents between one and two bedroom units as approximating the rent of a bedroom. Subtracting this amount from the rent of a one bedroom would provide a proxy of the cost of a "bedroom-less" one bedroom unit - a bachelor. Basing the differential on one and two bedroom units means that it is based on only apartment units. To expand the analysis to larger rental units would risk introducing townhouses and other types of rentals into the mix with another possible source of variation. The difference between one and two bedroom units was 15% on a national basis. The differential varied from province to province but not by much more than ±3%.

One could also look at the differential between the rents of one bedroom and bachelor units at the national level. This could not be done for the provinces because of the limited number of bachelor units. The difference in the median rents between bachelor and one bedroom units is 25%. To use all of the difference to derive a norm rent income for bachelor units would imply that sufficient bachelor units would be available for all one person households. Using the 15% differential from the one to two bedroom units inherently recognises that some one person households would have to look for suitable and adequate accommodation in one bedroom units, if they had sufficient means. This was the approach that was used with the PUMF file

In contrast to the PUMF, the blended approach could only be fully implemented on the Internal File. The size of area of residence breakdown of over and under 100,000 available on the

Internal File made for a more even distribution of the bachelor units, which facilitated the development of blended average rents between one bedroom and bachelor units. The results of that analysis will be discussed later in this report.

Only adequate unsubsidized units, for which annual rent was available, were included in the subset of units from which the norm rent incomes were derived.

Adequacy

The norm rent incomes are calculated using only the adequate rental units from the SHS file. *Adequacy* was based firstly on Question B3 of the SHS 1999 questionnaire.

B 3 Was this dwelling in need of any repair on December 31st 1999?
    Excluding remodelling and energy improvements

Yes, major repairs were needed (e.g., corroded pipes, damaged electrical wiring, sagging floors, bulging walls, damp walls and ceilings, crumbling foundations, rotting porches and steps)

Yes, minor repairs were needed (e.g., small cracks in interior walls and ceilings, broken light fixtures and switches, leaking sinks, cracked or broken window panes, some missing singles or siding, some peeling paint)

No, only regular maintenance was needed (e.g., painting, leaking faucets, clogged gutters or eaves troughs).

B6. How many bathrooms with a bathtub or shower were there in this dwelling?

Units that the occupants indicated were in need of major repair and/or did not have a bathroom were excluded from the base of rental units on which the norm rent income calculation was based.

The *Adequacy* criterion as previously measured on the HIFE also requires that the units have running hot water. However, dwellings without hot water were so rare that they were not identified as a separate category on the "*heating water fuel*" variable on the PUMF for confidentiality purposes. So it was not possible to include this criterion in the selection of adequate dwellings. The *Adequacy* selection on the PUMF file could only use "*need for major repair*" and "*no bathrooms*" to exclude rental units that would not provide adequate accommodation.

Market Rents

The norm rent incomes must be based on market rents, since they are used to determine the income a household would need to rent unsubsidized adequate accommodation. To ensure that only units rented at open market rents were included in the calculation of norm rent incomes, units that were not renting at full market rates had to be excluded.

Question I5 asked renters if their rent was reduced.

I 5 Did your household pay reduced rent in 1999 for any of the following reasons:

Government subsidized housing?
Include federal, provincial and municipal programs.

Other reasons, e.g., services to landlord and company housing?

No reduced rent?

Only those tenant occupied units that indicated "No reduced rent" were included in the calculations for norm rent income.

Full Year Shelter Cost Data

Households can form or change significantly in the course of a year. The survey identifies households that were in place for the entire reference period. The expenditure records for the other households may not include a full year's rent. Households with less than full annual rent data were excluded from the analysis for both the determination of norm rent income as well as for the identification of need.

Table 3: Adequate Rental Dwellings by Bedroom Size, SHS 1999					
Province	Bachelor	1 Bedroom	2 Bedrooms	3 or more Bedrooms	Total
Newfoundland	2	30	68	75	175
Prince Edward Island	3	24	56	28	111
Nova Scotia	5	92	128	87	312
New Brunswick	7	59	93	60	219
Quebec	22	187	327	156	692
Ontario	17	184	232	129	562
Manitoba	18	123	142	51	334
Saskatchewan	6	56	86	72	220
Alberta	13	88	124	133	358
British Columbia	26	157	158	128	469
Total	119	1,000	1,414	919	3,452

Table 3 shows the sample of adequate rental units by number of bedrooms on the PUMF file.

Geographic Strata

The next issue to be addressed was the capacity of the sample to support sub-provincial strata, using size of area of residence groupings, in developing norm rent incomes. The PUMF size of area of residence variable had the highest breakpoint at 30,000 in population. The provinces vary greatly in size as well as the sub-provincial distribution of population by size of area of residence groupings. Ideally, it would have been preferable to have norm rent incomes developed for all provinces based on the ±30,000 split. In practice, as can be seen from Table 3 the smaller provinces lacked a sufficient number of adequate rental units. In order to be able to implement core housing need on the PUMF, it was only possible to have a single set of norm rent incomes for the entire province in five cases. Table 4 shows the five provinces for which it was possible to have norm rent incomes by size of area of residence category, and the other five provinces in which the norm rent incomes were based on the rental stock in the province as a whole.

Table 4: Sub-Provincial Norm Rent Incomes Strata, SHS 1999	
Newfoundland	Total
Prince Edward Island	Total
Nova Scotia	± 30,000
New Brunswick	± 30,000
Quebec	± 30,000
Ontario	± 30,000
Manitoba	Total
Saskatchewan	± 30,000
Alberta	Total
British Columbia	Total

Implementation of the Core Housing Need Algorithm

The implementation of the core housing need methodology requires the addition of variables to each record. The algorithm then uses those variables to decide whether or not the household is in core housing need. The variables are used firstly to determine if the household falls below one or more of the three housing standards of adequacy, affordability or suitability. Households that do fall below one or more of these standards are then tested for their financial capacity to meet their own housing requirements.

- The "*Need for Repair*" and "*Number of Bathrooms*" questions were used to determine if the household lives in a unit that meets the *Adequacy* standard;
- The *Affordability* standard is based on the proportion of household income that is spent on shelter. The following items were included in shelter cost:
    - Renters - Rent plus utilities
    - Owners – Regular mortgage payments, property taxes, utilities and condominium charges.
    - For each household, their annual shelter payment, as defined above, was divided by their income before taxes. If the ratio was 30% or more, the household was considered to be below the *Affordability* standard;
- At the request of CMHC, Statistics Canada added a crowding variable to the PUMF file that was used to determine whether or not the household lived in a unit that met the *Suitability* standard.

With these variables in place, it was possible to determine if the household failed to meet one or more of the housing standards. For those that did fall below one or more of the housing standards, the household income was compared to the norm rent income for their size and geographic stratum. If the household income was below the norm rent income the household was considered to be in core housing need.

Housing Need on the PUMF File

This section presents the housing need estimates calculated from the SHS 1999 PUMF.

The incidence of core housing need on the SHS 1999 PUMF was approximately 13% of the households. In all, more than 1.46 million households were in core housing need in 1999. The comparable figure from the 1996 Census was almost 1.8 million or 18% of all households. There are several possible reasons for differences between the SHS and census data. The first is simply the passage of time.

Table 5: Households in Core Housing Need, SHS PUMF 1999		
Core need	Households	Percent
No	9,573,041	86.8
Yes	1,458,985	13.2
Total	11,032,026	100.0

The 1996 Census data are based on 1995 incomes. In a period of economic growth, the income of households will rise leading to a lower incidence of affordability need. A second source of difference could be that the SHS income and housing expenditures are for the same households for the same reference period. In the case of the census, the income is for the most recent completed year - 1995, while the expenditure data refers to May of 1996. Since core housing need was never before estimated using an expenditure file, it is not possible to determine the effect of that difference.

Table 6: Core Housing Need - Census Vs HIFE		Core need		Total
Vehicle		No	Yes	
HIFE 1991	Millions	8.42	1.16	9.58
	%	87.9%	12.1%	100.0%
Census 1991	Millions	8.10	1.27	9.37
	%	86.4%	13.6%	100.0%
HIFE 1996	Millions	2.78	1.15	3.93
	%	70.7%	29.3%	100.0%
Census 1996	Millions	2.30	1.20	3.50
	%	65.7%	34.3%	100.0%
The 1996 comparison pertains only to renters				

In 1991 and 1996, there were two readings on core housing need. One was from the Census conducted in that year and the other was based on HIFE. In 1991, HIFE also included a shelter cost schedule for owners. That was the only year when it was possible to compare rates of core housing need using different data platforms for the same year for both tenures. According to CMHC (1993), based on HIFE there were 1.16 million households in core housing need in 1991 or 12.1% of all households. Based on the census of the same year, the incidence of core housing need was 1.5 percentage points higher.

The 1996 comparison covers only renters since shelter costs were not collected for owners for that year on HIFE. Again, the Census had a higher incidence of need. From the above comparison, it would appear that the census produces higher estimates of the incidence of housing need compared with other vehicles. This difference in 1996 was five percentage points.

While the census uses a sample to collect income and housing expenditures, at 1/5 of the population, the sample is considerably larger than the 15,000+ usable sample from the SHS. So

sampling variation could lead to a difference in the results. However, sampling error could be in either direction, not just to a lower incidence of core housing need. In any event, the difference is larger than the potential sampling error so, in a statistical sense, it is a "significant" difference.

The survey modality could also be a source of difference. The census is self-enumerated, whereas the SHS is enumerator administered. Enumerators can introduce bias into a survey if they (unconsciously) tend to lead respondents to a specific answer. With more complex questionnaires, enumerators can provide detailed instructions to the respondents, leading to a reduced incidence of errors. This is particularly relevant when income and expenditure data are being collected. The enumerators can remind the respondents to consider all objects of expenditure and persons with income. Otherwise, some income receipts could be overlooked, for example. On the other hand, with a large sample and a well-designed survey, errors should be random (i.e., in either direction) and as such "wash out". Again, no evidence is being presented here on the absolute importance of the enumerator effect or even of its possible direction or the possibility of respondent error in the case of the census.

Rents from the SHS file were used in the determination of the norm rent incomes. When core housing need is estimated on the census, the rent information comes from an exogenous source - CMHC's Rental Market Survey (RMS) modified to take into account the fact that utilities are not always included in the rent as reported to the RMS. Although the RMS covers all urban centres with more than 10,000 in population, it does not cover the entire rental stock. It is limited to rental structures containing three or more rental units. It does not cover rented single detached units, duplexes or accessory suites. It is a subset of the entire rental universe, more heavily weighted towards larger rental structures containing apartments (except for individually rented condominia, which are excluded). RMS is a structure survey with rents collected in ranges for larger structures and not for the units individually.

In 1996, there were 1.8 million units in the RMS universe, compared to the total rental stock of 3.9 million as enumerated in the Census of that year. The RMS sample is drawn from the 46.7 percent of the rental stock included in its survey universe. It is likely that rents from the RMS sample would be somewhat above the level of rents in the entire rental stock, although the extent of any bias has never been estimated.

To estimate core housing need in rural or remote areas, where there is no rental market, the norm rent incomes on the census are based on the cost of supplying a new dwelling in kit form.

In summary, in applying the core housing need methodology to the census, the rent information is based on more geographically disaggregated sources than is available on sample surveys such as HIFE. However the RMS sample does not cover all of the types of rental units or areas that are included in the Census. Being based only on the so-called conventional part of the rental stock as well as the costs of building units from kits where rental units are not readily available in non-market areas, there may be an upward bias in the norm rent incomes, leading to a higher estimated level of core housing need.

Given past comparisons between different vehicles, it is not possible to conclude definitively whether the difference between the 1996 Census and SHS 1999 was due to the sample, the modality of administration, the norm rent income derivation, some underlying change in the level of need or some combination of those factors. The difference is within the range observed between different vehicles used to measure core housing need for the same year in the past.

Table 7: Core Housing Need By Tenure, SHS PUMF 1999						
In Core Housing Need	Owner		Renter		Total	
	#	%	#	%	#	%
No	6,896,072	95.6%	2,676,969	70.1%	9,573,041	86.8%
Yes	317,017	4.4%	1,141,968	29.9%	1,458,985	13.2%
Total	7,213,089	100.0%	3,818,937	100.0%	11,032,026	100.0%

The table above shows that the probability of being in core housing need varies greatly by tenure. Whereas only four percent of owners were in core housing need according to SHS 1999, the comparable figure for renters is 30%, similar with what was found using HIFE 1996.

Table 8: Core Housing Need by Type of Household, SHS PUMF 1999				
		In Core Housing Need		
		No	Yes	Row %
Owner	Senior led	82.1	17.9	100.0
	Lone Parent Families	91.4	8.6	100.0
	Couple led families	98.0	2.0	100.0
	Non-family households	91.4	8.6	100.0
Renter	Senior led	47.8	52.2	100.0
	Lone Parent Families	51.9	48.1	100.0
	Couple led families	84.2	15.8	100.0
	Non-family households	70.8	29.2	100.0

Table 8 shows the probability of being in core housing need by tenure and household type. The SHS uses an economic family household concept. Families include married or common law couples with or without never married children and lone parents with never married children. Senior-led renter households in which the reference person is 65 years of age or older were most likely to be in core housing need - more than half of these households could not afford adequate rental units at less than 30% of their income. Lone parent renter households were the next most likely group to be in core housing need followed by other households (often unattached individuals) who are renting and senior owners.

Table 9: Average Income, Shelter Cost and STIR, by Tenure, Household Type and Core Housing Need Status, SHS PUMF 1999					
			In Core Housing Need		Table Total
			No	Yes	
Owner	Senior led	Income	$24,067.46	$12,443.51	$21,984.11
		Shelter Cost	$3,606.30	$4,581.36	$3,781.06
		Ratio	17.1%	37.3%	20.7%
	Lone Parent Families	Income	$52,353.73	$21,152.96	$49,675.80
		Shelter Cost	$8,514.59	$8,455.95	$8,509.55
		Ratio	17.9%	39.8%	19.8%
	Couple led families	Income	$72,418.92	$19,783.82	$71,358.76
		Shelter Cost	$9,847.41	$8,611.96	$9,822.53
		Ratio	15.2%	43.8%	15.8%
	Non-family households	Income	$51,913.89	$12,392.10	$48,534.46
		Shelter Cost	$8,274.58	$5,679.92	$8,052.72
		Ratio	17.9%	47.0%	20.4%
Renter	Senior led	Income	$23,047.73	$13,209.96	$17,910.89
		Shelter Cost	$6,409.32	$5,995.86	$6,193.43
		Ratio	30.3%	45.9%	38.4%
	Lone Parent Families	Income	$36,348.88	$16,358.24	$26,729.76
		Shelter Cost	$7,061.51	$7,242.77	$7,148.73
		Ratio	20.9%	46.3%	33.1%
	Couple led families	Income	$52,134.52	$20,323.73	$47,118.31
		Shelter Cost	$8,207.77	$7,860.52	$8,153.01
		Ratio	18.1%	41.4%	21.8%
	Non-family households	Income	$39,402.89	$12,074.63	$31,435.73
		Shelter Cost	$6,884.34	$5,463.25	$6,470.04
		Ratio	20.0%	49.1%	28.5%

Table 9 shows the average income, shelter payment and shelter cost-to-income ratio by tenure, household type and core need status. Senior and Non-Family households tended to have the lowest incomes among households in core housing need. Renter households in need tended to have higher shelter cost-to-income ratios, on average, than households that owned their own dwelling.

Table 10: Housing Standards and Core Housing Need Status, SHS PUMF 1999		In Core Housing Need		
		No	Yes	Total
Affordability	LT 30%	98.3%	1.7%	100.0%
	GE 30% LT 100%	40.4%	59.6%	100.0%
Adequacy	Adequate	87.8%	12.2%	100.0%
	Not Adequate	75.6%	24.4%	100.0%
Suitability	Suitable	87.6%	12.4%	100.0%
	Not Suitable	72.1%	27.9%	100.0%
Below Adequacy or Suitability	Above Adeq & Suit	86.6%	13.4%	100.0%
	Below Adeq or Suit	88.1%	11.9%	100.0%
Afford + Other Stds	Above All Stds	100.0%	N/A	100.0%
	Afford only	41.7%	58.3%	100.0%
	Other not afford	86.9%	13.1%	100.0%
	Afford + other	33.8%	66.2%	100.0%

Table 10 cross-tabulates housing standards by core housing need status. Clearly, being unable to find affordable accommodation is the greatest predictor of being in housing need. Households that fall below other housing standards could well have the capacity to access suitable and adequate housing. Some households could be "crowded" on a short-term basis because a son or daughter had returned home temporarily, for example. Households in inadequate dwellings may have plans to make repairs or renovations or even to move. Those living below the affordability standard are more likely to be facing a more intractable constraint.

Table 11: Average Income By Standard and Core Housing Need Status, SHS PUMF 1999		In Core Housing Need	
		No	Yes
Affordability	LT 30%	$61,595	$20,888
	GE 30% LT 100%	$39,035	$14,570
Adequacy	Adequate	$59,605	$15,148
	Not Adequate	$58,270	$15,601
Suitability	Suitable	$58,832	$14,267
	Not Suitable	$73,333	$22,365

Table 11 shows that households below the affordability norm (but not in core housing need) tended to have much lower incomes on average than households below one of the other standards of suitability or adequacy. Households in core housing need tended to have lower incomes across the board.

GEOGRAPHY OF NEED

Table 12 shows the provincial distribution of households by core need status as well as the incidence of core need by province. Households in British Columbia had the highest probability of being in core housing need (18.5%), followed by Ontario (15.2%). At the other end of the scale, Alberta (8.4%) and Saskatchewan (8.7%) had the lowest incidence of need. Given the size of the province and the relatively high incidence of need, Ontario accounts for more than 40% of households in need. Quebec had the second largest share with more than 25% of the households in core housing need.

Table 12: Provincial Distribution of Core Housing Need, SHS PUMF 1999	In Core Housing Need				Total	
	No		Yes			
Province	Row %	Col %	Row %	Col %	Row %	Col %
Newfoundland	88.4	1.7	11.6	1.4	100.0	1.7
Prince Edward Island	89.3	0.4	10.7	0.3	100.0	0.4
Nova Scotia	86.8	3.2	13.2	2.9	100.0	3.1
New Brunswick	90.1	2.6	9.9	1.8	100.0	2.5
Quebec	86.2	25.9	13.8	25.4	100.0	25.8
Ontario	84.8	36.5	15.2	40.2	100.0	37.0
Manitoba	88.6	3.8	11.4	3.0	100.0	3.6
Saskatchewan	91.3	3.5	8.7	2.0	100.0	3.3
Alberta	91.6	9.9	8.4	5.6	100.0	9.3
British Columbia	81.5	12.5	18.5	17.4	100.0	13.2
Total	86.0	100.0	14.0	100.0	100.0	100.0

Table: 13: Core Housing Need by Community Size, SHS PUMF 1999						
Size of area of residence	In Core Housing Need				Total	
	No		Yes			
	Row %	Col %	Row %	Col %	Row %	Col %
Variable Masked	89.3%	4.4%	10.7%	3.5%	100.0	4.3
30,000 & over	85.8%	70.0%	14.2%	76.1%	100.0	70.8
Under 30,000	85.2%	8.0%	14.8%	9.2%	100.0	8.2
Rural	91.1%	17.5%	8.9%	11.3%	100.0	16.7
Total	86.8%	100.0%	13.2%	100.0%	100.0	100.0

Table 13 shows the distribution of core need by size of area of residence. Although the probability of being in core housing need was highest for households in urban centres with less than 30,000 in population, the largest percentage of households in core housing need lived in the largest urban centres. In fact, compared to the share of the overall population, they were over represented in core housing need. The provinces where size of area of residence was masked include Newfoundland, Prince Edward Island and Manitoba. In PEI, no geographic breakdown other than the province is provided. For Manitoba and Newfoundland, the size of area of residence categories on the PUMF were limited to "Rural" and "Masked" because of the small number of urban communities. For these provinces, as well as for Alberta and British Columbia, norm rent incomes were calculated on a province-wide basis.

The size of area of residence coding on the PUMF constrained the ability to develop norm rent incomes and analyze housing need by size of area of residence. It was possible that the above and below 30,000 distinction was not appropriate for housing need analysis. Ideally, in doing the norm rent calculation, it would be preferable to group areas with comparable rent levels. For that reason, a size of area of residence break at 100,000 population would be more in keeping with rent level differentials. It was therefore fortunate that access was provided by Statistics Canada to the Internal File with the more detailed size of area of residence breakdown. With this file, it was possible both to provide some assurance for the work done on the PUMF and to more precisely delineate the geographic distribution of housing need.

SHS Internal File

The Internal File had a more disaggregated classification of size of area of residence than the PUMF. Also, there were no records with masked province or size of area of residence variables on this file, leaving more usable records compared to the PUMF (15,686 compared to 15,563).

From a housing point of view, the Census Metropolitan Areas (CMAs) tend to be a focus of analysis. This would suggest 100,000 in population as a more appropriate breakpoint from a housing perspective. CMHC raised the issue of whether or not the 30,000 in population breakpoint on the PUMF could affect the estimates of core housing need. Using the PUMF meant that norm rent incomes were based, at best, on a pooled rental stock that included all urban areas with more than 30,000 in population. When rents were pooled over these areas, it could have the effect of lowering the norm rent incomes in the largest centres with a risk of underestimating the level of core housing need. As a corollary, it would raise the calculated norm rent incomes in smaller centres; however since they are less populous; the effect on the overall level of need would probably be downward.

In order to test the possible effects that the less sensitive geographic variable on the PUMF file might be having on the estimated level of core housing need, arrangements were made with Statistics Canada to have access to their Internal File. This involved programming the steps for core housing need using the file and estimating the resulting level of core housing need at Statistics Canada.

The Internal File is a working file used by Statistics Canada for preparing publications, responding to ad hoc requests, etc. It is not a complete record of all of the questions on the survey. It contains many summarized variables, often using a different method of aggregation than the PUMF file. Because the file is for internal use only, none of the records had either the province or size of area of residence variables masked.

HOUSING STANDARDS ON THE INTERNAL FILE

CMHC's crowding variable was included on the Internal File so the suitability standard was measured in the same way as on the PUMF. Similarly, housing affordability was calculated from the same income and shelter cost on both the Internal and PUMF files. The Internal File did have the full detail on the water supply so it was possible to identify households without running hot water. Therefore on the Internal File it was possible to use the more comprehensive criteria for measuring adequacy namely:

o   Dwelling in need of major repair
o   No bathroom
o   No running hot water

The above criteria were used to identify the adequate dwellings for use in the calculation of norm rent incomes and to identify all dwellings falling below the *Adequacy* standard.

The core housing need methodology also involved the calculation of the required number of bedrooms that would afford the household with the requisite amount of privacy. Suitability is codified in the NOS based on the age, gender and interrelationships among the household members. The PUMF file provided a summary of the household membership by age grouping without indicating the gender. The Internal File had the gender breakdown but the age groupings were different.

Table 14: The Age Breakdown on the Internal and PUMF files of SHS 1999	
Internal File	PUMF
Children 0-4	Children 0-4
Females 5 -14	Children 5-17
Males 5-14	Adults 18-24
Females 15 & +	Adults 25-64
Males 15 & +	Seniors 65 & +

For the allocation of bedrooms under the NOS, 18 years is the cut-off for requiring a separate bedroom. With the Internal File, a breakpoint at 18 was not available. The breakpoint at 14 was used instead. Persons over 14 were allocated a bedroom. This could mean that in cases where there were two children over 14 of the same gender, two bedrooms were allocated when one would have been appropriate under the NOS. Since the maximum number of bedrooms a household is allowed is three, the potential effect of this discrepancy is limited since it would only mean that three bedrooms were allotted to some households that would have only gotten two under the strict NOS criteria.

GEOGRAPHIC BREAKDOWNS ON THE INTERNAL FILE

The Internal File contains the following size of area of residence breakdown (The leading numbers are the assigned codes on the file.):

3   Urban centres 1,000,000 and over
4   Urban centres 500,000 to 999,999
5   Urban centres 250,000 to 499,999
6   Urban centres 100,000 to 249,999
7   Urban centres 30,000 to 99,999
8   Urban centres less than 30,000
9   Rural Areas

With this variable, it is possible to separate areas by above/below 100,000 in population. The Internal File also has an *Area* variable. This variable identifies some of the specific urban areas that the respondents lived in. In all, 20 specific areas are identified on the file and are shown in Appendix A. Areas not individually identified are grouped into urban areas above/below 30,000 and rural. The size of area of residence and area variable were used in combination to create a new geographic classification that identified the individual centres of Montreal, Toronto and Vancouver and grouped the rest of the respective provinces by size of area of residence. This is the basis for Method 2 as described below.

Having Canada's major individual centres identified on the file raised the potential of using this more precise geography in the estimation of core housing need. The largest CMAs - Montreal, Toronto and Vancouver - had samples large enough to have their own norm rent incomes. Therefore, norm rent incomes were estimated from the Internal File using two geographic breakdowns:

o   Method 1
    o   Above/Below 100,000 by province, where available
o   Method 2
    o   Montreal, Toronto, Vancouver individually
    o   Above/Below 100,000 by province, excluding Montreal, Toronto, Vancouver in Quebec, Ontario and BC respectively

PEI still had only one set of provincial norm rent incomes and New Brunswick had a breakdown at above/below 30,000, since that made better use of the available sample in that province. In contrast, on the PUMF file, five provinces had only provincial level norm rent incomes.

Two sets of core housing needs estimates were run on the Internal File - using the over/under 100,000 break and the other separating the largest CMAs. They have been designated as Methods 1 and 2 respectively.

Using the two different methods of estimating core housing need did not change greatly the resulting overall rate. Both rates were, however above the level on the PUMF.

PUMF   13.2
Method 1 Internal File   13.9
Method 2 Internal File   14.2

Table 15: Incidence of Core Housing Need by Community Size, SHS Internal File 1999		
Size of Area of Residence	Method 1	Method 2
1 Million & +	15.9	17.2
500,000 - 999,999	12.6	12.5
250,000 - 499,999	15.6	14.9
100,000 - 249,999	14.0	13.8
30,000 - 99,999	12.4	12.4
Urban < 30,000	12.0	12.0
Rural	9.0	9.0
> 100,000	15.0	15.5
< 100,000	12.1	12.1

The hypothesis raised by CMHC that the breakpoint at 30,000 in population could lead to an underestimation of the incidence of core housing need is substantiated by the above results. As a general tendency, with the exception of the 500,000 to 999,999 stratum, the incidence of core housing need rises with size of size of area of residence.

Treatment of Bachelor Units

Earlier in this report, the limitations imposed by the relatively small number of bachelor units were alluded to. In the case of the PUMF it was not possible to use a blended bachelor and one bedroom rent as had been done on the HIFE file. Consequently, on the PUMF file the norm rent income for bachelor units was calculated as 85% of one bedroom units in the same stratum. For consistency, the same approach was used on the Internal File since the exercise with that file was simply to study the effect of the less sensitive size of area of residence variable.

On the Internal File, by using the breakpoint of above/below 100,000, the rental stock was more evenly distributed between the two size of areas of residence strata. It was possible to construct a blended average rent for bachelor and one bedroom units and to use that as the norm rent income for one person households. As could be expected, using the blended rent would raise the level of core housing need as it increased the norm rent income for single individuals and put more of them into core housing need. The effect was not dramatic. With Method 1 the rate was raised from 13.9 to 14.2, while for Method 2 the rate rose from 14.2 to 14.3.

Sample Limitations of the SHS

The SHS does have a much more limited sample than the HIFE file that had been used previously as the source of inter-censal estimates of housing need. This naturally leads to a consideration of the absolute constraints imposed by the sample size for estimating the incidence and level of need for lower levels of geographies. The limiting factor in determining how far to push the sample is the estimated reliability of the statistics. The SHS file documentation provides the following guidance:

> "For reliability reasons, estimates with CVs greater than 33% should be suppressed. Since CVs are not calculated for all estimates, data suppression for the Survey of Household Spending has been based on a relationship between the CV and the number of households reporting expenditure on an item. Analysis of past survey results indicates that CVs usually reach this level when the number of households reporting an item drops to about 30. Therefore, data should be suppressed for spending on items reported by fewer than 30 households."
>
> 1999 SHS User Guide, Page 82

A different formulation of guidance in the same vein was provided with HIFE. Table 16 was extracted from Statistics Canada (1994).

Table 16: Standard Canada Publication Guidelines	
Alphabetic Indicator	Standard Error as % of Estimate
A	0.0 to 0.5
B	0.6 to 1.0
C	1.0 to 2.5
D	2.6 to 5.0
E	5.1 to 10.0
F	10.1 to 16.5
G	16.6 to 25.0
H	25.1 +
Cat no 64-202, 1994, page 31	

A coefficient of variation (CV) of 33% is off the scale provided in this table. If it were a simple random sample, a sample of 30 would provide a reliability of ±18% for a population characteristic shared by 50% of the population. The incidence of core housing need is 13% so the sample reliability of a sample of 30 would be improved to ±12%. The SHS is a more complicated design - a stratified, multi-stage sample - so the calculations for a simple random sample do not apply. However, the limit of 30 as the minimum usable cell size is somewhat conservative.

There are two aspects to the sample size issue on SHS. Firstly, the core housing need methodology requires that the number of adequate rental units be sufficient for the estimation of norm rent incomes. Secondly, once the core housing need status has been assigned to each household on the file, the issue becomes what details can be extracted on the characteristics of those households. To answer this latter question, a series of core housing need runs were carried out on both the PUMF and the Internal File. Their purpose was to identify the level at which cell sizes dropped below the Statistics Canada guideline. The variables included tenure, household type and geography.

The rental sample question is the more straightforward of the two issues. On the PUMF, the sample has been shown to be sufficient for provinces in total and, within five provinces, for strata composed of urban areas with above/below 30,000 in population. In the other five provinces norm rent incomes are based on the sample of adequate unsubsidized dwellings in the entire province.

On the Internal File, a breakdown of above/below 100,000 could be used for Nova Scotia, Quebec, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia. The sample in New Brunswick is better utilized with an above/below 30,000 division. In Prince Edward Island and Newfoundland, because of the predominance of ownership, it is always difficult to find sufficient rental sample. In 1988 and 1991, when the ownership schedule was added to the HIFE, the rental sample was also augmented in these provinces (as well as in Manitoba). The current sample is sufficient for Montreal, Toronto and Vancouver as strata in their own right. In

summary, sub-provincial strata could be formed in most provinces using the cut-off of 100,000, except for New Brunswick where 30,000 is more appropriate and Newfoundland and PEI where no sub-provincial breakdown could be done.

The sample is sufficient to provide core housing need estimates by province by household type or tenure individually. In other words, it would not be possible to cross-tabulate household type by tenure within province. Since household type, tenure and core housing need are not statistically independent some cells will tend to be very small. As a general observation, the sample is sufficient for two-way cross-tabulations for the most part. This approach will facilitate the examination of the predictors of core housing need (e.g., size of area of residence, household type), although not the enumeration of the precise level of that need for sub-groupings.

A subsidiary question raised by CMHC concerns the possible augmentation of the sample that would be required in order that the results would provide the same level of reporting on core housing need as had been possible using the HIFE file. With HIFE, it was possible to estimate the level of housing need by tenure, type of household and size of area of residence (above/below 100,000) by region or province in the case of the larger provinces. To determine the sample augmentation required to achieve the same level of detail using SHS involves assuming basically that the level of core housing need will remain unchanged and be distributed in the same way as in 1999. Each time the SHS is run, the sample is different so there may also be a difference in the level of core housing need, given normal sampling variation. Certainly, for the more detailed cross-classifications of core need by demographic and other variables, there would undoubtedly be inter-survey variations.

Characteristics such as household type and core need status cannot be built into the sample selection process. Statistics Canada knows from the census and the pre-survey listings where there are concentrations of renter households. So it would be feasible to increase that component of the sample. Adding renter households to the sample in clusters might not add greatly to the survey information if there was too much homogeneity within the renter sampling units selected.

It would not be possible to direct the sample selection towards the other important characteristics, from a core housing need point of view, that would be less visible in the pre-selection process, such as low income and household type.

To increase the sample size so as to provide detailed household type and tenure at the province level would require, at a minimum, more than 5,500 additional usable records. If the additional sample were distributed in exactly the same way as the 1999 sample, the cells would all be raised to the 30+ guideline. Statistically speaking, that result is not very probable.

To raise the cell size for a tabulation of a more restricted set of household type, tenure and above/below 100,000 by province would take at a minimum, 3,000 extra usable sample households distributed exactly like the 1999 sample.

The sample can, as it now stands, provide a breakdown of tenure **or** household type separately by province but not both variables simultaneously. To cross tabulate those variables singly by above/below 100,000 by province would require at a minimum another 800 responses.

The SHS survey is fairly expensive compared to other Statistics Canada surveys simply because of the amount of information collected. To add sample, CMHC would have to pay all of the survey infrastructure costs as well as for a lot of information on expenditure items that might not be of great interest to CMHC. Given that CMHC gets the present sample of 15,000+ for the marginal cost of adding the questions on mobility and need for repair, the cost of obtaining the additional sample is very high by comparison. Added to the cost consideration is the fact that any additional sample might not add to the survey's usefulness if it did not enhance the insights into households in need but turned out to be predominantly households not in need.

Conclusion

The purpose of the project was to apply the core housing need methodology to the 1999 Survey of Household Spending micro data file. This was done on two different versions of the file - the Public Use Micro Data File and the Internal File (used as a working file within Statistics Canada)- using alternative geographic breakdowns. The first conclusion is that it is certainly possible to apply the core housing need methodology to the SHS and the results provide unique insights into the nature of housing need in Canada in the sense that the housing expenditures can be related to income for the same period as well as to other outlays (such as food and clothing). This, in itself, provides some assurance that the core housing need assessment is based on a statistically reliable foundation since the income has been validated against all of the household expenditures. In the case of the census and HIFE, it was possible that the core housing need measure was being affected by the mismatch in time between housing expenditures and income. The level of housing need on SHS is consistent with that measured on other inter-censal vehicles. It is less than the incidence as measured using the census, as was the case with HIFE, even when compared to a census taken in the same year.

The SHS is based on a limited sample, even compared to HIFE. So it should be seen as a thumbnail view of housing need, without the full corroborative detail that a census would provide. SHS can be used to produce national and provincial estimates of need as well as for the most important characteristics such as tenure or household type. However, cross-tabulating the data by all of these characteristics simultaneously will result in very low cell counts. Even if these cells are within the Statistics Canada guidelines, sampling variations between surveys will cause numbers at this level to change in fairly unpredictable ways from one round of the survey to the next. If one were to conduct analyses at this level of detail, conclusions could be affected by the sampling error.

Recommendations

In order to make the PUMF file more suitable for the estimation of core housing need, CMHC should ask Statistics Canada to:

o   Modify the size of area of residence variable from above/below 30,000 to above/below 100,000 on the PUMF file;
o   Add required bedrooms using the NOS variable to the PUMF file; and
o   Include the *Adequacy* variable as they have the *Suitability* variable, using "need for major repair", "no bathroom" and "no running hot water".

The Internal File is available several months before the PUMF is released, shortly after the end of the survey year. Given that the programs have now been developed and tested for use on the Internal File, CMHC could negotiate with Statistics Canada for access by CMHC to this file, as has been done with the Survey of Financial Security. Having access to the Internal File would allow the analysis to distinguish Montreal, Toronto and Vancouver from other centres. These large CMAs should be analyzed individually given their level of need.

The methodology on the Internal File should also use the blended bachelor and one bedroom rent approach to derive the norm rent income for bachelors since this will provide a more realistic estimate of the housing cost facing one person households.

If CMHC wishes to add sample to the SHS, the metropolitan areas in Quebec and Ontario would be the locations to add any additional sample. The metropolitan areas in other provinces are fairly well represented. Ontario and Quebec have a greater number of large centres than other provinces. Additional sample would facilitate the ability to run detailed tabulations above/below 100,000.

References

CMHC, Various Years, *"Canadian Housing Statistics*", CMHC, Cat. No. NH 12/1
CMHC, 1991, "*Core Housing Need in Canada*". Cat. No. NHA 6567
CMHC, 1993, "*Canadian Housing Need, 1991",* Research & Development Highlight - Socio-Economic Series, Issue # 11, Ottawa
CMHC, 1999, "*Special Studies on the 1996 Census: Canadian Housing Conditions*", Research Highlights, Socio-Economic Series, Issue 55-1, Ottawa
CMHC, 2000, "*Housing In Canada Electronic Data Series"*, Ottawa
Statistics Canada, 1994, "*Household Facilities and Equipment, 1994*", Cat. No. 64-202, Ottawa,
Statistics Canada, 2001, *"Survey of Household Spending 1999*", Questionnaire and PUMF documentation, Ottawa

Appendix A : The Area Variable on the Internal File

The Area Variable on the Internal File is broken down as follow

2	St. John's
3	Charlottetown-Summerside
4	Halifax
5	Saint John
6	Quebec City
7	Montreal
8	Ottawa
9	Toronto
10	Thunder Bay
11	Winnipeg
12	Regina
13	Saskatoon
14	Calgary
15	Edmonton
16	Vancouver
17	Victoria
18	Whitehorse
19	Yellowknife
20	Iqaluit
21	Other Atlantic - Urban Centres GE 30,000
22	Atlantic - Urban Centres LT 30,000
23	Atlantic - All Rural
24	Other Quebec - Urban Centres GE 30,000
25	Quebec - Urban Centres LT 30,000
26	Quebec - All Rural
27	Other Ontario - Urban Centres GE 30,000
28	Other Ontario - Urban Centres LT 30,000
29	Ontario - All Rural
30	Other Western - Urban Centres GE 30,000
31	Western - Urban Centres LT 30,000
32	Western - All Rural
33	Other Territories excluding Yellowknife, Whitehorse and Iqaluit

Appendix B: Key SHS Variables used in the Calculation of Core Housing Need

The appendix documents key SHS questions and the variables derived from them for the SHS micro data file.

Income

SHS collects the income of all household members aged 15 years and older. The following elements of income are collected on the questionnaire

---

Section U

For 1999, what was this member's income from the following sources?

2. Wages and Salaries
3. Net Income from Farm and Non-Farm Self-employment

4. Gross Income from Roomers and Boarders

    4.1 Household members (non-relatives)
    4.1 Not members of the household
5. Dividends, Interest, Other Investment Income
6. Child Tax Credit
7. Old Age Security, Guaranteed Income Supplement, Spouse's Allowance
8. Canada or Quebec Plan Pension
9. Employment Insurance Benefits
10. Goods & Services Tax Credit
11. Provincial Tax Credits
12. Social Assistance, Provincial Income Supplements, Workers' Compensation Benefits, Veteran's Pension, Civil War Pensions and Allowances, and Other Income from Government Sources
13. Retirement Pensions, Annuities, and RRIF Withdrawals (exclude RRSP withdrawals)
14. Personal Income Tax refunds
15. Other money income (e.g., alimony, child support)
16. Other Money receipts (e.g., Cash gifts, inheritances, life insurance)

Total income includes all of the above categories except
    14 – Personal Income Tax refunds and
    16 – Other Money receipts (e.g., Cash gifts, inheritances, life insurance).

Shelter Cost

Owners

G2.   In Reference Year, what payments did your household make on its mortgages? *Exclude amounts pertaining to a business e.g., part of a duplex*
.

	Amount	Number
2.1 Regular payments		
2.1 Irregular payments and lump sum payments Including payments made to close the mortgage		

Question G.3
Did the payments include
      Property Taxes G014
      Mortgage, life or disability insurance G015

G.4 Were any amounts added to the mortgage in Reference Year?

E.3   For dwellings owned and occupied during Reference Year,
3.1   Total amount billed for property taxes in Reference Year?
      Include school taxes, special service charges and local improvements billed during Reference Year

3.2   Total Premiums paid in Reference Year for homeowners' insurance covering fire, theft and other perils?

E3.3 Amount paid for Condominium charges (E006) include special levies?

Regular mortgage payments = the number of payments multiplied by the amount of the payments.

Renters

> I2   What monthly rental payments were made for the principal residences which your household occupied in 1999?
> *Include any part of the dwelling used for business or rented to others*
> *Include amounts paid on behalf of your household if known*
>
> I3   In 1999, what additional amount was paid to the landlord that was not included in the payments just reported, e.g., security deposits? (I003)
>
> I4   In 1999, how much of the rent paid was returned to your household for any reasons (e.g., rent overpayment and return of damage deposit? (I004)
>   Exclude provincial tax credits for rent paid or municipal rent allowances returned
>
> I7   In 1999, was any part of the rent expense charged against income from businesses owned by household members?Exclude rooms rented out
>
> 7.1   What amount or percentage of the rent expense was charged against income from your businesses (I010)

Rent Paid = I2 + I3 – I4 for the percentage of the dwelling that is non-business related

Utilities

> Question J1
> In 1999, how much did your household spend on?
> 1.1   Water and Sewage charges) e.g., pumping services: J001
> 1.2   Electricity J002
> 1.3   Other fuel for heating and cooking, e.g., oil, gas, propane and wood? J003
> 1.4   Rental heating Equipment J004

These elements are aggregated on the file to G019 Water, fuel and electricity for principal residence for both owners and renters.

Shelter Payments

Owners

Shelter cost for homeowners is the sum of regular mortgage payments, property taxes, utilities and condominium charges

Renters

Shelter cost for renters is the sum of rent paid and utilities.

Test for Adequacy

> Question B3
>
> Was this dwelling in need of any major repairs on December 31st, 1999
> *Exclude remodelling and energy improvements*
> Yes, Major repairs were needed (e.g., corroded pipes, damaged electrical wiring, sagging
>   floors, bulging walls, damp walls and ceilings, crumbling foundation, rotting porches and
>   steps)
>
> Yes, minor repair were needed (e.g., small cracks in interior walls and ceilings, broken light
>   fixtures and switches, cracked or broken window panes, some missing shingles or siding,
>   some peeling paint)
>
> No, only regular maintenance was needed (e.g., painting, leaking faucets, clogged gutters or
>   eavestroughs)
>
> B6
> How many bathrooms with a bathtub or shower were there in this dwelling?

Only dwellings not needing major repair and having at least one bathroom are included in the calculation of norm rent incomes.

Test of Subsidized

> I5   Did the household pay reduced rent for any of the following reasons?
> Government subsidized housing, include federal, provincial and municipal programs.
> Other reasons, e.g., services to landlord and company housing?
> No reduced rent

Only dwellings rented at market rates are included in the calculation of norm rent incomes

> *B5*
> *How many bedrooms were there in dwelling*
>
> *Include all rooms designated as bedrooms even though the use may be occasional, as in the case of "spare" bedrooms,*
> *Exclude rooms designated as dining rooms living rooms, etc which may be used as bedrooms at night.*

The bedroom question was used to establish the number of bedrooms in the present dwelling. The National Occupancy Standard determines the number of bedrooms required to meet the household's requirements for space and privacy. If the number of bedrooms in the dwelling is less than the number determined by the NOS, the household is deemed to be below the suitability standards.

Appendix C: SPSS Programs

Creating the SPSS file

```
SET
  BLANKS=SYSMIS
  UNDEFINED=WARN.
DATA LIST
  FILE='d:\erp00-32\Shs99\pumdfSHS99.txt' FIXED RECORDS=1 TABLE
  /1 id 1-5 weight 6-10 yind 11-11 prov 12-13 urbrur 14-14 area 15-15 dweltyp 16-16 yrblt 17-17
rooms 18-19  brooms 20-20 baths 21-21 ten1999 22-22 tendec 23-23 purprice 24-34 selprice 35-45
nrepair 46-46 adds 47-58 newinst 58-68 yrmove 69-69 purchome 70-70 redrent 76-76
rpinctot 77-87 rpmarp 132-132 rpagep 133-134 rpagegrp 135-136 rpsex 137-137 rpweekft 138-139
rpweekpt 140-141 rprevten 142-142 spinctot 143-153 spagep 198-199 spagegrp 200-201 spsex 202-202
spweekft 203-204 spweekpt 205-206 sprevten 207-207 econfam 208-208 hhtype 209-209
hhsizede  210-211 kids04 212-212 kids517 214-214  yout1824 216-216 adul2564 217-217
sen65 218-218  hhsize99 219-220 ageyounp 221-222 numwks 223-225 numftp 226-226
numptp 227-227 incsou 228-228 hhinc 229-239 incearn 240-250 incinv 251-261 inctran 262-272
incoth 273-283 othmon 284-294 monflow 295-305  DRRSP 306-316 eiben 317-317
xfood 337-347 shelexp 370-380 prinacc 381-391 rentqtr 392-402 rent 403-413
ownqtr 414-424 mortpay 425-435 Maintain 436-446 condochr 447-457 proptax 458-468
insprem 469-479 utilexp 480-490 water 491-501 fuel 502-512 elec 513-523 othacc 524-534
vachome 535-545 hhldop 557-567 furneqp 711-721 cloth 832-842 trans 942-952 health 1107-1117
percare 1294-1304 recreate 1327-1337 reading 1701-1711 educ 1745-1755 tobalc 1778-1788
othexp 1855-1865 crowd 2064-2064.
EXECUTE.


variable label id "Record #".
variable label weight "Weight".
variable label yind "Full-yr Indicator".
variable label prov "Prov/Terr".
variable label urbrur "Urban/rural Indicator".
variable label area "Size of Area".
variable label dweltyp "Dwelling Type".
variable label yrblt "Year Built".
variable label rooms "Number of Rooms".
variable label brooms "# of Bedrooms".
variable label baths "# of Bathrooms".
variable label ten1999 "Tenure".
variable label tendec "Tenure in Dec".
variable label nrepair "Need for Repairs".
variable label adds "Adds, renos, etc".
variable label newinst "New Installations".
variable label yrmove "Year moved in".
variable label redrent "Reduced Rent Ind".
variable label rprevten "Previous Tenure".
variable label rpagegrp "Age Group Ref Per".
variable label spagegrp "Age Group Spouse".
variable label rpsex "Sex of Ref Person".
variable label spagep "Age Group Spouse".
variable label sprevten "Previous Tenure Spouse" .
variable label spsex "Sex of Spouse".
```

variable label econfam "# of Econ Families".
variable label hhtype "HHLD Type".
variable label hhsizede "HHLD Size Dec".
variable label kids04 "Kids 0 - 4".
variable label kids517 "Kids 5 - 17".
variable label yout1824 "Youths 18-24".
variable label adul2564 "Adults 25-64".
variable label sen65 "Seniors 65 & +".
variable label hhsize99 "HHLD Size 99".
variable label incsou "HHLD Inc Source".
variable label HHINC "HHLD Y pre-tax".
variable label incearn "Earned Income".
variable label incinv "Investment Income".
variable label inctran "Transfer Payments".
variable label incoth "Other Income".
variable label othmon "Other Cash Flow".
variable label monflow "Cash Flow".
variable label DRRSP "Change In RRSP".
variable label eiben "EI Indicator".
variable label shelexp "Total Shelter Exp".
variable label prinacc "Principal Accommodation".
variable label rentqtr "Rented Quarters".
variable label rent "Rent Paid".
variable label ownqtr "Owned Quarters".
variable label mortpay "Mortgage Payments".
variable label maintain "Maint, Add, Improv".
variable label condochr "Condo Charges".
variable label proptax "Property Taxes".
variable label insprem "Insurance Premiums".
variable label utilexp "Total Utility Exp".
variable label water "Water Charges".
variable label fuel "Fuel Expenses".
variable label elec "Electricity Charges".
variable label othacc "Other Accommodation".
variable label vachome "Vacation Home".
variable label hhldop "Household Operations".
variable label furneqp "Furnishings & Equipment".
variable label trans "Transportation" .
variable label cloth "Clothing".
variable label health "Health" .
variable label percare "Personal Care".
variable label recreate "Recreation".
variable label educ "Education".
variable label reading "Reading Materials".
variable label tobalc "Tobacco & Alcohol".
variable label othexp "Other Expenses".
variable label crowd "Crowding Indicator".

format adds hhinc incearn incinv inctran incoth othdol
dolflow DRRSP shelexp prinacc rentqtr rent ownqtr mortpay Maintain
condochr proptax insprem utilexp water fuel elec othacc vachome
hhldop furneqp cloth trans health percare recreate reading educ
tobalc othexp (dollar8.0).

/* **value labels for standard variables*/**

add val label ten1999
1"Owned with Mortgage"
2 "Owned no Mortgage"
3 "Rented"
4 "Mixed".

add val lab prov
00 "Masked Record"
10 "Newfoundland"
11 "Prince Edward Island"
12 "Nova Scotia"
13 "New Brunswick"
24 "Quebec"
35 "Ontario"
46 "Manitoba"
47 "Saskatchewan"
48 "Alberta"
59 "British Columbia"
60 "Territories".

add val lab urbrur
0 "Masked Record"
1 "Urban"
2 "Rural".

add val lab area
0 "Masked Record"
1 "30,000 & over"
2 "Under 30,000"
3 "Rural".

add val lab prevten
1 "Owner"
2 "Renter"
0 "Before 1992"
3 "Did not Maintain".

val lab ten1997 tendec
1 "Homeowner no Mortgage"
2 "Homeowner with Mortgage"
3 "Renter"
4 " Mixed".

add val lab urbrur
0 "Masked Record"
1 "Urban"
2 "Rural".

```
add val lab nrepair
1 "Yes, Major"
2 "Yes, Minor"
3 "No, Maintenance only".


add val lab rerent
0 "Not Rented"
1 "Government Subsidized"
2 "Other Reduced"
3 "No reduction".


add val lab hhtype
1 "1 Person"
2 "Couple No Children"
3 "Couple with Children"
4 "Couple + Other Relatives"
5 "Lone Parents only"
6 "Other HH with relatives"
7 "Other HH with unrelated persons".


variable label YIND "Full/Part Year Indicator".
add val label yind
1"Full Year"
2 "Part Year".
```

/* derived variables*/

```
if (hhtype eq 1) hhtype2 = 1.
if (hhtype eq 2) hhtype2 = 2.
if (hhtype eq 3) hhtype2 = 3.
if (hhtype eq 4) hhtype2 = 4.
if (hhtype eq 6)  hhtype2 = 6.
if (hhtype eq 7) hhtype2 = 7.
if (hhtype eq 5 and sex eq 1) hhtype2 = 8.
if (hhtype eq 5 and sex eq 2) hhtype2 = 9.
execute.

add val lab hhtype2
1 "1 Person"
2 "Couple No Children"
3 "Couple with Children"
4 "Couple + Other Relatives"
6 "Other HH with relatives"
7 "Other HH with unrelated persons"
8 "Lone Parent, Male"
9 "Lone Parent, Female".
```

```
/* Number of bedrooms Calculation*/
/* Number of bedrooms Calculation*/

/*number of bedrooms for children <=4*/
compute babeven = 0.
compute babeven = male04 + fmale04.
compute babebed = trunc (babeven/2).
compute babeodd = mod(babeven,2).
if (babeodd gt 0) babebed = babebed + 1.
execute.


/*number of bedrooms for boys 5-17*/
compute boyseven = 0.
compute boysbed = trunc (male517/2).
compute boysodd = mod(male517,2).
if (boysodd gt 0) boysbed = boysbed + 1.
execute.

/*number of bedrooms for girls 5-17*/
compute girleven = 0.
compute girlsbed = trunc (fmal517/2).
compute girlodd = mod(fmal517,2).
if (girlodd gt 0) girlsbed = girlsbed + 1.
execute.

/* computes adult beds*/
compute adulbed = yout1824 + adul2564 + sen65.
compute noadul = yout1824 + adul2564 + sen65.
if (spouse eq 1 and noadul ge 1 and adulbed ge 2) adulbed = adulbed - 1.
execute.

do if (noadul gt 1 and spsex ne 9).
compute adulbed = (noadul - 1).
else.
compute adulbed = noadul.
end if.
execute.

do if (hhsizede = 1).
compute reqbed = 0.
else.
compute reqbed = babybed + kidsbed + adulbed.
end if.
execute.

If(babyeven > 0 and (boysodd > 0 or girlodd > 0)) reqbed = reqbed –1.

/*computes adequacy*/
compute adequacy = 0.
if (nrepair = 1) adequacy = 1.
add val label adequacy
1 "Not Adequate"
0 "Adequate".
Execute.
```

```
compute zero_inc = 0.
if (hhinc le 0) zero_inc = 1.
add val label zero_inc
0 "Positive Income"
1 "Zero/Neg Income".
execute.
```

Calculating Norm Rent Incomes

```
/*Adequate Rental Filter*/
USE ALL.
COMPUTE filter_$=(nrepair > 1 & ten1999 = 3 and redrent =3).
VARIABLE LABEL filter_$ 'nrepair > 1 & ten1999 = 3 (FILTER)'.
VALUE LABELS filter_$  0 'Not Selected' 1 'Selected'.
FORMAT filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE .

* Basic Tables.
TEMPORARY.
NUMERIC T0000000.
LEAVE T0000000.
VARIABLE LABEL T0000000 'Table Total'.
VALUE LABELS T0000000 0 ' '.
TABLES
 /FORMAT BLANK MISSING('.')
 /OBSERVATION rent
 /FTOTAL $t 'Group Total'
 /TABLES (o_u30k > (broom3 > rent +  $t ) + T0000000 > rent)
 BY (prov > (STATISTICS) +  $t  + T0000000 > (STATISTICS))
 /STATISTICS
 count( ( F5.0 ))
 median( ).


* Basic Tables.
TEMPORARY.
NUMERIC T0000000.
LEAVE T0000000.
VARIABLE LABEL T0000000 'Table Total'.
VALUE LABELS T0000000 0 ' '.
TABLES
 /FORMAT BLANK MISSING('.')
 /OBSERVATION rent
 /FTOTAL $t 'Group Total'
 /TABLES (area > (broom3 > rent +  $t ) + T0000000 > rent)
 BY (prov > (STATISTICS) +  $t  + T0000000 > (STATISTICS))
 /STATISTICS
 count( ( F5.0 ))
 median( ).
```

Assigning the Norm Rent Incomes

```
/* Rented Shelutil */
/*Prov   NF*/
If (prov = 10 and reqbed = 0) cnit = 14244.
If (prov = 10 and reqbed = 1) cnit = 16758.
If (prov = 10 and reqbed = 2) cnit = 21283.
If (prov = 10 and reqbed > 2) cnit = 22800.
/*Prov   PE 11*/
If (prov = 11 and reqbed = 0) cnit = 15767.
If (prov = 11 and reqbed = 1) cnit = 18030.
If (prov = 11 and reqbed = 2) cnit = 22573.
If (prov = 11 and reqbed > 2) cnit = 25027.
/*Prov   NS 12 */
If (prov = 12 and o_u30k = 1 and reqbed = 0) cnit = 16456.
If (prov = 12 and o_u30k = 1 and reqbed = 1) cnit = 19360.
If (prov = 12 and o_u30k = 1 and reqbed = 2) cnit = 25110.
If (prov = 12 and o_u30k = 1 and reqbed >2) cnit = 28023.
If (prov = 12 and o_u30k = 2 and reqbed = 0) cnit = 14280.
If (prov = 12 and o_u30k = 2 and reqbed = 1) cnit = 16800.
If (prov = 12 and o_u30k = 2 and reqbed = 2) cnit = 20325.
If (prov = 12 and o_u30k = 2 and reqbed >2) cnit = 21416.
/*Prov   NB 13 */
If (prov = 13 and o_u30k = 1 and reqbed = 0) cnit = 14754.
If (prov = 13 and o_u30k = 1 and reqbed = 1) cnit = 17358.
If (prov = 13 and o_u30k = 1 and reqbed = 2) cnit = 21333.
If (prov = 13 and o_u30k = 1 and reqbed >2) cnit = 25770.
If (prov = 13 and o_u30k = 2 and reqbed = 0) cnit = 13090.
If (prov = 13 and o_u30k = 2 and reqbed = 1) cnit = 15400.
If (prov = 13 and o_u30k = 2 and reqbed = 2) cnit = 19067.
If (prov = 13 and o_u30k = 2 and reqbed >2) cnit = 20442.
/*Prov   QC 24 */
If (prov = 24 and o_u30k = 1 and reqbed = 0) cnit = 14875.
If (prov = 24 and o_u30k = 1 and reqbed = 1) cnit = 17500.
If (prov = 24 and o_u30k = 1 and reqbed = 2) cnit = 20710.
If (prov = 24 and o_u30k = 1 and reqbed >2) cnit = 24493.
If (prov = 24 and o_u30k = 2 and reqbed = 0) cnit = 11744.
If (prov = 24 and o_u30k = 2 and reqbed = 1) cnit = 13817.
If (prov = 24 and o_u30k = 2 and reqbed = 2) cnit = 17613.
If (prov = 24 and o_u30k = 2 and reqbed >2) cnit = 19600.
/*Prov   ON 35 */
If (prov = 35 and o_u30k = 1 and reqbed = 0) cnit = 21767.
If (prov = 35 and o_u30k = 1 and reqbed = 1) cnit = 25609.
If (prov = 35 and o_u30k = 1 and reqbed = 2) cnit = 30000.
If (prov = 35 and o_u30k = 1 and reqbed >2) cnit = 36400.
If (prov = 35 and o_u30k = 2 and reqbed = 0) cnit = 17139.
If (prov = 35 and o_u30k = 2 and reqbed = 1) cnit = 20163.
If (prov = 35 and o_u30k = 2 and reqbed = 2) cnit = 23557.
If (prov = 35 and o_u30k = 2 and reqbed >2) cnit = 27822.
/*Prov   MN 46*/
If (prov = 46 and reqbed = 0) cnit = 14790.
If (prov = 46 and reqbed = 1) cnit = 17400.
If (prov = 46 and reqbed = 2) cnit = 23492.
If (prov = 46 and reqbed > 2) cnit = 25610.
```

```
/*Prov   SK 47 */
If (prov = 47 and o_u30k = 1 and reqbed = 0) cnit = 14779.
If (prov = 47 and o_u30k = 1 and reqbed = 1) cnit = 17387.
If (prov = 47 and o_u30k = 1 and reqbed = 2) cnit = 22507.
If (prov = 47 and o_u30k = 1 and reqbed >2) cnit = 27741.
If (prov = 47 and o_u30k = 2 and reqbed = 0) cnit = 11815.
If (prov = 47 and o_u30k = 2 and reqbed = 1) cnit = 14360.
If (prov = 47 and o_u30k = 2 and reqbed = 2) cnit = 17110.
If (prov = 47 and o_u30k = 2 and reqbed >2) cnit = 20650.
/*Prov   AB 48  */
If (prov = 48 and reqbed = 0) cnit = 17071.
If (prov = 48 and reqbed = 1) cnit = 20083.
If (prov = 48 and reqbed = 2) cnit = 23853.
If (prov = 48 and reqbed > 2) cnit = 31300.
/*Prov   BC 59 */
If (prov = 59 and reqbed = 0) cnit = 20929.
If (prov = 59 and reqbed = 1) cnit = 24623.
If (prov = 59 and reqbed = 2) cnit = 28060.
If (prov = 59 and reqbed > 2) cnit = 36540.
execute.
```

/* Computing Affordability */

```
if (tendec = 3) shelutil = rent + utilexp.
execute.

if (tendec ne 3) shelutil = mortpay +utilexp + condochr + proptax.
execute.

compute shelyrat = shelutil/hhinc.


compute shelyrat = 0.
If (hhinc gt 0) shelyrat = (shelutil/hhinc).
execute.

compute zero_inc = 0.
if (hhinc le 0) zero_inc = 1.
add val label zero_inc
0 "Positive Income"
1 "Zero/Neg Income".
execute.

compute stirge1 = 0.
if (shelyrat ge 1 and zeroinc ne 1) stirge1 = 1.
if (zeroinc = 1) stirge1 = 2.
add val label stirge1
0 "STIR LT 1"
1 "STIR GE 1"
2 "Zero/Neg Income".
execute.

compute afford = 0.
do if (stirge1 = 1).
compute afford = 2.
```

```
else if (stirge1 = 0 and shelyrat ge .3).
compute afford = 1.
else if (stirge1 = 2).
compute afford = 3.
end if.
execute.

variable label afford "Affordability".
add val label afford
1 "GE 30% LT 100%"
0 "LT 30%"
2 "GE 100%"
3 "Zero/Neg Income" .
Execute.


compute othstds = 0.
if ((adequacy = 1 or crowd = 1) and afford eq 0) othstds = 1.
execute.

variable label othstds "Below Adeq or Suit".
add val lab othstds
1 "Below Adeq or Suit"
0 "Above Adeq & Suit".
```

/*multiple standards*/

```
compute mulstdpa = 0.
if (affordpa = 1 and adequacy = 1)multstd = 1.
if (affordpa = 1 and crowd = 1) multstd = 1.
if (adequacy = 1 and crowd = 1) multstd = 1.
if (affordpa = 1 and adequacy = 1 and crowd = 1) multstd = 1.
execute.

compute othstds = 0.
if ((adequacy = 1 or crowd = 1) and afford eq 0) othstds = 1.
execute.

variable label othstds "Below Adeq or Suit".
add val lab othstds
1 "Below Adeq or Suit"
0 "Above Adeq & Suit".


compute mulstd = 0.
if (afford = 1 and adequacy = 1)multstd = 1.
if (affordpa = 1 and crowd = 1) multstd = 1.
if (adequacy = 1 and crowd = 1) multstd = 1.
if (afford = 1 and adequacy = 1 and crowd = 1) multstd = 1.
execute.

compute affonly = 0.
if (afford = 1 and crowd ne 1 and adequacy ne 1) affonly = 1.
if (afford ne 1 and (crowd = 1 or adequacy = 1)) affonly = 2.
if (afford eq 1 and (crowd = 1 or adequacy = 1)) affonly = 3.
```

```
variable label affonly "Afford + Other Stds".
add val label affonly
0 "Above All Stds"
1 "Afford only"
2 "Other not afford"
3 "Afford + other".
execute.

/* Below Any Standard */
compute anystd = 0.
if (crowd = 1 or adequacy = 1 or afford = 1) anystd = 1.
variable label anystd "Below Any Standard".
add val label anystd
0 "Above All Stds"
1 "Below Stds".
execute.


/*coreneed variable */
compute coreneed = 0.
if ((hhinc < CNIT) and ((crowd = 1) or (adequacy = 1) or (afford eq 1))) coreneed = 1.
execute.


variable label COREneed  "In Core Housing Need".
add val lab coreneed
1 "In Core Housing Need"
0 "Not in Core Housing Need".
execute.


/*CNIT Line */
compute cnitline = 0.
if (hhinc < cnit) cnitline = 1.

variable label cnitline "Above Below Cnit".
add val lab cnitline
0 "Above Cnit"
1 "Below Cnit".
execute.

compute othstds = 0.
if ((adequacy = 1 or crowd = 1) and affordpa eq 0) othstds = 1.
execute.

variable label othstds "Below Adeq or Suit".
add val lab othstds
1 "Below Adeq or Suit"
0 "Above Adeq & Suit".
```

Running Tables

/*turns on the weight variable*/

weight by weight.

```
* Basic Tables.
TABLES
 /FORMAT BLANK MISSING('.')
 /OBSERVATION hhinc shelutil shelyrat
 /TABLES tenor > (hhinc + shelutil + shelyrat)
 BY (STATISTICS)
 /STATISTICS
 mean( hhinc shelutil (dollar 8.0) shelyrat (pct2.2 ).


TABLES
 /FORMAT BLANK MISSING('.')
 /FTOTAL $t 'Group Total'
 /TABLES R0000000
 BY (tenor > (STATISTICS) +  $t )
 /STATISTICS
 count( ( F5.0 )).


 /TABLES tenor
 BY (STATISTICS)
 /STATISTICS .

* Basic Tables.
TABLES
 /FORMAT BLANK MISSING('.')
 /OBSERVATION hhinc shelutil shelyrat
/FTOTAL $t 'Group Total'
 /TABLES tenor > (hhinc + shelutil + shelyrat)
 BY (STATISTICS)
 /STATISTICS
 mean( )
 /TABLES R0000000
 BY (tenor > (STATISTICS) +  $t )
 /STATISTICS
 count( ( F5.0 ))..


TABLES
 /FORMAT BLANK MISSING('.')
 /FTOTAL $t 'Group Total'
 /TABLES R0000000
 BY (tenor > (STATISTICS) +  $t )
 /STATISTICS
 count( ( F5.0 ))..
```

```
* Basic Tables.
TEMPORARY.
NUMERIC R0000000.
LEAVE R0000000.
VARIABLE LABEL R0000000 ' '.
VALUE LABELS R0000000 0 ' '.
TABLES
 /FORMAT BLANK MISSING('.')
 /FTOTAL $t 'Group Total'
 /TABLES R0000000
 BY (tenor > (STATISTICS) +  $t )
 /STATISTICS
 count( ( F5.0 )).

* Basic Tables.
TABLES
 /FORMAT BLANK MISSING('.')
 /OBSERVATION hhinc shelutil shelyrat
  /TABLES (tenor > hhtype2 > (hhinc + shelutil + shelyrat) + tenor))
 BY (STATISTICS)
 /STATISTICS=
 mean (hhinc) mean(shelutil) mean (shelyrat) .

* Basic Tables.
TABLES
 /FORMAT BLANK MISSING('.')
 /OBSERVATION hhinc shelutil shelyrat
 /TABLES ten1999 > (hhinc + shelutil + shelyrat)
 BY (STATISTICS)
 /STATISTICS
 mean (hhinc shelutil  ( DOLLAR7.0 ) shelyrat (pct4.2)).
* General Tables.
TABLES
 /FORMAT BLANK MISSING('.')
 /GBASE=CASES
 /FTOTAL= $t000001 "Total"
 /TABLE=afford + adequacy + crowd + othstds + affonly  BY coreneed >
 (STATISTICS) + $t000001  .

* Basic Tables.
TABLES
 /FORMAT BLANK MISSING('.')
 /OBSERVATION hhinc
 /TABLES (afford + adequacy + crowd) > hhinc
 BY coreneed > (STATISTICS)
 /STATISTICS
 mean( hhinc (dollar7.0)).
```

```
* Basic Tables.
TABLES
 /FORMAT BLANK MISSING('.')
 /OBSERVATION hhinc shelutil shelyrat
 /FTOTAL $t 'Group Total'
 /TABLES tenor > ((hhtype3 > (hhinc + shelutil + shelyrat) +  $t ))
 BY (coreneed > (STATISTICS) +  $t )
 /STATISTICS
 mean( hhinc (dollar7.0)) mean (shelutil (dollar7.0)) mean (shelyrat (f4.2)).

* Basic Tables.

TABLES
 /FORMAT BLANK MISSING('.')
 /OBSERVATION hhinc shelutil shelyrat
 /FTOTAL $t 'Group Total'
 /TABLES tenor > ((hhtype3 > (hhinc + shelutil + shelyrat) +  $t ))
 BY (coreneed > (STATISTICS) +  $t )
 /STATISTICS
 mean( ).
* Basic Tables.
TEMPORARY.
NUMERIC T0000000.
LEAVE T0000000.
VARIABLE LABEL T0000000 'Table Total'.
VALUE LABELS T0000000 0 ' '.
TABLES
 /FORMAT BLANK MISSING('.')
 /OBSERVATION hhinc shelutil shelyrat
 /TABLES (tenor > (hhtype3) + T0000000) > (hhinc + shelutil + shelyrat)
 BY (coreneed + T0000000) > (STATISTICS)
 /STATISTICS
 mean( ).
```

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