

Developing Poverty Thresholds 1993-2003

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Abstract

In 1995 the National Academy of Sciences (NAS) released a report recommending revisions to the current official measure of poverty for the U.S. Since then, research has been conducted at the Bureau of Labor Statistics to test and examine the NAS recommendations for poverty thresholds. In June 2004, the NAS held a workshop to review the work that had been conducted since the initial report was released, to obtain feedback from the scientific community on which approaches are methodologically sound, to gain consensus regarding the measures produced, and to specify topics for further research. The purpose of the current research is to produce the thresholds that were discussed during the workshop and to show these over a 10-year period. Three basic thresholds are produced: one based on the official CE publication definition of expenditures, one based on out-of-pocket spending using CE data, and one based on spending with an adjustment for consumption primarily for owner-occupied shelter.

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1. Introduction

In 1995, the National Academy Sciences (NAS) Panel on Poverty and Family Assistance, under the auspices of the Committee on National Statistics (CNSTAT), published a report, *Measuring Poverty, A New Approach* (Citro and Michael, 1995). In this report, recommendations were made that the current official measure of poverty should be revised. The Panel emphasized the importance of first determining the threshold and then the resource measure. The concept underlying the threshold and resource measure should be the same, resulting in an internally consistent measure of poverty.

The Panel justified their position to recommend a revised official poverty measure for the U.S. indicating that with the exception of minor changes, the thresholds have not been altered since 1965. The Panel noted that the thresholds have not been updated for real growth in consumption, only price change. The resulting poverty threshold “no longer represents the concept on which it was originally based—namely, food times a food share multiplier—because that share will change (and has changed) with rising living standards. Rather, the poverty threshold reflects in today’s dollars the line that was set

some 30 years ago” (Citro and Michael, 1995, p. 25). The Panel noted that the total expenditures of families have increased in real terms, and spending on nonfood items has risen more rapidly than spending on food. While expenditures on food accounted for one-third of the total in the 1950s they account for less than one-sixth of the total in the 1990s. “If the original approach were used to develop the poverty thresholds today, their value would be significantly higher” (Citro and Michael, 1995, p. 30).

In the report, the Panel recommended a procedure to calculate poverty thresholds that would, by design, be updated on a continuous basis and would reflect changes in levels of living over time that are relevant to a poverty budget rather than for changes in total expenditures. Since the release of the report, staff members within the Census Bureau and the Bureau of Labor Statistics (BLS) have collaborated in producing the proposed thresholds in a series of papers and reports (for example, see Garner et al., 1998, Johnson et al., 1997, Short et al., 1999, and Short, 2001).

In June 2004, CNSTAT convened a workshop (hereafter referred to as the NAS Workshop) to review BLS and Census Bureau research that had been conducted since the 1995 report was released, and to make recommendations regarding next steps. The workshop had been requested by the U.S. Office of Management and Budget to evaluate the progress that had been made in moving towards a new measure of poverty based on the NAS report. Issues related to thresholds and resources were discussed. Some degree of agreement was reached regarding the implementation of selected recommendations. For other recommendations, further research was suggested. It was further recommended that a time series be produced since there was no consistent time series of alternative poverty statistics based on the NAS recommendations.

The threshold topics discussed during the 2004 workshop include setting and updating the reference family threshold, updating the threshold, selecting an equivalence scale, and accounting for medical needs and owner-occupied housing. Geographic adjustments were also discussed, but not recommended to be made in the near future. As noted by Iceland (2005), “...many felt that the methods currently available to make these adjustments were too technically problematic and too crude, especially in light of their substantial effect on state-level poverty rates – a politically sensitive issue.”

This paper follows the discussion and recommendations for thresholds presented at the workshop, including a review of the conceptual issues that underlie the NAS Panel's approach to poverty threshold construction. Themes underlying much of the discussion at the workshop and earlier research are the differences among needs, consumption, and expenditures, and the treatment of health care and owner-occupied housing in poverty measurement.

Three thresholds are produced. The first follows the NAS Panel approach as presented in the NAS report: thresholds are based on expenditures as defined by the BLS for official publications. A second measure differs from the first in that out-of-pocket expenditures are used. The third measure accounts for consumption needs with the major adjustment being for owner-occupied housing.

A time series of thresholds is produced and presented for 1993-2003. The thresholds are based on the same methodologies over time and are estimated using data from the U.S. Consumer Expenditure Survey Interview. Differences in the thresholds over time result due to changes in expenditures but in some cases due to changes in the survey instrument.

2. Poverty Thresholds: Concept and Measurement

Poverty is most often defined in terms one's ability to meet his/her basic or minimum needs for survival or participation in society. Basic needs can be defined in terms of inputs or outputs, or the costs of providing for these at some minimum level. For example, there may be a minimum number and amount of nutrients needed for a certain level of output or energy. In the U.S., we have most often been concerned with the costs, at least officially, of some minimum or basic bundle of goods and services (inputs) that can be used to meet one's needs, and the income or resources available to meet those needs.

A poverty threshold based on "costs" could be measured in terms of the dollar spending necessary to pay for a basic bundle of goods and services, or it could be measured in terms of the dollar value of a consumption bundle. For a spending-based threshold, expenditures would most appropriately be used to derive the thresholds. Cash and near-cash income, adjusted for required spending (e.g., income taxes paid) that reduces a family's income to meet its basic spending needs, would be compared to a spending-based threshold.

In contrast, a consumption-based poverty threshold would refer to what is needed in dollar terms to meet minimum consumption needs in contrast to spending needs. Let's say public policy dictates, through the creation of a poverty line, that there is a basic consumption level of food, clothing, shelter, and utilities that individuals and

families living in the U.S. should have for them not to be considered poor. Expenditures for food, clothing, and utilities could be used as proxies of the value of the consumption of these goods and services. Thus spending- and consumption-based thresholds that are based on these three commodities alone would be expected to be the same. However, when shelter is included in the set, the thresholds would be expected to differ, given the current renter-owner housing mix in the U.S. The full costs or value of the consumption would be the market value of the shelter service, not what the family spends for shelter. Let me explain, families living in subsidized rental housing consume more than they spend for the shelter. Homeowners with very little shelter expenditures are likely to consume more shelter than would be reflected in their spending. The value of shelter consumption, not the spending for shelter, would be reflected in a consumption-based threshold.

The resource measure used to compare to a consumption-based threshold would include cash and near-cash income with adjustments for reduced spending power as before, plus the value of non-cash transfers (e.g., rental subsidies) and the implicit income from owning one's home. A consumption-based poverty measure would consider the homeowner to be both a renter and a landlord of his/her current residence. The threshold would include the value of the implicit rent for shelter consumption while resources would include a value for the implicit income from renting the house to one self. This implicit income includes both net rent (i.e., implicit rent minus landlord expenses) and the change in market value (an unrealized capital gain or loss). Most poverty measurement discussions have focused on including the implicit net rent only rather than the full value of the implicit income.

Spending and consumption both underlie the official and NAS recommended thresholds. The official thresholds and the NAS thresholds presented in the Panel's report are based on spending, yet both are assumed to reflect needed consumption (e.g., Citro and Michael, 1995, pp. 1, 4, 148).

The current official measure was developed in the early 1960s as an indicator of the number of people with inadequate income to meet needed consumption of food and other goods and services (see Citro and Michael, 1995 for details). The official measure is based on the share of food spending in after-tax money income (one-third) using data from the 1955 Food Consumption Survey. The food need (or consumption) standard was based on the U.S.D.A. Economy Food Plan. Since the multiplier to create the thresholds was based on spending data, the implicit assumption is that the consumption of all other goods and services, in addition to food, can be valued in terms of out-of-pocket spending.

Since the first official thresholds were released, the primary change to the thresholds has been to update them by the Consumer Price Index for urban consumers (CPI-U). The CPI-U represents the change in prices of some fixed market basket of goods and services, with relative prices changing while utility remains constant for a particular market basket of goods and services. The CPI market basket changes on a periodic basis. In addition to this regular change in the CPI, other changes have been made in the production of the index over the years. For example, since the early 1980's the CPI-U has incorporated the value of housing services for owner-occupants using reported rental equivalence in the weights; changes in the value of these services are determined using the change in rents of comparable rental properties. In this way, owners and renters are consistently treated in the index. The CPI-U reflects changes in the value of shelter services, not the change in spending or expenditures for owner-occupied housing. The updating mechanism for the official poverty measure is based on the relative change in prices of goods and services purchased by an average consumer unit (using plutocratic, not democratic, weights¹).

To develop the NAS thresholds, the Panel used spending data. However, a consumption based measure for the value of shelter for homeowners was recommended, and the recommend updating mechanism was to be based on changes in consumption. Unlike the official measure which accounts primarily for changes in prices holding utility constant, the NAS Panel recommended a new measure of poverty that places importance on creating a poverty threshold that would maintain a relationship to the overall standard of living in the nation over time and would allow for changes in utility. The Panel's report states that, "The major reason, in our view, to revise the threshold concept for the U.S. poverty measure is its implications for updating the thresholds over time" (Citro and Michael, 1995, p. 102). The NAS Panel recommended that the poverty thresholds, once determined, would be updated over time using the change

¹ Plutocratic weights are based on the value of goods and services across all consumer units for each commodity represented in the index. For example, the weight for food is total spending on food for all consumer units divided by the value of all goods and services for all consumer units. These weights are then combined with prices to produce the index. Democratic weights reflect the distribution of consumer units in the population. For example, consumer unit specific price indexes would be created based on the value of goods and services of each consumer unit and the prices that the consumer unit faces. To obtain an overall index for the population, the consumer unit specific price indexes would be averaged using demographic population weights to reflect the value of goods and services and price experience of all consumer units.

in expenditures at the median for a basic set of goods and services for a specified reference family. The Panel "... propose[d] a conservative updating procedure that adjusts the thresholds for changes in consumption that are relevant to a poverty budget, rather than for changes in total consumption" (Citro and Michael, 1995, p.4).

To summarize, the official measure is based on spending patterns in 1955 and a food consumption standard defined for the early 1960s; the NAS measure reflects more recent living standards and a poverty relevant budget. Since the early 1980's, the updating in official poverty thresholds, using the CPI-U, reflects changes in prices of all goods and services purchased by the average consumer in the U.S., with owner-occupied housing valued in terms of implicit rental equivalence. The official thresholds are based on *spending*, not on the *costs* of goods and services as defined in the CPI-U. The NAS threshold is updated to account for changes in levels of living over time, using either spending or consumption, depending upon the concept underlying the thresholds.

3. Poverty Thresholds: The Recommendations

The NAS Panel's recommendations for revising the threshold follow.

Recommendation 2.1: A poverty threshold with which to initiate a new series of official U.S. poverty statistics should be derived from Consumer Expenditure Survey data for a reference family of four persons (two adults and two children). The procedure should be to specify a percentage of median annual expenditures for such families on the sum of three basic goods and services—food, clothing, and shelter (including utilities)—and apply a specified multiplier to the corresponding dollar level so as to add a small amount for other needs (Citro and Michael, 1995, p. 6).

Recommendation 2.2: The new poverty thresholds should be updated each year to reflect changes in consumption of the basic goods and services contained in the poverty budget: determine the dollar value that represents the designated percentage of the median level of expenditures on the sum of food, clothing, and shelter for two-adult/two-child families and apply the designated multiplier. To smooth out year-to-year fluctuations and to lag the adjustment to some extent, perform the calculations for each year by averaging the most recent 3 years' worth of data from the Consumer Expenditure Survey, with the data for each of those years brought forward to the current period by using the change in the Consumer Price Index (Citro and Michael, 1995, p. 7)..

The percentage of the median was to approximate the 30-35th percentile of the value of the sum of expenditures for food, clothing, shelter, and utilities (Citro and Michael,

1995, p. 149). In 1992, the percentages of the median applied were 0.78 and 0.83. The multipliers recommended by the Panel were based on an examination of CE Interview data for 1989-1991. A range of multiplier values, from 1.15 to 1.25, was recommended to account for other needs (e.g., household supplies, personal care, and non-work related transportation) in addition for food, clothing, shelter, and utilities.

The Panel made two other recommendations regarding the initial thresholds. Recommendation 2.3 noted that when the new threshold concept is first implemented, that the Census Bureau should produce another set of poverty rates using the new thresholds updated only for price changes for evaluation purposes. Recommendation 2.4 notes that part of the implementation of a new measure would also include a reevaluation of the threshold level derived by the Panel.

The Panel called for adjustments to the thresholds in Recommendations 3.1, 3.2, 3.3 and 3.4. In 3.1 the Panel stated that the reference family threshold should be adjusted to reflect the needs of different family types and recommended a specific equivalence scale. In 3.2 the Panel noted that the thresholds should be adjusted to reflect geographic differences in housing costs. In 3.3 the Panel called for research to update the geographic housing cost component of the threshold and in 3.4 they called for additional research to improve the estimation of geographic cost-of-living in all components of the poverty budget.

4. Poverty Thresholds: Implementation of NAS Workshop Recommendations

Discussions during the 2004 NAS Workshop that focused on thresholds included setting and updating a reference family poverty threshold, equivalence scales, and accounting for health and medical care needs and implicit housing transfers (e.g., from subsidies and owner-occupancy). There was consensus regarding certain issues but not others. For example, accounting for owner-occupied housing in a new measure was discussed, but there was no recommendation regarding how this should be done. Discussion ensued regarding counting unrelated partners in the household when producing poverty statistics, but again, no recommendation was made to include unrelated partners when producing the thresholds. Another topic discussed but with no recommendation was whether child care costs should be included in the thresholds rather than a subtracted from resources.

The remainder of this section is divided into five parts. The first reviews issues related to setting the threshold, the second with adjusting the threshold, the third with computing the threshold, and the fourth and fifth with

data and results from implementing the NAS Workshop recommendations.

4.1 Setting the Threshold

Setting the threshold has several parts. These include selecting the reference family, identifying the goods and services upon which the threshold would be based, and specifying percentages of the median and multipliers. Particular attention is given to the treatment of medical/health care and shelter in defining the threshold bundle.

4.1.1 Reference family

Following the Panel's recommendations, calculation of the poverty thresholds begins with the choice of a reference family for whom an estimate of median expenditures is obtained. The reference family chosen by the Panel was one including two adults and two children, specifically, a married couple with two children of their own. The criteria used to select the family type was that the reference family would "fall near the center of the family size distribution rather than at one of the extremes...also, it is preferable for the reference family to be one that accounts for a relatively large proportion of the population because its spending patterns observed in a sample survey will be the basis for the poverty threshold..." (Citro and Michael, 1995, p. 101).

In earlier work, Garner (2002) found that about 9 percent of all families were two-adult/two-child families, using 1998 quarter two through 2001 quarter one Consumer Expenditure Interview Survey data. Of families with children, those with two adults and two children were the largest group. Since children make up a large portion of the poverty population it is reasonable that the reference family represent spending patterns for that group.

4.1.2 Expenditures

Once the reference family is chosen, median expenditures for a select group of goods and services are calculated. The Panel specified that this group of commodities would include food, clothing, shelter (including utilities), and a small additional amount to allow for other needs (e.g., household supplies, personal care, and non-work-related transportation). They defined expenditures as in official CE publications: the transaction costs, including excise and sales taxes, for commodities acquired during the interview period. The interview reference period for the quarterly CE survey is three months.

A topic not discussed by the Workshop participants was whether the CE publication definition is the most appropriate for defining median expenditures or if an out-of-pocket measure of expenditures would be better. Since

people often think about expenditures as out-of-pocket, an additional set of thresholds are produced to show the effect of moving from a CE publication definition to one that is out-of-pocket. An outlays definition was used to produce NAS based thresholds in earlier work by Garner and Short (2001).

At the Workshop, significant discussion ensued regarding the treatment of medical/health care and owner-occupied shelter in a new poverty measure. The following two sections focus on these and how they are dealt with in this study.

4.1.2.1 Medical/ Health Care

Not included in Panel's threshold set of goods and services were those for medical/health care. Rather the Panel recommended that actual medical care expenditures be subtracted from resources. At the Workshop, there was broad agreement that medical needs be accounted for but there was no clear consensus on how this would be done. The method that received the greatest support was to include expected medical out-of-pocket expenses in the poverty thresholds. Thus, medical care would be treated as a basic need, along with food, clothing, shelter, and utilities. An advantage of this change would be that the thresholds would be more portable. This means that the thresholds could be used with other types of survey data more easily by researchers outside the Census Bureau. Portability of a poverty measure is an important consideration in the framework of an official poverty measure that can be used across programs. For earlier research with medical care included in the thresholds, see: Banthin, et al. (2001), Bavier (2001), Short (2001), Short and Garner (2002).

For this study, the threshold based on the CE publication definition is referred to as FCSUM-CE. The threshold based on an out-of-pocket definition is referred to as FCSUM-OOP.

The CE publication definition for FCSUM-CE threshold includes the following.

- Out-of-pocket spending on:
 - Food
 - Clothing
 - Utilities (includes telephone)
 - Medical care
 - For renters, shelter expenditures
- For homeowners, non-vacation shelter expenditures that include:
 - Mortgage interest payments (no principal repayments)
 - Prepayment penalties
 - Property taxes
 - Maintenance, repairs, insurance and other related expenditures.

Out-of-pocket expenditures for the FCSUM-OOP threshold include the following:

- FCUMR-CE expenditures
- Repayments of mortgage principal for homeowners

4.1.2.2 Shelter

The Panel used the official CE publication definition of shelter to define expenditures for the thresholds that they produced for the 1995 report. However, the Panel noted that using the CE definition of shelter was for "processing convenience; a preferable definition would include actual outlays for mortgage payments, taxes, insurance, and maintenance and repairs, together with an imputed amount for the estimated rental value of the home net of such outlays" (Citro and Michael, 1995, p. 148). For the threshold measure, the Panel's recommendation is equivalent to replacing shelter expenditures for owner-occupiers in the thresholds with the implicit rent of this shelter.

Detailed information was presented at the Workshop on methods to account for owner-occupied shelter and subsidized rents in a poverty measure, but there was little discussion concerning which method or methods should be adopted. Workshop attendees agreed that homeowners and subsidized renters have more available resources to meet basic needs due to their housing situation. Yet, as noted by the Panel, a threshold should first be chosen followed by a consistent measure of resources. The question then became how would one account for owner-occupied housing and subsidized rents in the production of the threshold. Workshop participants encouraged BLS and Census Bureau researchers to continue working on this topic. The remainder of this section highlights the issues related to homeownership and poverty measurement.

To account for homeownership in a poverty threshold, following the Panel's recommendation, shelter spending would be replaced by implicit rents from homeownership. Such an approach results in a threshold based on consumption needs.

The implicit assumption in a consumption-based threshold is that there is a basic level of consumption that is needed so as not to be poor. A consumption-based threshold would include the value of shelter services regardless of who paid for them (e.g., they could have been paid for by a person not living in the household or another entity) or if there were very low expenditures for the services (e.g., there is no mortgage and the homeowner only pays for property insurance). Shelter consumption would most appropriately be valued using market rents for subsidized renters and for homeowners. The resource measure consistent with such a threshold would include the subsidy for subsidized renters and for

homeowners, the implicit income from renting to oneself minus deductible landlord expenditures associated with this rental. See Garner and Rozaklis (1999, 2001) for an hedonic approach to account for owner occupied housing and subsidized rents in poverty thresholds, and Garner and Short (2001) for out-of-pocket spending- and consumption-based thresholds using homeowners rental equivalence for the year 2000. These earlier studies did not include medical care in the thresholds.

In this study, consumption-based thresholds are developed and produced. For simplicity, and due to data constraints, owner-occupied housing services are the primary consumption item considered. The implicit rent or value of shelter services consumption for owner-occupants is based on the responses of consumer units to the following question:

If someone were to rent your home today, how much do you think it would rent for monthly, unfurnished and without utilities?

The expenditures for food, clothing, utilities, medical care, and rent for renters are assumed to measure consumption, with a few noted exceptions.² One exception is medical care. In this case, an adjustment is made in the thresholds so that the expected medical consumption needs of families are considered rather than medical expenditures only (see “Adjusting the Threshold”).

The consumption-based threshold, FCSUM-R, is defined as follows:

- Out-of-pocket spending on
 - Food
 - Clothing
 - Utilities (includes telephone)
 - Medical care
- Food as pay
- Rent as pay
- Rent of renters
- Rental equivalence of owner-occupants
- Adjustment for the medically uninsured using CE data

² For a more complete consumption-based threshold one would also need information on rent-controlled and government subsidized housing, free or reduced price school breakfasts and school lunches, WIC benefits, energy assistance, medical consumption not financed out-of-pocket, and any other goods and services received as gifts or transfers to the family. The value of the transfers or gifts received would need to be added to resources for consistency. Since the CE expenditure include those made for gifts given to others, the value of gifts received would need to be subtracted from the expenditures made for gifts given.

4.1.3 Percentage of the Median

The NAS panel recommended that percentile values for expenditures, based on percentages of the median, be used to drive the poverty thresholds. The use of the percentage links updates in the threshold to changes in expenditures at the median rather than those below the median. The percentages selected correspond to the reference family’s expenditures between the 30th and 35th percentiles of the distribution of the sum of food, clothing, shelter, and utilities (FCSU) expenditures. The Panel noted that, “The designation of a percentile value...is obviously a matter of judgment” (Citro and Michael, 1995, p. 149).

In the work conducted by the BLS and Census Bureau staff, rather than selecting a specific percentage, our applications have used the midpoint of the recommended range to set the value of the thresholds. Workshop participants did not comment on the percentage chosen or the use of the midpoint of the range.

The Panel recommended that a base year threshold would be established first and then the same percentage would be used to produce the thresholds for other years. However, it seems reasonable that if the bundle were redefined, as is the case in this study when shelter is valued in terms of service flows, re-estimation of the percentage of the median that corresponds to the 30-35th percentile range would be needed (Citro, 1999).

Calculations conducted for this study reveal a stable relationship between the percentiles and the relevant percentages of the median that the Panel had in mind when spending is used. Using the CE publication definition of the expenditure bundle (FCSUM-CE), the percentages are 78 or 79 to 83 or 84 over the years 1993-2003. When an out-of-pocket expenditures definition (FCSUM-OOP) is used the percentages are slightly lower: 77 or 78 to 82 or 83. In contrast, the percentages for the consumption-based threshold (FCUMS-R) are higher: 79 or 80 to 84 to 85.

4.1.4 Multipliers

The Panel recommended that, once the percentage of median expenditures on a basic bundle had been estimated, multipliers would be applied to the basic bundle to add a small additional amount to allow for other needs. A range of multipliers was proposed to represent smaller and larger groups of commodities. Two commodity bundles were considered by the Panel: (1) the basic bundle plus those for personal care and one-half of transportation; and (2) the basic bundle plus personal care, one-half transportation, education, and reading

materials costs.³ The Panel stated that, in the NAS report, “we arbitrarily chose to exclude one-half of transportation costs because the CE Interview Survey does not distinguish between work expenses, which we propose to deduct from resources, and personal transportation for errands, vacations, etc.” (Citro and Michael, 1995, p. 151). This allocation is consistent with other studies.⁴

The multipliers used by the Panel, and in this study, are 1.15 to represent the smaller bundle and 1.25 to represent the larger bundle. Again, the midpoint of the two multipliers is used in the estimation of the thresholds. There was no discussion at the NAS Workshop regarding the multipliers.

4.2 Adjusting the Threshold

4.2.1 Adjustment for Differences in Family Needs

The Panel applied an equivalence scale to the reference family threshold to obtain thresholds for families of other sizes and composition. The Panel recommended a two-parameter scale to account for the different needs of adults and children, and for the economies of scale of living in larger families.

Workshop participants mostly favored a three-parameter scale that allowed for a different adjustment for single

³ **Transportation** expenditures were defined by the Panel to include vehicle finance charges, expenses for gasoline and motor oil, maintenance and repairs, vehicle insurance, public transportation (including air fares), and vehicle rentals, licenses and other charges. In addition, transportation included the total purchase price (minus the trade-in value) on new and used vehicles.

Personal care includes products for hair, oral hygiene, and shaving, cosmetics and bath products, electric personal care appliances, other personal care products, and personal care services.

Education includes tuition, fees, textbooks, supplies and equipment for public and private nursery schools, elementary, and high schools, colleges, and universities, and others schools

Reading materials includes subscriptions for newspapers, magazines, and books through book clubs, purchase of single copy newspapers, and magazines, newsletters, books, encyclopedias, and other reference books.

⁴ In constructing the cost of raising a child, the Department of Agriculture used data from a 1990 study by the Department of Transportation which found that employment-related transportation activities account for about 40 percent of travel costs for families with children. See *Expenditures on Children by Families, 1995 Annual Report*, Center for Nutrition Policy and Promotion, USDA, page 5, and U.S. Department of Transportation, Federal Highway Administration, 1994, *1990 Nationwide Personal Transportation Study*.

parents. The three-parameter scale had been used in several BLS and Census Bureau studies prior to the Workshop. The three-parameter scale is shown below.

One and two adults: $scale = (adults)^{0.7}$

Single parents: $scale =$

$$(adults + 0.8 * firstchild + 0.5 * otherchildren)^{0.7}$$

All other families: $scale =$

$$(adults + 0.5 * children)^{0.7}.$$

The economy of scales factor was set at 0.70; the Panel recommended a range of 0.65 to 0.75. Workshop participants supported continuing the use of the three-parameter scale, but suggested that equivalence scale research continue. Iceland (2005) noted that several participants suggested that future research should address expanding the scale to account for addition factors related to needs (e.g., age of children, household production by stay-at-home parents).

4.2.2 Adjustment for the Medically Uninsured

Workshop participants mostly agreed that medical/health care would be included as a basic need in the thresholds; however, the question arose regarding how to account for the needs of the medically uninsured. Workshop participants agreed that an adjustment should be applied. There was no discussion regarding whether the adjustment would be for both spending- and consumption-based thresholds. After considerable discussions with Kathleen Short of the Census Bureau, she and I decided that the adjustment would only be appropriate for the consumption-based threshold since the adjustment is to account for “expected” needs, not actual expenditures. Even with this adjustment, the full costs of providing for medical consumption needs are not counted in the production of the thresholds; thus, the consumption thresholds will be underestimated.

In earlier work, Short and Garner (2002) made an adjustment for medical needs using data from the 1996 Medical Expenditure Panel Survey with input from Banthin (see Banthin et al. 2001). Medical care expenditure risk indexes were created that accounted for variations in family expenditures as related to family size, and the age, health status, and health insurance coverage of family members.

One of the goals of the current research was to use the CE Interview Survey only for the production of the thresholds. Since the CE does not include information on the health status of members, only the remaining factors were used in the production of the CE-based indexes. An additional challenge in using the CE to produce the medical indexes is that the CE does not collect health insurance information for each member; data are collected on whether the consumer unit as a whole has various private health insurance policies. However, data are

collected concerning the total number of people who are covered by Medicaid and Medicare.

The medical risk indexes are calculated as the ratio of median medical out-of-pocket expenditures for different groups, varied by the factors noted previously, compared to the median expenditures of the reference family. For the uninsured, the medical risk index for a family with health insurance and the same family size and age of members was assigned to a family without health insurance.

4.3 Computing the Threshold

The general formula for deriving the reference family threshold, using food, clothing, shelter, utilities, and medical care is shown in the equation below.

$$(1 - s_{\text{medical}}) \frac{(1.15 * P_L * M) + (1.25 * P_H * M)}{2} + (s_{\text{medical}}) \frac{(P_L * M) + (P_H * M)}{2}$$

where

- s_{medical} = medical share of threshold value
- P_L = lower percentage of median costs
- P_H = higher percentage of median costs
- M = median expenditures for reference family.

The multipliers of 1.15 and 1.25 are applied to the non-medical part of the threshold, $(1 - s_{\text{medical}})$, since they are based on the relationship between the sum of food, clothing, shelter, and utilities expenditures and expenditure for smaller and larger other bundles of needed goods and services as noted in the 1995 report. The three-parameter equivalence scale is also only applied to the non-medical part of the threshold. This is because the medical care needs of children are not expected to be less than those of adults and because there are few inherent scale economies in medical care consumption with increasing family size. Only the medical part of the threshold is adjusted by the medical risk index.

4.4 Updating the Thresholds Over Time

There was broad agreement at the Workshop that the Panel's quasi-relative approach for annually updating the thresholds continue. The Panel's original recommendation was that the most recent three years of CE data be used, with earlier years' data updated to current dollars. This approach would allow for "...changes in real consumption but in a conservative manner" (Citro and Michael, 1995, p. 154). The three-year approach was recommended to increase the sample size and also to smooth out year-to-year changes in the thresholds. Using three years of data however produces thresholds that lag somewhat behind changes in real consumption. Yet, such

thresholds are more reflective of current consumption than the official threshold that is updated by the CPI-U.

4.5 Data

For this study, Consumer Expenditure Quarterly Interview Survey (CE) data are used to produce the thresholds for 1993 through 2003. CE Interview data are made available on a quarterly cycle. Data collected in an interview refer to expenditures made during the three months prior to the interview month. It is assumed that data from each reference quarter is independent of the data from other quarters, just as for CE publications. Three years of quarterly data are used to produce each threshold. For example, for the 1993 threshold, data from 1990 quarter two through 1993 quarter one are used; for the 2003 threshold, data from 2000 quarter two through 2003 quarter one are used. Data from earlier years in the three-year cycle are updated to the threshold year using the annual all items consumer price index, U.S. city average (CPI-U).⁵

When the current research began, it was expected that the Census Bureau would be publishing the thresholds from this study. Given the CE data release dates and Census Bureau publication dates, the data chosen to produce the thresholds are from the three most recent years minus one. However, shortly before this work was completed, it was determined that the NAS-based thresholds would not be published; thus, the three most recent years of data could have been used as in the earlier BLS and Census Bureau studies previously cited. If the earlier approach had been used, the 2003 threshold would have been based on data from 2001 quarter two through 2004 quarter one and the thresholds would be more reflective of more recent consumption and spending patterns.⁶

As noted earlier, data from 1990-2003 were used to produce the thresholds. Over this time period, the data collection for the rental equivalence by owner-occupants changed. Up until 1993 quarter three, rental equivalence was asked in the General Housing Characteristics Section (1B) and was only asked during the consumer unit's first interview. The value then was carried over to the

⁵ Medians were also produced based on an updating of the expenditures of threshold components using their corresponding CPI-U's; there was essentially no difference in the medians in threshold year dollars with this approach or when the overall CPI-U was used for the sum of expenditures.

⁶ The FCSUM-CE threshold using the most recent three years of data, rather than using data from the most recent three years minus one year (as done in this study), was \$21,635; the FCSUM-R threshold was \$25,026. Using more recent CE data results in thresholds that are slightly lower than those produced for this study.

following interviews. Beginning with 1993 quarter 3, the rental equivalence question has been asked each quarter and is located in the Owned Living Quarters and Other Owned Real Estate Section (3I). By asking rental equivalence each quarter, the consumer unit has the opportunity to update rental equivalence as the market value of comparable rental units change or as the consumer unit makes changes to his or her housing structure.

4.6 Results Based on Implementation

The three experimental thresholds and the official poverty line for a family with two adults and two children are presented in Table 1. The experimental thresholds increase over the 1993 to 2003 period, just as the official threshold increases. However, the rate of increase for the experimental thresholds is greater. The different rate of increase appears to begin around 1998. From 1993 to 1996, the experimental thresholds are relatively closer to each other. Then there is a larger increase in the consumption-based threshold (FCSUM-R). The 1993-1996 FCSUM-R thresholds are based on the rental equivalence data that is collected in the first, and not the following, interview.

The official threshold in 1993 is \$14,654 and in 2003 it is \$18,660 (a 27 percent increase). The FCSUM-CE threshold is about \$1,500 a year high in 1993 (\$16,192) and about \$3200 higher in 2003 (\$21,900) than the official threshold (a 35 percent increase in FCSUM-CE). When mortgage principal payments are included in spending (FCSUM-OOP), the 1993 threshold (\$16,797) is about \$600 higher than the FCSUM-CE threshold, the one without principal payments included. By 2003, the difference in the two spending thresholds (FCSUM-CE and FCSUM-OOP) is doubled at \$1,200. The FCSUM-OOP threshold increases by 38 percent from 1993 to 2003. The FCSUM-R threshold is about \$1,700 greater than the FCSUM-CE threshold in 1993 and \$3,260 greater in 2003.

Table 1. Experimental Poverty Thresholds for the Reference Family

Year	FCSUM			
	Official	CE	OOP	R
1993	\$14,654	\$16,192	\$16,797	\$17,949
1994	15,029	16,723	17,346	18,421
1995	15,455	17,237	17,871	18,981
1996	15,911	17,672	18,390	19,792
1997	16,276	17,773	18,511	20,154
1998	16,530	17,938	18,711	20,408
1999	16,895	18,408	19,414	21,052
2000	17,463	19,298	20,309	21,839
2001	17,960	20,091	21,177	22,797
2002	18,244	20,899	22,036	23,867
2003	18,660	21,900	23,170	25,162

Table 2 compares the official and experimental poverty thresholds to published Current Population Survey before tax money income and published CE total expenditures. Before-tax money income for all households increases more rapidly than do total expenditures for all consumer units and than do the reference family thresholds until about the year 2000 when income flattens out. CE total expenditures and the thresholds appear to follow a similar pattern from 1993 to 1995 and then total expenditures increase at a faster rate. From the year 2000 to 2003, thresholds are increasing at a faster rate than total expenditures.

Table 2. Average Annual CPS Household Income, CE Total Expenditures, and Thresholds

Year	FCSUM				
	BTM Income	CE Total	CE	OOP	R
1993	\$41,428	\$30,692	\$16,192	\$16,797	\$17,949
1994	43,133	31,731	16,723	17,346	18,421
1995	44,938	32,264	17,237	17,871	18,981
1996	47,123	33,797	17,672	18,390	19,792
1997	49,692	34,819	17,773	18,511	20,154
1998	51,855	35,535	17,938	18,711	20,408
1999	54,737	36,995	18,408	19,414	21,052
2000	57,135	38,045	19,298	20,309	21,839
2001	58,208	39,518	20,091	21,177	22,797
2002	57,852	40,677	20,899	22,036	23,867
2003	59,067	40,817	21,900	23,170	25,162

The thresholds can be examined further by examining the expenditure budget components underlying the thresholds. The thresholds are based on percentages of the median, 78 and 83 percent, corresponding to the 30-35th percentiles of the distribution based on the sum of expenditures or costs of consumption for the commodity bundle. Presented in Table 3 are the annualized expenditures of the reference family, using the CE publication definition (FCSUM-CE), in the 30-35th percentile range. Medical and clothing expenditures have remained fairly flat from 1993 to 2003 in current dollars, with a slight increase in medical spending in 2001. Expenditures for food, shelter, and utilities have been climbing steadily during 1993-2003. The largest increase has been for shelter: a 56.1 percent increase. (The results for FCSUM-OOP are available from the author upon request.)

Table 4 includes the spending for the reference family in the 30-35th percentile range when consumption is used to derive the thresholds. The value of shelter services based on reported rental equivalence for owner-occupants and rents for renters is not that much higher than food expenditures in 1993 (\$4,695) versus \$5,086); however by the year 2003, the difference is quite large (\$5,961 versus \$8,556). The percentage increase for shelter over the 1993 to 2003 period is 68.2 percent, the largest increase among the budget items. This large increase is

likely due to the increase in expected implicit rents associated with increased market values of homes beginning in the year 2000. The second largest increase is for medical care (47.7 percent).

Table 3. Reference Family Annualized Spending in the 30-35th Percentile for FCSUM-CE

Year	Food	Clothing	Shelter	Utilities	Medical
1993	\$4,658	\$1,184	\$3,815	\$2,089	\$1,156
1994	4,720	1,166	4,167	2,206	1,210
1995	4,747	1,254	4,355	2,264	1,264
1996	4,871	1,229	4,494	2,366	1,265
1997	4,989	1,264	4,460	2,347	1,287
1998	5,053	1,231	4,721	2,420	1,184
1999	5,289	1,217	4,798	2,581	1,140
2000	5,423	1,210	5,070	2,668	1,143
2001	5,566	1,220	5,488	2,650	1,328
2002	5,675	1,319	5,587	2,918	1,471
2003	5,923	1,286	5,956	3,047	1,594

Table 4. Reference Family Annualized Spending/Owner Consumption in the 30-35th Percentile for FCSUM-R

Year	Food	Clothing	Shelter	Utilities	Medical
1993	\$4,695	\$1,235	\$5,086	\$2,149	\$1,122
1994	4,846	1,238	5,425	2,201	1,135
1995	4,862	1,150	5,807	2,263	1,250
1996	4,857	1,167	6,310	2,343	1,258
1997	4,901	1,169	6,468	2,435	1,313
1998	4,990	1,155	6,625	2,578	1,353
1999	5,266	1,119	6,945	2,640	1,221
2000	5,412	1,171	7,148	2,716	1,145
2001	5,591	1,288	7,549	2,760	1,256
2002	5,726	1,302	8,023	2,902	1,463
2003	5,961	1,273	8,556	3,034	1,657

The results presented in Tables 3 and 4 indicate that the dollars that the reference family is spending or the value of their consumption has been increasing for most items in the budget. But why are they going up? Is it due to prices or due to the fact that reference families spend differently than the average consumer unit? By examining the CPI-U for all items and for the items in the thresholds this can at least in part be explored.

Table 5 includes the CPI-U's (U.S. city average) for all items and for the items included in the thresholds. This table reveals that relative prices in shelter and medical care are increasing at faster rates than the overall CPI-U, the index used to adjust official poverty thresholds. The average change in the medical care CPI-U (48.8 percent) is approximately the same as the change in medical care spending in the 30-35th percentile for the reference family using FCSUM-R (47.7 percent in Table 4).

Underlying the consumer price indexes are the relative importances of the items that make up the index. The

relative importances are derived from the expenditure base weights, adjusted by monthly price changes. Relative importances indicate which items more heavily influence the consumer price index.

Table 5. CPI-U for All and for Selected Categories

Year	CPI-U	Food	Clothing	Shelter	Utilities	Medical
1993	1.45	1.41	1.34	1.56	1.21	2.01
1994	1.48	1.44	1.33	1.61	1.23	2.11
1995	1.52	1.48	1.32	1.66	1.24	2.21
1996	1.57	1.53	1.32	1.71	1.28	2.28
1997	1.61	1.57	1.33	1.76	1.31	2.35
1998	1.63	1.61	1.33	1.82	1.29	2.42
1999	1.67	1.64	1.31	1.87	1.29	2.51
2000	1.72	1.68	1.30	1.93	1.38	2.61
2001	1.76	1.71	1.29	1.98	1.52	2.69
2002	1.80	1.76	1.24	2.08	1.44	2.86
2003	1.84	1.80	1.21	2.13	1.55	2.97

Relative importances for 2003 and shares of the FCSUM-R threshold are presented in Table 6. The FCSUM-R component shares are presented since the CPI-U assumes that owners' equivalent rent is used to value the cost of shelter services. As seen in Table 6, the share of the FCSUM-R threshold for food is 25 percent while the relative importance of food in the 2003 CPI-U is 15 percent. Shelter accounts for 35 percent of the threshold but 30 percent of the CPI-U. Utilities account for almost twice as much of the total in the threshold (13 percent) as in the CPI-U (7 percent). The other large difference is the share or relative importance for other goods and services: 16 percent in the threshold as compared to 38 percent in the CPI-U.

Table 6. Threshold Shares and CPI-U Relative Importances: 2003

	FCSUM-R	CPI-U
Food	0.246	0.154
Clothing	0.052	0.040
Shelter	0.352	0.299
Utilities	0.125	0.071
Medical	0.068	0.061
Other	0.156	0.376

5. Conclusions

The thresholds presented in this study, unlike the official thresholds, reflect recent spending and consumption needs in levels and patterns. They account for changes in living standards over time, unlike the official measure. A focus on meeting spending needs versus consumption needs dictates which threshold is more appropriate. Both types have been produced in this study. The thresholds produced follow the same procedure over the 1993-2003 period. This is the most recent series of thresholds available that uses the same method over time. The

results presented reveal thresholds that have been increasing at a faster rate than official poverty thresholds. This is not surprising given the different assumptions underlying the NAS approach and the official measure.

The NAS-based thresholds in this study represent the best that could be produced at this time. However, refinements could be made. More research is needed regarding equivalence scales and how best to account for medical care needs in the thresholds. The question of how and whether to adjust the thresholds for differences in living costs across geographic areas was not addressed in this study. Yet, the NAS Workshop participants indicated that this is an important topic for continued work.

Other topics that need further thought and consideration are whether spending or consumption should be the underlying concept driving the choice of poverty measurement and deciding whose experience updates are to represent. Regarding this last point, are strictly price changes faced by the average consumer (as in the official poverty measure where the change from year to year only reflects changes in prices) the only relevant issue in producing thresholds, or are the changing levels of living of particular families or households important. This latter issue is left to policymakers.

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A summary of the CNSTAT workshop is presented in a National Research Council report (2005).

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