

Where Do We Stand in Measuring Medical Care Needs for Poverty Definitions?

A Summary of Issues Raised in Recent Papers

By

Jessica S. Banthin, Ph.D.
Director, Division of Modeling and Simulation
Center for Financing, Access and Cost Trends
Agency for Healthcare Research and Quality
Rockville, MD

June 2004

The views expressed in this paper are those of the author and no official endorsement by the Agency for Healthcare Research and Quality or the Department of Health and Human Services is intended or should be inferred. This paper has benefited from discussions with Kathleen Short but the recommendations, and any errors and omissions are my own.

Introduction

The latest Census reports on poverty in the U.S. include three different methods of incorporating medical care needs into poverty measures. These three different measures reflect the range of workable approaches to the problem of incorporating medical care needs and include two opposing methods, one method that deducts medical expenses from incomes and another that incorporates medical expenses into poverty thresholds. When the National Research Council (NRC) first recommended that the official poverty measure be revised in their 1995 report, it marked the beginning of a new area of research on the impact on poverty rates of different methods of accounting for medical care needs. Although total consensus on how best to incorporate medical care needs into a revised poverty measure remains elusive, we have made substantial progress in understanding the measurement issues.

The difficulty in achieving consensus on this issue stems, in part, from the difficulty in measuring medical care needs when the distribution of out of pocket medical care expenditures is so skewed. Researchers continue to debate whether the poverty measure should include *actual* or *expected* medical expenditures. Actual out of pocket expenditures are much less than expected out of pocket expenditures for most of the population. But for a few of the top spenders, actual out of pocket expenditures are much greater than expected. Furthermore, it is not clear what is the most reasonable way to measure expected out of pocket medical expenditures if that is what the measure should include.

Another reason for the lack of consensus on how to incorporate medical care needs, however, stems from the fact that there the latest estimates from the Medical

Expenditure Panel Survey find that 47.3 million persons in the U.S. were uninsured in the first half of 2003. Moreover, there were 31.5 million persons uninsured for the full year, 43.8 persons uninsured for the first half, and 61.7 persons uninsured at some time during the year 2000, according to the MEPS. How do we account for their health care needs when there is plenty of evidence to show that the uninsured forego needed health care services because they can't afford them? A poverty measure based on actual spending patterns would be biased in its classification of this group.

Despite the lack of consensus on how to incorporate medical care needs into a unified measure of poverty, however, I am going to draw some positive conclusions from the progress that we have made so far. First of all, there is agreement among researchers and government analysts that it is most practical to measure medical care needs using data on out of pocket expenditures for health insurance premiums, medical care goods and services. There is a consensus that attempts to measure the total value of public or private insurance and add that value to family resources is not justified.

Second, there is also agreement among researchers that there are essentially two main approaches to incorporating medical care needs into poverty measures. The first approach is the one recommended by the NRC whereby medical out of pocket expenditures are deducted from income before comparing a family's resources to the poverty thresholds. In the NRC method it is *actual* rather than *expected* medical out of pocket expenditures that are deducted from income and medical care needs are not included in poverty thresholds. The alternative approach, favored by many economists, is to include some measure of *expected* medical care needs in poverty thresholds and compare family incomes to these thresholds to determine poverty status. The Census

Bureau has also produced a third method that combines these two approaches but I will defer discussion of that method to later in this paper.

Instead of debating which is the better approach to incorporating medical care needs into poverty measures, or offering yet more alternative methods, I would like to use this paper to do two things. First, I will review some of the pros and cons of the two main approaches to accounting for medical care needs with references to recent research on this topic. This summary is not comprehensive but touches on the main themes of past research. Second, I would like to return to some of the more technical issues that arise if and when either approach becomes accepted and is computed consistently year after year and applied to other data sets.

The debate concerning the best method of accounting for medical care needs in poverty measures is greatly clarified by the use of a common terminology. Along these lines I will adopt the terminology used in the Census reports which refers to medical out of pocket expenditures as MOOP and establishes shorthand acronyms for the three methods (MSI, MIT, and CMB). Furthermore, I will also use terminology that contrasts the two methods in terms of their reliance on *actual vs expected* medical out of pocket expenditures. Actual MOOP refers to methodologies that replicate the full distribution of MOOP as reported in the household surveys, including many families with zero expenditures as well as a few families with expenditures that are many times greater than

the mean.¹ Expected MOOP, on the other hand, refers to a predicted or mean level of MOOP.²

MSI: MOOP Subtracted from Income

The original method for imputing medical out of pocket (MOOP) expenditures to families in the CPS was developed for the NRC report using data from the 1987 National Medical Expenditure Survey (NMES). Some of the steps in the original methodology, such as inflating the aggregate level of MOOP to compare with benchmarks from the National Health Accounts, have since been reconsidered and rejected. There is now agreement among researchers that MOOP should not be treated differently than other types of expenditures in terms of benchmarking to aggregate national control totals. The only inflation of MOOP that is now done is to account for changes in costs of medical care between the year when MOOP data was collected and the year of the Current Population Survey (CPS) data to which it is imputed.

The basic technique of assigning values of MOOP to families in the CPS based on a regression model designed to replicate the full distribution of actual MOOP remains the same, however. The major change is that current Census reports have switched to data from the Consumer Expenditure survey (CES) instead of data from the 1987 NMES or its successor the Medical Expenditure Panel Survey (MEPS). In this section I will focus on the method of imputing MOOP expenditures and reserve my comments on the best data source for a later section of the paper.

¹ David Betson draws a distinction between actual MOOP and reported MOOP in his discussed on the under-reporting of medical expenditures that is typical of household surveys. In this paper I am going to assume actual equals reported.

² Richard Bavier uses a different terminology which can confuse our discussions so I will translate his term family-specific into actual MOOP and family-type into expected MOOP.

To assign MOOP, families are first divided into elderly and non-elderly determined by the age of the family head. Non-elderly families are divided into 36 family types based on insurance status (private, public, uninsured), family size (1, 2-3, 4 or more), poverty status (above or below 150%), and race (Black and all other). Elderly families are divided into 8 family types based on age (65-74, 75 or older), family size (1, 2 or more), and poverty status (below or above 150% of poverty).

After dividing the sample into 44 family types, positive MOOP values are assigned using a regression model based on a cubic log-logistic function and a random component. Zero MOOP values are assigned by family type using a random process. As mentioned above, the model was developed to replicate as closely as possible the highly skewed distribution of MOOP, including the unexplained variance.³ Betson (2001) finds that this model fits the data very closely although he makes some recommendations for minor improvements to capture the distribution more exactly.⁴

The advantage of this method is that it replicates the full distribution of actual MOOP. The weakness is that the independent variables used in the model are limited to a small set that includes age, family size, insurance status, poverty status and race. Furthermore, the independent variables are treated as categorical variables and limited in their variation to two or three categories. Betson (2001) discusses how important it is for the imputation model to maintain the covariance between MOOP and other characteristics and mentions education in addition to age. But the current model does not

³ Although there is a large and growing literature within health economics on the best models to use for predicting health expenditures given the highly skewed distribution and the presence of many zeros, this literature does not provide much guidance in modeling the whole distribution. For example, there is also general agreement among health economists that these models explain at most about 25% of the total variance.

⁴ Betson (2001) recommends that imputed MOOP levels be limited to the lower 99% of the estimated MOOP distribution.

support the inclusion of education categories, presumably because it would create too many family type categories some of which would contain insufficient numbers of observations.

I would like to point out that the Betson model is essentially equivalent to a statistical matching model which uses the same variables identified above to define the classes or cells. Such statistical matching models are often referred to as “hot decking” when one is imputing within one dataset or “cold decking” when one is imputing from one dataset to another. Because of increased computer capacity these statistical matching models are much easier and faster to implement than they were ten years ago. Hot decking is a method widely used throughout government statistical agencies as one of the primary methods for imputing for missing values, for example. Hot decking or cold decking has the advantage of replicating the full distribution without forcing the data into a particular functional form. When it is well designed, it is a method that achieves the dual goals that Betson identified in his method: replicating the full distribution and preserving important correlations between the variable of interest and its determinants. One of the key steps to designing a good cold deck or statistical match model involves identifying the “class” variables that determine how the data sets will be divided into cells. A statistical match is potentially no better or worse than the current method except that it may be easier to implement as well as more transparent in its design. Depending on the size of the imputation data set as well as the set of common variables across the two data sets, a cold deck method can potentially accommodate more class variables and more categories within class variables than in the current imputation model.

Along these lines, it is also worth re-examining the variables used in the current model, specifically the use of race. Race is currently used to divide families into two categories: Black and all other racial types. Although race may have statistically significant coefficients in a multivariate model that predicts MOOP, it does not follow automatically that we should use this variable to impute MOOP values. Implicitly, the current MSI methodology has created two sets of poverty thresholds, one for black families and one for families of other racial categories. I would recommend that we eliminate race and substitute education or health status categories or allow for finer categorization of age and family size.⁵

Another criticism of the MSI method is its treatment of uninsured families. The MSI method implicitly assumes that all expenditures for health care are necessary and adequate. Since insurance status is one of the main classifying variables used to define family types for which the regression model imputes MOOP, this means that uninsured families are imputed levels of MOOP based on their expenditures despite the widespread research evidence that these families forego needed health care services because they cannot afford them.⁶ For example, an uninsured family near the poverty line may be classified as non-poor under the MSI method because their expenditures on health care are relatively low. Had they purchased a health insurance policy, however, they would have been classified as poor.

Finally, another question arises about how the MSI method would account for changes in poverty rates over time. This is an important question raised in Burtless and Siegel (2001). If we deduct MOOP from resources and one group, such as the elderly,

⁵ Health status could be supported if the model matched MEPS to CPS data.

⁶ Ayanian, et al (2000); Baker, et al (2000); Schoen and DesRoches (2000).

are spending increasingly more than other groups on health care over time, the MSI methodology can exhibit the perverse result of increasing poverty rates among the elderly while they simultaneously enjoy increasing health benefits and increasing longevity. Of course, this concern applies to the alternative MIT method as well, but the effects over time of increased spending by one group such as the elderly would be somewhat attenuated when expected MOOP rather than actual MOOP was incorporated into poverty measures. Before either the MSI or the MIT methods are officially adopted it is important to see how they behave over relatively long periods of time.

MIT: MOOP Incorporated Into Thresholds

The alternative method to MSI is the method referred to as MIT - to incorporate some expected amount of MOOP into poverty thresholds. One of the advantages of this approach is that medical out of pocket expenditures are treated like all other expenditures and incorporated into the poverty thresholds, which represent some minimum level of necessary resources. Another advantage is that MIT can be adjusted for the under-consumption of medical care by the uninsured. The thresholds can be adjusted to reflect the minimum resources needed by an uninsured family to buy a health insurance policy or to buy adequate health care services.

In recent work by Short and Garner (2002) they find that for year 2000 the MIT method produces higher overall poverty rates than MSI and that elderly poverty rates are relatively lower under MIT compared to MSI (14.2 vs 16.6 percent), although both are higher than the official rate (10.2 percent). In addition, they find that child poverty rates are relatively higher under MIT than MSI (15.8 vs 14.6 percent), although both are lower

than the official rate (16.1 percent). This is an important difference between the two methodologies that for some researchers and policy makers increases their confidence in the MIT method. It appears that using expected MOOP rather than actual MOOP reduces some of the differences in consumption of medical care between the two population subgroups.

The original criticism of the MIT method is that using expected rather than actual medical out of pocket expenditures would result in erroneous poverty classification. This is because expected or average MOOP would overestimate the costs for many families and underestimate the costs for a few families. Though true, it is not clear why this reasoning should apply only to medical care costs and not housing costs. Bavier has shown that *actual* housing costs, which consumer a much larger share of most families' budgets than medical care costs, also vary much more widely than *expected* or average housing costs.

Applying Alternative Poverty Measures to Other Datasets

One of the issues common to any method of incorporating medical care needs into poverty measures is how easily can such a new method be applied to other datasets. Researchers using other datasets very often want to assign poverty status to the individuals and families in their data. Currently, the only information required is family income, family size, and age of household head. Alternative poverty measures that account for medical care needs would require insurance status and out of pocket medical expenditures. Health status might also be required. Since most other survey datasets do not collect medical out of pocket expenditures, however, applying the MSI method would

require a table containing imputed “actual” MOOP to deduct from each family in these other datasets. In effect, this table would contain numerous cells varying by age, family size, insurance status, and other variables. Within each cell would be an imputed value of MOOP for researchers to assign to the families in their datasets. This table would be necessary because of the difficulty for researchers to replicate the assignment of actual MOOP that underlies the MSI method. Thus, one of the original criticisms of the MIT method that it would generate too many separate poverty thresholds, is not limited to this method, but in fact applies to both the MIT and the MSI methods.

The MIT method would be easier to apply to other datasets since MOOP would already be incorporated into the poverty thresholds. The thresholds, however, would likely be much more numerous and would vary by additional variables than just the current age and family size.

The Medical Expenditure Panel Survey (MEPS)

Before concluding, I would like to bring to your attention some recent improvements in the Medical Expenditure Panel Survey (MEPS) that would make it very attractive to use in future improvements to both the MSI and the MIT methods for incorporating medical care expenditures into poverty measurement. The MEPS is designed as an overlapping two year panel design. Each year a new sample is begun while the sample from the year before continues to be followed. The samples are drawn from the NHIS and contain nearly 200 primary sampling units. The MEPS 2001 sample includes about 13,500 households and beginning in 2002 the sample includes about 15,000 households or 37,000 persons. Furthermore, sample sizes can be increased by

pooling years of data together. Weights and sampling variables are published that support pooling.

Most people are familiar with the fact that the MEPS collects detailed information on health care expenditures including out of pocket expenditures. In the early years, 1996-1999, there was significant non-response in the collection of premium data from employers. Furthermore, data collected from employers was confidential and only available in the AHRQ data center.⁷ Starting in 2001, however, the MEPS collects out of pocket premiums (or premium contributions) directly from household respondents and these data are released annually. Also, starting in 2002 there has been improvements in the quality of income data collected from the elderly. All of these data are released as public use data files on a regular basis that OMB has approved. For example, the “full year” file for 2002 will be released in December 2004.⁸ This schedule will continue to be followed in coming years.

This means that the MEPS now collects all the information needed to construct reliable estimates of MOOP for family types that match what can be measured in the CPS. A statistical match could be performed using more than 42 family types used in the Betson imputation method. Family units are identified in MEPS that match the definitions used in the CPS. For example, insurance status might be expanded to include those with private non-group insurance who often pay very high premiums. Family size, age and income categories might be expanded while additional variables such as

⁷ The data collected in the MEPS employer survey was confidential because of legal agreements between AHRQ and the Census Bureau. Census wouldn't let us release employer data based on their confidential sampling frames.

⁸ Data files are published one year after the conclusion of data collection. For the MEPS Household Component, data files are published one year after the conclusion of the health care provider followback survey to verify payments.

education and health status could also be incorporated. Health status is collected in both the MEPS and the CPS.

Conclusion

In conclusion, I think that the Census Bureau should continue to publish both the MSI and the MIT methods for a few more years before deciding which one is preferred. In the meantime, it makes sense to improve the methods for calculating both measures on a regular basis and consider using statistical match techniques along with improved data from the MEPS. Updating the MOOP estimates over time, as health care expenditures grow faster than other types of expenditures, is an important issue in the calculation of both of these methods. Regular updates make sense when medical care inflation exceeds total price inflation.

References

- Ayanian, John S., Joel Weissman, et al. 2000. Unmet Health Needs of Uninsured Adults in the United States. *Journal of the American Medical Association* 284(16):2061-2069.
- Baker, David W., Martin F. Shapiro, and Claudia L. Schur. 2000. Health Insurance and Access to Care for Symptomatic Conditions. *Archives of Internal Medicine* 160(9):1269-1274.
- Banthin, Jessica, Thesia Garner, and Kathleen Short. Medical Care Needs in Poverty Thresholds: Problems Posed by the Uninsured. Presented at the American Economic Association meetings (January 2001). *Poverty Measurement Working Paper*. U.S. Census Bureau, 2001.
- Bavier, Richard. Personal communication. April 2004.
- Betson, David. Imputation of Medical Out of Pocket (MOOP) Spending to CPS Records. January 2001. *Poverty Measurement Working Paper*. U.S. Census Bureau, 2001.
- Burtless, Gary and Sarah Siegel. Medical Spending, Health Insurance, and Measurement of American Poverty. August, 2001. *Poverty Measurement Working Paper*. U.S. Census Bureau, 2001.
- Schoen, Cathy and Catherin DesRoches. 2000. Uninsured and Unstably Insured: The Importance of Continuous Insurance Coverage. *Health Services Research* 35(1):187-206.
- Short, Kathleen and Thesia I. Garner. Experimental Poverty Measures: Accounting for Medical Expenditures. *Monthly Labor Review*. August 2002.