Multi-dimensional Poverty in the U.S.

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Abstract

Measuring poverty using multiple dimensions of deprivation provides a more complete picture of poverty since the poor are not only those who lack income but also those who lack the capability to lead a normal, decent life. Typically, the deprivation dimensions and the indicators included in the global multidimensional poverty index are chosen to measure well-being in *developing* countries; less is known about multidimensional poverty in *developed* nations such as the U.S. In this paper we develop measures of multi-dimensional poverty uniquely suited to the United States of America (U.S.). The deprivation dimensions and thresholds for the proposed multi-dimensional poverty measures are chosen with reference to the standard of living in the U.S. We use data from the American Community Survey (ACS), 2011, and estimate indices of multidimensional poverty which provide a more complete picture of poverty and deprivation compared to the official poverty statistics.

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"Poverty" is an inherently vague concept, and developing a poverty measure requires a number of relatively arbitrary assumptions.--Blank, 2008.

Introduction

This paper measures multidimensional poverty in the United States of America (U.S.). Measuring and characterizing poverty using multiple dimensions of deprivation provides a more complete picture of poverty since the poor are not only those who lack income but also those who do not possess minimally acceptable standards in a number of dimensions of economics wellbeing.

The official U.S. poverty measure provided by the U.S. Census Bureau (the Office of Management and Budget's Statistical Policy Directive, 1978) is measured in terms of income deprivation. However, as is recognized, cash income and hence the income poverty measure fails to capture a number of aspects of economic well-being. Amartya Sen (2006) has long argued that while income is one of the sources of adequate living, a variety of other aspects of life quality are also relevant. In Sen's view, an individual's well-being comes from his/her "capability" of adequately functioning in one's society. Hence, in defining and measuring this capability, it is necessary to make judgments regarding what aspects of life are relevant for adequate functioning and a minimally acceptable standard for each of these aspects. The capabilities approach treats poverty as lack of a set of endowments (e.g. education or health) rather than a lack of money income that these endowments might have generated (Grusky and Kanbur, 2006). Although this capabilities approach to individual well-being and poverty measurement is appealing, it is difficult to implement in practice.

In this paper, we provide first estimates of a U.S. based multidimensional poverty index (US-MPI). Our US-MPI is based on a methodology developed by Alkire and Foster (2011a, AF methodology henceforth). An important property of the MPI based on the AF methodology is that it identifies multiple deprivations experienced by an individual in different realms of well-being. Thus it takes into account

the joint distribution of deprivations. The AF method gained prominence among other methodologies due to its adoption by the United Nations Development Program (UNDP) in 2010 to estimate a global multi-dimensional poverty index (UNDP-MPI), which is now published annually in the Human Development Report. Our estimate of the U.S. based multidimensional poverty index (US-MPI) uses micro level data from the 2011 wave of the American Community Survey (ACS). We also conduct a sensitivity analysis of our US-MPI estimate. Estimating the US-MPI following the AF method involved several choices including selecting well-being indicators, threshold values within indicators, choice of minimum number of indicators, weights attached to the indicators and so on. Hence we treat our baseline US-MPI as a "benchmark" value. Keeping all other choices intact, we change one choice at a time, and calculate the sensitivity of the US-MPI value to that particular choice. We thus provide the readers a range of likely MPI values for the U.S.

The remainder of the paper is structured as follows. Section 2 contains a brief review of the different poverty measures estimated in the U.S; Section 3 contains a review of different multidimensional measures estimated internationally. In Section 4, we discuss the AF methodology, formulate the MPI and list step-by-step, the numerous choices a researcher has to make in order to estimate the MPI. Results of our estimates of the US-MPI are discussed in Section 5. The sensitivity of the US-MPI to the different choices made is conducted in Section 6. And a summary of conclusions and future extensions is provided in Section 7.

2. U.S Poverty Measures

2.1. Official Poverty Measure

The official poverty measure dates back to Orshansky (1965) who constructed poverty thresholds by calculating the cost of food budgets; the poverty threshold was taken to be three times the family food budget. For a household to be 'poor', annual cash income (earnings, pensions, interest, rent, assets and

cash welfare) must be less than the poverty threshold. The thresholds vary by family size and composition, and are updated for inflation using the Consumer Price Index (CPI).

The drawbacks of the official poverty measure have been well documented (Iceland, 2005). The definition of money income does not capture a family's purchasing power, and excludes non-cash income transfers such as food stamps, housing subsidies, and the Earned Income Tax Credit which form a large share of the government's antipoverty efforts (Smeeding, 1982 and Ruggles, 1990). The income definition also fails to reflect taxes paid, transportation costs to get to work, and cost of child care, all of which reduce the discretionary income of a family. The poverty thresholds are outdated. With rising costs of housing, clothing, food expenditure comprise far less than one-third of the total families' expense. Thresholds do not vary spatially though costs of living differ drastically across states and within states among rural and urban cities.

2.2. Alternative Poverty Measures

In the early 1990s, the National Academy of Sciences (NAS), formed a panel on Poverty and Family Assistance in order to address the shortcomings of the official poverty measure. Following the recommendations of the 1995 report (Citro and Michael, 1995), the Census Bureau published a series of experimental poverty measures (Short et al. 1999).[1] In 2010, an Interagency Technical Working Group recommended a Supplemental Poverty Measure. The supplemental measure differs from the official poverty measure by taking into account household expenses such as taxes, housing, utilities, health care and child support costs and including government in-kind support, such as school lunch programs, housing subsidies, and food stamps. The poverty thresholds in the supplemental measure vary by geography, family size and whether a family pays a mortgage, rents or owns their home.

[1] For instance, experimental poverty measures based on internally consistent poverty thresholds (Garner and Short, 2010) or thresholds adjusted for medical out-of-pocket spending (Betson and Warlick, 2006) were proposed.

In addition to income, absolute poverty in the U.S. has also been measured in terms of consumption expenditure (Meyer and Sullivan, 2012), earnings capacity (Haveman and Bershadker, 2001), wealth (Azpitarte, 2011) and assets (Haveman and Wolff, 2004). The official measures as well as most of the alternatives suggested differ in their definition of thresholds and measurement of economic resources. In all cases, the income, expenditure, or wealth measures are indirect and inadequate indicators of an individual's capabilities. The capability approach argues that poverty is a lack of an individual's ability to lead a fully functioning life.

Finally, there is a related set of studies that directly observes deprivation in various aspects of material well-being, and constructs a poverty measure based on these. These studies of U.S. material hardship typically use data from the Survey of Income and Program Participation (SIPP), a longitudinal survey conducted by the Census Bureau to collect information on several aspects of material well-being, including ownership of consumer durables, housing quality, neighborhood quality, diet adequacy, perceived access to medical care, expenditures for current consumption and the existence of informal support networks (e.g. Beverly 2001, Carle et al. 2009). Some set of these factors are taken into account in measuring poverty based on material hardship. Like the official and other proposed measures, observed material deprivation poverty only captures some of the factors that reflect individual and household capability. The MPI is distinct from poverty measures based on material hardship. While material hardship measures are able to capture deprivation in material possessions such as basic consumer durables (e.g., refrigerators, telephones, washing machines and a number of housing conditions), these measures fail to reflect a variety of non-material capabilities such as health outcomes, employment status and level of education. The US-MPI measure that we estimate takes into account such non-material capabilities. Moreover, while there is no commonly accepted definition of material

hardship on which material hardship poverty measures rest (Ouellette et. al. 2004), our estimate of US-MPI rests on an axiomatic approach described in Section 4.[2]

3. Measures of Multidimensional Deprivation

An early attempt at measuring well-being on a global scale was undertaken by the UNDP in the form of the Human Development Index (HDI). Begun in 1990, the annual Human Development Report (HDR) ranks countries by the HDI which measures a country's achievement in social and economic development; in particular, the HDI is a weighted (geometric) average of national estimates of life expectancy, educational attainment and income.

Between 1997 and 2009, the UNDP also published a deprivation index called the Human Poverty Index (UNDP-HPI). The UNDP-HPI aggregated deprivations in health, education, and standards of living and was estimated separately for developing (HPI-1) and developed countries (HPI-2).

In 2010, the UNDP's Human Development Reports replaced the UNDP-HPI by estimates of a multi-dimensional poverty index (UNDP-MPI). The UNDP-MPI, also referred to as an index of acute poverty, measures an individual's inability to meet simultaneously minimum international standards in indicators related to the Millennium Development Goals (Alkire and Santos, 2013b). It identifies deprivations in ten indicators spanning the health, education and standard of living dimensions, and estimates the number of people who are multi-dimensionally poor.[3] The 2013 Human Development Report estimated that 30 percent of the population in the 104 poor and middle-income countries covered in the UNDP-MPI lived in multidimensional poverty between 2002 and 2011 based on country-

[2] In addition to the axiomatic approach, other prominent methodologies in the literature include the latent variables analysis, factor analysis, fuzzy set and information theory have also been used to formulate multidimensional deprivation measures (see Kakwani and Silber, 2008, for a summary).

[3] An individual is identified as multidimensionally poor if the individual is deprived in some combination of indicators whose weighted sum is 33 percent or more. For example, the UNDP-MPI uses indicators such as, type of cooking fuel used, access to safe drinking water and electricity, and whether the house has a dirt, sand or dung floor

specific data.[4]Table 1 provides a summary of the indicators used to measure the UNDP-HDI, UNDP-HPI-2 and the global UNDP-MPI.

Less is known about multidimensional poverty in *developed* countries such as the U.S. In this paper, the deprivation dimensions and thresholds for the multidimensional poverty index are chosen with reference to the standard of living in the U.S. For instance, we choose indicators such as employment status, health insurance coverage, a house equipped with kitchen and plumbing facilities which better reflect the standard of living in a developed country than those more rudimentary indicators used in the UNDP-MPI (See note 4). The UNDP-MPI is severely restricted by compatibility of cross-country data. Few countries have personal data, so the UNDP-MPI estimates rely on household data to assign individual values; moreover, the UNDP-MPI relies on aggregate national income data rather than information on individual personal income. By using the ACS data on both households and personal records and information on personal income, we are able to overcome both of these drawbacks.

In addition to these global estimates of multi-dimensional poverty, a few studies have attempted to estimate MPI for developed countries. Wagale (2009) estimates capability deprivation by using approaches different than the AF method--namely, the fuzzy set and the (relative and absolute) factor analysis. He uses data on educational attainment and degree, health condition, and occupational prestige as capability indicators from the general social survey (GSS). He finds that the magnitude of capability deprivation differed depending on the method used but in all cases, it was lower than that of income poverty and that capability deprivation in the U.S. decreased between 1994 and 2004. Whelan et. al. (2010) are the first to estimate the MPI for 28 European countries making use of the European

[4] The 2013 HDR reports MPI for 104 countries; only 8 of which are high-income countries, namely Croatia, Czech Republic, Latvia, Russian Federation, Slovakia, Slovenia, Trinidad and Togabo, and Uruguay. In addition to the HDR, an MPI has been independently estimated for a number of individual countries, most of which are developing nations. See Santos and Alkire (2013a) edited special issue which contains nine papers which have applied the AF methodology to measure multidimensional poverty in different developing countries.

Union Statistics on Income and Living Standards data for 2009.[5] They measure deprivation in four dimensions; namely, basic deprivation, consumption deprivation, neighborhood deprivation and health deprivation using 20 non-monetary indicators (see Table 1). Within the European Union, they find that basic and consumption deprivation are more prominent in the less affluent European countries whereas relative income poverty and health are the key dimensions of poverty in the more affluent countries. Compared to the standard relative income poverty approach, the MPI identifies a non-trivial minority as poor in each of the countries covered. A second study is by Alkire and Foster (2011a) and is designed to exemplify application of the AF methodology to the U.S. and Indonesia. For the U.S., they use data from the 2004 National Health Interview Survey conducted by the U.S. National Center for Health Statistics on four indicators, namely, income measured in poverty line increments, self-reported health, health insurance, and years of schooling.

4. The Multidimensional Poverty Index for the U.S. (US-MPI)

4.1. The AF Method for Estimating Multi-dimensional Poverty

The AF method generalizes standard income poverty measures—namely, the headcount ratio, the poverty gap and the squared poverty gap (Foster et al. 1984)—and proposes their analogs in a multidimensional setting. The headcount ratio for instance, is referred to as the adjusted headcount ratio in a multi-dimensional context. The MPI is a special case of the adjusted headcount ratio.

The MPI formulation based on the AF method has several advantages. First, while multidimensional measures such as the Human Development Index (HDI) calculate the percent of individuals deprived in each dimension and then aggregates the dimensions, the MPI based on the AF methodology rests on the joint distribution of deprivations. In particular, the AF-based MPI is calculated by first aggregating dimensions for each individual and then aggregating individuals. Thus the MPI tracks the same individual

[5] 26 countries in the European Union; Sweden is excluded and Norway and Iceland are included.

across multiple dimensions and counts the number of deprivations simultaneously experienced by an individual. Second, the AF-based MPI can be estimated using categorical, ordinal and cardinal data on continuous variables whereas most of the prevailing deprivation indices use only ordinal, discrete data. Third, the MPI satisfies desirable axiomatic properties: i) deprivation monotonicity: if a poor person becomes deprived in an additional indicator, the MPI will increase ii) subgroup decomposability: the overall index can be expressed as the population-weighted sum of subgroup indices, say for different races, thus making possible deprivation comparisons across groups, iii) decomposition by indicators: it can be broken down to measure the contribution of a specific indicator in overall deprivation. Like any other measure, the MPI has its own drawbacks. For instance, it ignores information about individuals who are not deprived in a dimension (Thorbecke, 2011), it uses arbitrary weights and disregards price information while aggregating across dimensions (Ravallion, 2011).[6]

4.2. Formulation of the US-MPI

Let $i = 1,2, \dots n$ be the number of individuals. We wish to measure deprivation of each individual in multiple dimensions, $l = 1, 2, \dots L, L \geq 2$. Indicators representing various dimensions are denoted by $j = 1,2, \dots d, d \geq L$. Let w be a $(1xd)$ weighting vector for each indicator such that $\sum_{j=1}^{d} w_j = 1$. For the sake of notational simplicity, assume weights are attached only to the indicators and that each indicator carries equal weight, as in UNDP-MPI $w_j = \frac{1}{d}, j = 1,2, \dots d$. Let y_{ij}denote the achievement of individual i in indicator$j$ so that y is an (nxd)achievement matrix. Vector z, $(1xd)$ contains pre-determined poverty thresholds z_j for each indicator j. Specifying a poverty threshold for each indicator denotes the first of the two-step identification process. The next step is to define the minimum number of weighted indicators $(0 < k \leq 1)$ in which if an individual is deprived, she will be identified as being in multidimensional poverty.

[6] See the special issue of *Journal of Economic Inequality* (Lustig, 2011), for details on the debate over the MPI.

For any given achievement matrix y, let g^0 denote the (nxd) matrix of deprivations. If an individual is deprived in any indicator j, i.e. $\left(y_{ij} < z_j\right)$ then her deprivation score is $g_{ij}^0 = 1$; else the score is equal to zero. The weighted sum of indicators in which an individual is deprived is given by $c_i^0 = \sum_{j=1}^{d} w_j g_{ij}^0$ and belongs to the $(nx1)$column vector c^0. Each individual is identified as being multidimensionally deprived if her weighted deprivation score is at least equal to k.[7] The $(nx1)$column vector$c^0(k)$ depends upon the value of k, and contains the truncated deprivation score of each individual, $c_i^0(k) = c_i^0$ if $c_i^0 \geq k$ and $c_i^0(k) = 0$ otherwise. Finally, the deprivation scores for all individuals, are aggregated in the MPI, which is defined as $M_0 = \frac{1}{n}\sum_{i=1}^{n} c_i^0(k)$.

The MPI is an adjusted headcount index and can be expressed as a product of two indices $M_0 = H.A$: i) the headcount ratio which gives the incidence/percentage of people who are poor $H = \left(\frac{q}{n}\right)$, where $q$is the number of poor identified using the dual cutoff approach and ii) the average intensity of deprivation $A = \frac{1}{q}\sum_{i=1}^{n} c_i^0(k)$ – which reflects the proportion of dimensions in which poor individuals are deprived. By adjusting the incidence of multidimensional poverty by the intensity, M_0 satisfies dimensional monotonicity: if a poor person becomes deprived in an additional indicator, then A rises and so does M_0.

4.3. Data used

The US-MPI is calculated based on data on the joint distribution of the various deprivation indicators and hence requires data to originate from the same survey for each individual. We estimate the MPI by using micro data from the 2011 wave of the American Community Survey (ACS). The ACS is currently the largest U.S. household survey and provides reliable data on numerous socio-economic characteristics of households. The ACS selected samples in *all* counties across the nation, and all municipios in Puerto

[7] If there is an indicator $(j = s)$ of high significance, in the sense that we want to make sure that any individual who is deprived in that particular indicator should always be included in the poor, then the deprivation score for that indicator can be assigned such that $(g_{is}^0 \geq k)$.

Rico. We use one-year estimates from Public Use Microdata Sample (PUMS) files which provide data from areas with population of 65,000 or more.[8] All individuals, 18 years old and above are included. Data on individual records is matched with data on individual's household characteristics; individuals living in group quarters are excluded.[9]

Compared to the Current Population Survey's (CPS) annual sample size of 100,000, the ACS covers about 3 million households every year. The CPS collects detailed information on more than 50 income types. The ACS, on the other hand, collects fewer details on income but is more focused on collecting information on demographic, social, economic, and housing characteristics of the sample population. Table 2 provides a list of the dimensions, indicators, their thresholds and weights chosen to measure the benchmark US-MPI. Below we discuss each of these choices; additional details are provided in the Appendix.

4.4. Choices Made

4.4.1. Dimensions: We measure deprivation in four dimensions: health, livelihood, standard of living and housing. The HDR clearly defines human development as a process of 'enlarging people's choices', though the precise articulation of the concept varies in each report. However, every HDR from 1990 to 2009 mentions health, education and living standards (Alkire, 2010). Not surprisingly, these three dimensions have been used in almost all multidimensional poverty measures based on the AF method, such as the UNDP-MPI, the UNDP-HPI and the HDI to reflect an individual's capabilities. In addition to indicators in these three dimensions, we also include indicators on housing characteristics in order to measure the material deprivation experienced by a person.

[8] PUMS is a sample of population and housing unit records from the ACS; the 1-year ACS PUMS file represents about 1-percent of the total U.S. population or approximately 1.3 million housing unit records and about 3 million person records.

[9] Group quarters (GQ) include such places as college residence halls, residential treatment centers, skilled nursing facilities, group homes, military barracks, correctional facilities, and workers' dormitories. People living in GQ are usually not related to each other and survey values for GQs are often imputed. Hence we exclude all person records of individuals from GQ.

4.4.2. Indicators: Each dimension is measured by multiple indicators.[10] Given the constraints imposed by the ACS data, we chose indicators and their thresholds to reflect the quality of life in a developed country like the U.S.

Health:

We use two indicators to measure deprivation in this dimension, namely, health insurance coverage and disability status. Health insurance coverage includes programs that provide comprehensive health coverage.[11] A deprived individual lacks any health insurance coverage, private or public. Disability in the ACS is identified as serious difficulty with four basic areas of functioning – hearing, vision, cognition, and ambulation—supplemented by questions about difficulties with self-care such as difficulty in bathing and dressing, and difficulty performing independent errands such as shopping. An individual experiencing disability in any one of the six functional areas is considered deprived.

Livelihood:

The second dimension broadly reflects deprivation in the ability to earn a decent livelihood and is measured by indicators on schooling and employment status. Individuals who are 18 years old and over and who have not completed high school (12the grade) are treated as deprived.[12] Employment status was used as a measure of social exclusion in the UNDP-HPI; we use it as an indicator of the ability to earn a livelihood. The deprived individuals are those who are in the labor force but are "unemployed", i.e. individuals who (1) were neither "at work" nor "with a job but not at work" and (2) were actively looking for work during the last 4 weeks, and (3) were available to start a job.

Standard of living:

[10] While estimating the MPI, Alkire and Santos (2010) distinguish between dimensions and indicators whereas Alkire and Foster (2011a) make no such distinction and use indicators without classifying them in dimensions.

[11] Plans that provide insurance for specific conditions or situations such as cancer, long-term care policies and other types of insurance like dental, vision, life, and disability insurance are not considered health insurance coverage.

[12] Respondents who report completing the 12th grade without receiving a high school diploma, or those who received a regular high school diploma and did not attend college or those who received the equivalent of a high school diploma (G.E.D.) and did not attend college, are not considered deprived.

We measure an individual's standard of living by two indicators, namely, a person's poverty status, and her housing expenses. The poverty status is measured by the ratio of income to the poverty threshold. The income-poverty ratio is estimated by comparing a person's total family income in the last 12 months with the poverty threshold appropriate for that person's family size and composition as defined by the Census Bureau. Those individuals with the income to poverty threshold ratio less than 100 percent are counted as deprived. Selected monthly owner costs or gross rent as a percentage of household income provide information on the monthly housing expenses for residents.[13] An individual is deprived if the owner costs or gross rent in a year is greater than 30 percent of the household income.[14]

Housing:

In addition to housing expenses, data on a number of housing characteristics are used by the ACS to report selected conditions of housing units. A residence may lack complete plumbing facilities (e.g., hot and cold running water, or a flush toilet, or a bathtub or shower) or lack complete kitchen facilities (e.g., a sink with a faucet, or a stove or range, or a refrigerator). An individual living in a resident that lacks any one of the several kitchen and plumbing facilities is considered deprived. The ACS reports data on occupants per room by dividing the number of people in each occupied housing unit by the number of rooms in the unit. The ACS categorizes a crowded unit as one which has typically has more than one occupant per room. Following the ACS classification, an individual living in a crowded housing unit is considered deprived.

[13] Selected monthly owner costs are the sum of payments for mortgages, deeds of trust, contracts to purchase, or similar debts on the property (including payments for the first mortgage, second mortgages, home equity loans, and other junior mortgages); real estate taxes; fire, hazard, and flood insurance on the property; utilities (electricity, gas, and water and sewer); and fuels (oil, coal, kerosene, wood, etc.). It also includes, where appropriate, the monthly condominium fee for condominiums and mobile home costs (installment loan payments, personal property taxes, site rent, registration fees, and license fees). Gross rent is the contract rent plus the estimated average monthly cost of utilities (electricity, gas, and water and sewer) and fuels (oil, coal, kerosene, wood, etc.) if these are paid by the renter (or paid for the renter by someone else).

[14] The 30 percent cutoff is based on the criterion used by the ACS to measure "selected housing conditions," taken to provide information in identifying those homes in which the quality of living and housing can be considered substandard.

4.4.3. Thresholds: The AF methodology uses a dual cut-off approach when identifying the multi-dimensionally poor. The dual cut-offs comprise thresholds, both within and between dimensions. The first threshold is employed for each indicator within a dimension in order to determine whether a person is deprived or not. The second cut-off is applied to the number of indicators and/or dimensions which are counted towards identifying the poor. This second threshold specifies the minimum number of indicators in which a person should be deprived in order to be counted as multidimensional poor. One approach to addressing this dual cut-off issue is known as the "union criterion". This criterion identifies a person as poor if there is at least one indicator in which the person is deprived. This approach does not distinguish between the poor suffering from one and the poor suffering multiple deprivations; it is meaningful if achievement in each and every dimension is essential to be above poverty; otherwise it tends to overestimate poverty. The other approach is known as the "intersection approach." This approach identifies a person as being poor only if the person is deprived in all indicators. This approach is appropriate when achievement in any one indicator is sufficient to belong to the non-poor class. It does not identify persons deprived in most but not all indicators and tends to underestimate poverty. The AF methodology is a combination of the traditional intersection and union approaches and allows the researcher the flexibility to choose the number for the second cutoff. In the benchmark US-MPI, we identify individuals as deprived when they are deprived in two or more indicators--this is the second cutoff.

4.4. Weights: The weight attached to each dimension indicates the relative importance of the dimension in determining deprivation. Dimensional weights can be assigned by using different methods: value judgment, expert advice, prevalence rate, statistical analysis and so on. Even within each dimension, different weights can be attached to different indicators in order to reflect the relative importance of indicators in determining deprivation in that dimension. For the benchmark case, we follow the UNDP-MPI and attach equal weights to all indicators within each dimension and equal weights to all

dimensions. Having roughly equal weights across dimensions also eases the interpretation of the index for policy (Atkinson et al. 2002). Since all eight indicators are assigned equal weights, in the benchmark case, the second cutoff implies that the weighted score of deprivation for an individual should be ($k \geqslant 0.25$), for individuals to be counted as multidimensional poor.

5. Results

5.1. Deprivation in Different Indicators

Figure 1 shows the marginal distribution of deprivation in each indicator as in the joint distribution approach (often called the dashboard approach). The largest percent of individuals (26.2) incurred housing costs which were greater than 30 percent of their household income. Being deprived in the health dimension is also important; 18 percent of all individuals experienced at least one disability, and 15 percent had no health insurance.[15] Our estimate of 13.7 percent individuals being income poor is close to the Census estimate of 12.8 percent adults experiencing income poverty. The unemployment rate estimated at 6 percent is less than the 8.9 percent rate released by the Bureau of Labor Statistics (BLS), largely because of differences in which employment data is collected by the BLS and the ACS (for details see the Appendix). 12 percent of individuals above the age of 18 years did not complete high school (grade 12). Compared to education, health and standard of living, few individuals lived in overcrowded houses (4 percent) and yet fewer lived in houses lacking at least one of the several housing facilities (1.4 percent).[16]

In Table 3, we provide the correlation between deprivations in different indicators. As seen in the table, the correlation coefficients have rather low values--indicating that few individuals experienced overlapping deprivations. Of particular interest is the correlation of income poverty with

[15] Disability/difficulty distribution was: 11 percent-ambulatory, 7 percent-difficulty in independent living, 6 percent-hearing or cognitive, and 3 percent-vision or difficulty in self-care.

[16] Most individuals deprived (0.9 percent) had no running water, some (0.6-0.7 percent) had no bath or toilets, sink or a stove/range and very few (0.5) had no refrigerator.

other types of deprivations. If this correlation is high, the case for estimating a multidimensional poverty index is weakened—those who have low incomes are also poor in terms of housing, health, education and so on. However as seen from Table 3, the correlation of income poverty with other indicators is very low; the highest correlation value is 0.4 between income poor and those who have high housing costs.[17] This suggests that the U.S. income poverty measures perform poorly in identifying those who are deprived in terms of non-income dimensions such as education, health, employment and housing.

5.2 Estimate of a Benchmark US-MPI

Instead of calculating a weighted average of the percentages of each indicator given in Figure 1, the MPI counts multiple deprivations simultaneously experienced by an individual and calculates a weighted average of the joint deprivations. Recall that the MPI (M_0) is calculated as the average of the aggregate deprivation scores for all *n* individuals, $\left(M_0 = \frac{1}{n}\sum_{i=1}^{n} c_i^0(k)\right)$. The aggregate deprivation scores can be written as $\sum_{i=1}^{n} c_i^0(k) = \sum_{i=1}^{n}\sum_{j=1}^{d} w_j g_{ij}^0$, for a given threshold value k. In the benchmark case,$\left(w_j = \frac{1}{d} = \frac{1}{8}\right)$, hence the MPI can be written as$\left(M_0 = \frac{1}{nd}\sum_{i=1}^{n}\sum_{j=1}^{d} g_{ij}^0\right)$. Thus the benchmark US-MPI (M_0) for a given threshold of $\left(k \geq 0.25 = \frac{2}{8}\right)$) , is calculated as the proportion of deprivations that the poor experience ($\left(\sum_{i=1}^{n}\sum_{j=1}^{d} g_{ij}^0\right)$, out of all the total potential deprivations that ***society*** could experience (nd). The MPI is equal to 8.7 percent; it indicates that the poor (i.e. those deprived in 2 or more indicators) were deprived in 8.7 percent of deprivations out of total potential deprivations for the society. As noted in the previous section, the MPI can be expressed as a product of two indices$M_0 = H.A$, namely, i) incidence, i.e. proportion of individuals who were multidimensional poor $\left(H = \frac{q}{n} = 26.6\ percent\right)$and ii) average intensity $\left(A = \frac{1}{q}\sum_{i=1}^{n} c_i^0(k)\right) = 0.33$ i.e., the proportion of deprivations

[17] The literature on material deprivation too finds that the correlation between measures of material hardship and income poverty is not very strong in the U.S. (e.g. Rector et al., 1999, Bradshaw and Finch, 2003).

that the poor experience ($\left(\sum_{i=1}^{n}\sum_{j=1}^{d} g_{ij}^{0}\right)$, out of all the total potential deprivations that *poor* could experience(qd).

In Table 4, we compare the incidence of the US-MPI with alternative income poverty estimates for 2011. Setting aside the differences in datasets, methodology, sample size etc. used for different poverty measures, we see that measures solely based on income poverty estimate between 13 to 15 percent of the adult population as poor. However when we estimate multidimensional deprivation, we find that more than a quarter of the population (26.6 percent) was multidimensional poor.

5.3. Decomposition of the Benchmark US-MPI by Indicators

This decomposition enables us to measure the contribution of deprivations in a specific indicator in the MPI estimate. The censored headcount ratio is the percent of individuals who are deprived in that indicator after having applied the second threshold. For instance, 13.7 percent of the entire sample had income less than poverty line income (headcount ratio) but among the multidimensional poor (individuals who experienced more than one deprivation) 12.6 percent were income poor (censored headcount ratio). The percentage contribution of a given indicator is equal to the weighted censored headcount ratio of the indicator, where the weight attached is the weight of the indicator, divided by the MPI. Thus the contribution of income poverty in the MPI is equal to $\left(\frac{\frac{1}{8}x12.6}{0.087} =\right)$ 18.2 percent in the overall MPI.

Figure 2 shows the breakdown of the benchmark US-MPI by indicators and dimensions. The breakdown by indicator shows that housing costs (24.4 percent) and income poverty (18.2 percent) had high contributions in the overall US-MPI. Deprivation as in lack of health insurance (15.9 percent), having disability (15 percent) and not completing high school (13.4 percent) were moderate. Less important were contributions of indicators such as unemployment (6.6 percent), living in a crowded

house (4.7 percent) and lack of facilities in the house (1.7 percent). If we combine the indicators according to the dimensions (by color in Figure 2) and sum their contributions, we see that the contribution of deprivation in standard of living was the highest (42.5 percent), followed by contribution of health deprivation (31 percent), deprivation in means of livelihood (20 percent) and finally deprivation in housing (6.5).

6. Sensitivity of the US-MPI to Different Choices

Poverty is a vague notion and every poverty measure is based on some arbitrary choices made by the researcher (Blank, 2008). The researcher can justify the assumptions made on certain evidence in the literature, using some axiomatic framework and/or using empirical evidence, but ultimately the estimate is arbitrary. Hence, it is important to test the sensitivity of the poverty measure to a variety of alternative choices.[18] In this section we review the sensitivity of the benchmark MPI to the dual cut-offs used by the AF method, as well as to the weights applied to each indicator.

6.1. Sensitivity to the Indicator-Specific Thresholds

The first cut-off is employed for each indicator within a dimension in order to determine whether a person is deprived or not in terms of that indicator. There is a legitimate diversity of judgments regarding what would or would not count as a deprivation in a number of the indicators used. If small changes in any cutoff would lead to a considerable change in the MPI value, this should be made explicit and the accuracy of that cutoff closely examined (Alkire and Santos 2013). In this section, we review threshold values of a majority of indicators.[19] Note that we change a threshold value for one indicator at a time and keep all other thresholds for the benchmark US-MPI intact; in this way, we can isolate the

[18] In testing the sensitivity of the MPI, we follow the general framework laid down in Dhongde and Minoiu (2013) who test the sensitivity of global poverty estimates to underlying assumptions by using a benchmark measure and the effect of changing one assumption at a time.
[19] Two indicators, namely employment and health insurance, have yes or no type of information, so there is no scope to change the threshold values.

effect of changing a single indicator's threshold value on the benchmark US-MPI. For instance, in the benchmark measure, we use a threshold of not completing grade 12 for the years of schooling indicator. Keeping everything else constant, a lower threshold of not completing grade 9, results in the MPI (and percent of individuals deprived) decrease from 8.7 (26.6 percent) to 7.7 (24.2 percent) and a higher threshold of not receiving any post-secondary degree (associate, bachelors and higher) leads the US-MPI to increase to rise to 14.8 (44 percent).

Table 5 summarizes the results of sensitivity of the benchmark MPI to within-indicator thresholds. We find that the US-MPI is less sensitive to downward as opposed to upward revisions of the income poverty threshold. If we change the threshold of income to poverty ratio from less than 100 percent to less than 50 percent i.e. consider only the "acute poor", then the proportion of multidimensional poor decreases slightly from 26.6 to 24 percent, the MPI value decreases from 8.7 to 7.4. On the other hand, we can raise the threshold to 200 percent to include the "near poor", i.e. people who have income above poverty but less than 2 times their poverty threshold. In this case there is a significant rise in the value of the US-MPI from 8.7 to 11.5 and the percent deprived from 26.6 to 34 percent. Thus we notice that there were relatively fewer individuals just-below the poverty line and more individuals just-above the poverty line. Similarly, if we change the housing costs threshold (now set at more than 30 percent of household income) to a level that includes more people (e.g., costs more than 15 percent), the US-MPI estimate increases more than if the threshold is changed to include fewer people (e.g., costs more than 60 percent). For the remaining three indicators, i) number of disabilities, ii) lack of housing facilities and iii) occupants per room, we change the threshold from "one or more" to "two or more", and find that the US-MPI estimate decreases. The extent of decline is small due to the smaller contributions of each of these indicators to overall deprivation discussed in Section 5.3.

6.2. Sensitivity to the Threshold specifying the number of Indicators

The second cut-off counts those individuals as multidimensional poor if their weighted deprivation score is at least equal to k. Since each indicator carries equal weight in the benchmark case, the second cut-off $(k \geq 0.25)$ implies that individuals who are deprived in two or more of the 8 indicators (2/8= 0.25) are identified as poor. In Table 6, we estimate US-MPI values by varying the number of indicators specified as threshold from one to eight $(0.125 \leq k \leq 1)$. Recall that the MPI $(M_0 = H.A)$ is a product of the percent of deprived individuals (column 3) and their average intensity of deprivation (column 4). As the threshold value increases, the incidence of deprivation (column 4), i.e. the percent of individuals who are counted as multidimensional poor, decreases. Following the union approach if the poor are identified as those who are deprived in at least one indicator$(k \geq 0.125)$, then more than half of the sample, i.e. 54 percent individuals are identified as poor. It is not surprising that the percent of individuals identified as multidimensional poor decreases as we increase the deprivation cutoff; for instance 26.6 percent individuals are deprived in two or more indicators $(k \geq 0.25)$and 11 percent individuals are deprived in three or more indicators $(k \geq 0.375)$. There is not much overlap of deprivations beyond two to three indicators; only 4 percent individuals are deprived in four or more indicators $(k \geq 0.5)$and less than 1 percent individuals are deprived in five or more indicators $(k \geq 0.625)$; no observation in our sample is deprived in all of the indicators. Interestingly, as the threshold value increases so does the average intensity of poverty (column 4). For instance, the benchmark US-MPI estimates that, on average, the poor were deprived in 33 percent of all dimensions. As the threshold increases to seven or more indicators, we find that, on average, the poor were deprived in 88 percent of all indicators.

6.3. Sensitivity to Relative Weights

In the benchmark US-MPI, all four dimensions are equally weighted (25 percent) and all indicators within a dimension are also equally weighed; since each dimension has 2 indicators, each indicator's weight equals 12.5 percent. In this section we compare two alternative weighting structures, namely dominant

dimension and prevalence weighting (see Table 7). Under the first alternative structure, we designate one dimension as the dominant dimension and assign it a weight of 40 percent; all other dimensions are given a lower weight equal to 20 percent each. The US-MPI value varies from 8.9 (standard of living is dominant), 8.1 (health), 6.4 (livelihood) and 4.6 (housing). The US-MPI value is high when deprivation in standard of living is given more weight, since higher percent of individuals are deprived in those indicators; similarly, the MPI value is low when deprivation in housing is given more weight, because fewer individuals in the sample experienced housing deprivation. Note that we keep constant all the other choices, including the second threshold value $(k \geq 0.25)$.[20] The second alternative is based on the notion of prevalence weighting. Whelan et al (2012) propose this weighing structure when estimating the MPI for European nations. The idea is that deprivation of a widely available item is treated more seriously than a corresponding deprivation of an item whose absence is more prevalent. Referring back to figure 1, we find that very few i.e. 1.4 percent individuals were deprived of kitchen and/or plumbing facilities at their homes and 4.2 percent individuals were living in a crowded house. Hence deprivation in these indicators carries the highest weight.[21] The value of the MPI using prevalence weight is 5.3 and is close to the value of the MPI when housing is assigned a greater weight (4.6).

7. Conclusions and Extensions (to be written...)

[20] With equal weights, the second threshold of (k≥0.125) implied that individuals deprived in two or more indicators were counted as multidimensional poor. Now when we change the weights, the implication of a threshold value of (k≥0.125) also changes. For instance, if health is the dominant dimension, then (k≥0.125) implies that individuals who are identified as multidimensional poor are i) individuals deprived in two or more indicators, at least one of which is a health indicator or ii) individuals deprived in three or more non-health indicators.
[21] The prevalence weight is equal to the proportion of individuals who are not deprived in that indicator.

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Table 1 Variables used in Prevailing Multidimensional Measures

Index	**Dimensions**	**Indicators** *(deprived if)*
Human Development Index (HDI)	Health	Life expectancy at birth (*a minimum of 20 years and maximum of 83.4 years*)
	Education	Average years of schooling for adults aged 25 years Expected years of schooling for children of school entering age (*maximum of 18 years*)
	Standard of Living	GNI per capita (PPP$) (*minimum income is $100 and the maximum is $107,721*)
Human Poverty Index (HPI-2):developed countries	Health	Mortality rate (*probability of not surviving to age 60*)
	Education	Percent of adults who are illiterate
	Standard of Living	Percent of the population below the income poverty line (*50% of median household disposable income*)
	Social Exclusion	Rate of long term unemployment (*12 months or more*)
UNDP-MPI: developing countries	Health	Child Mortality (*any child has died in the family*) Nutrition (*any adult or child who is malnourished*)
	Education	Years of school (*if no household member has completed 5 years of schooling*) Children enrolled (*any school-aged child is not attending school up to class 8*)
	Standard of Living	Cooking fuel (*cooks with dung, wood or charcoal*) Sanitation (*sanitation facility is not improved according to MDG guidelines*) Water (*no access/more than a 30-minute walk to safe drinking water*) Electricity (*no electricity*) Floor (*has a dirt, sand or dung floor*) Assets (*no more than one radio, TV, telephone, bike, motorbike or refrigerator and does not own a car or truck*)
MPI: EU	Basic	Absence of a meal, clothes, a leisure activity, a holiday, a meal with meat or a vegetarian alternative, adequate home heating, shoes
	Consumption	Absence of a PC, a car and an internet connection
	Health	Self-assessed health status, restrictions on current activity and the presence of a chronic illness
	Neighborhood Environment	Reported levels of litter, damaged public amenities, pollution, crime/violence/vandalism and noise in the neighborhood
	Income Poverty	Relative poverty (*income less than 60% of median disposable income*)

Table 2 Benchmark US Multidimensional Poverty Index

Dimensions	Indicators *(deprived if)*	Relative Weight
Health	**Health insurance** (*no public or private insurance*)	12.5%
	Disability (*difficulty in one or more functions: Hearing, Vision, Cognitive, Ambulatory, Self-care, Independent Living*)	12.5%
Livelihood	**Years of schooling** (*grade 12 not completed*)	12.5%
	Employment status (*in labor force and unemployed*)	12.5%
Standard of Living	**Income poverty** (*income to poverty threshold ratio less than 100%*)	12.5%
	Housing costs (*monthly owner costs or gross rent is more than 30% of household income*)	12.5%
Housing	**Housing facilities** (*lacks one or more facilities: stove/range, refrigerator, sink with a faucet, hot and cold running water, a flush toilet, bathtub or shower*)	12.5%
	Crowded house (*more than 1 occupant per room*)	12.5%

Table 3 Correlation between Deprivations in Different Indicators

	Health Insur.	Disability	Schooling	Employment	Income Poverty	Housing cost	Housing facilities	Crowded house
Health Insur.	1.00							
Disability	-0.08	1.00						
Schooling	0.11	0.15	1.00					
Employment	0.20	-0.03	0.04	1.00				
Income Poverty	0.21	0.10	0.17	0.16	1.00			
Housing cost	0.14	0.08	0.08	0.09	0.36	1.00		
Housing facilities	0.05	0.04	0.06	0.02	0.08	0.00	1.00	
Crowded house	0.13	-0.03	0.13	0.06	0.15	0.01	0.12	1.00

Table 4 Comparing U.S. Poverty Estimates 2011

Measures	Indicator[1]	Data Source	Age	% population
Official Poverty Measure	Income	Annual Social and Economic Supplement to the Current Population Survey (CPS-ASES)	18 years and above	12.8
SPM	Income	Survey of Income and Program Participation (SIPP)	18 years and above	15.4
Poverty Measure	Income	American Community Survey (ACS)	All ages[2]	15.9
US-MPI (% deprived)	**Multiple**	**American Community Survey (ACS)**	**18 years and above**	**26.6**

1. Income definitions and time covered differ for each dataset; http://www.census.gov/hhes/www/poverty/about/datasources/factsheet.html.
2. Excludes children under age 15 who are not related to the householder, people living in institutional GQs, college dormitories or military barracks.

Table 5 Sensitivity to Within Indicator Thresholds

Indicators	Benchmark Threshold	Lower Threshold	MPI[1] (%deprived)	Higher Threshold	MPI (%deprived)
	Benchmark US-MPI		8.67 (26.56%)		8.67 (26.56%)
Years of schooling	*grade 12 not completed*	*grade 9 not comp.*	7.70 (24.21%)	*no degree*	14.77 (44%)
Income poverty	*income to poverty threshold ratio less than 100%*	*less than 50%*	7.42 (24.01%)	*less than 200%*	11.54 (34.24%)
Housing costs	*monthly owner costs or gross rent is more than 30% of household income*	*more than 60%*	6.69 (20.94%)	*more than 15%*	11.45 (35.38%)
Disability	*difficulty in 1 or more functions*	*2 or more*	7.74 (23.95%)	-	-
Housing facilities	*lacks 1 or more facilities*	*lacks 2 or more facilities*	8.59 (26.41%)	-	-
Crowded house	*more than 1 occupant per room*	*more than 2*	8.18 (25.61%)	-	-

1. All MPI values are calculated keeping constant the second threshold of deprivation in two or more indicators.

Table 6 Sensitivity to Number of Indicators Threshold

Deprivation Cutoffs	Deprived in at least as many indicators	Incidence (H): Percent Deprived	Intensity (A): Av. Deprivation Score	MPI = H X A
Union	1	54.07	0.22	12.11
Benchmark MPI	**2**	**26.56**	**0.33**	**8.67**
	3	11.44	0.43	4.89
	4	3.84	0.53	2.04
	5	0.84	0.64	0.54
	6	0.10	0.76	0.08
	7	0.007	0.88	0.006
Intersection	8	0	-	0

Table 7 Sensitivity to Relative Weights

Dimensions	Indicators	Relative Weights (in %)					
		Benchmark		**Dominant Dimension**			**Prevalence**
Health	Health insurance	12.5	20	10	10	10	12.0
	Disability	12.5	20	10	10	10	11.7
Livelihood	Years of schooling	12.5	10	20	10	10	12.5
	Employment status	12.5	10	20	10	10	13.4
Standard of Living	Income poverty	12.5	10	10	20	10	12.3
	Housing costs	12.5	10	10	20	10	10.5
Housing	Housing facilities	12.5	10	10	10	20	14.0
	Crowded house	12.5	10	10	10	20	13.6
MPI Value (Percent deprived)		**8.67 (26.6%)**	8.06 (21.5%)	6.42 (17.02%)	8.89 (21.55%)	4.63 (12.78%)	5.29 (13.75%)

Figure 1 Percent of Individuals Deprived in Each Indicator

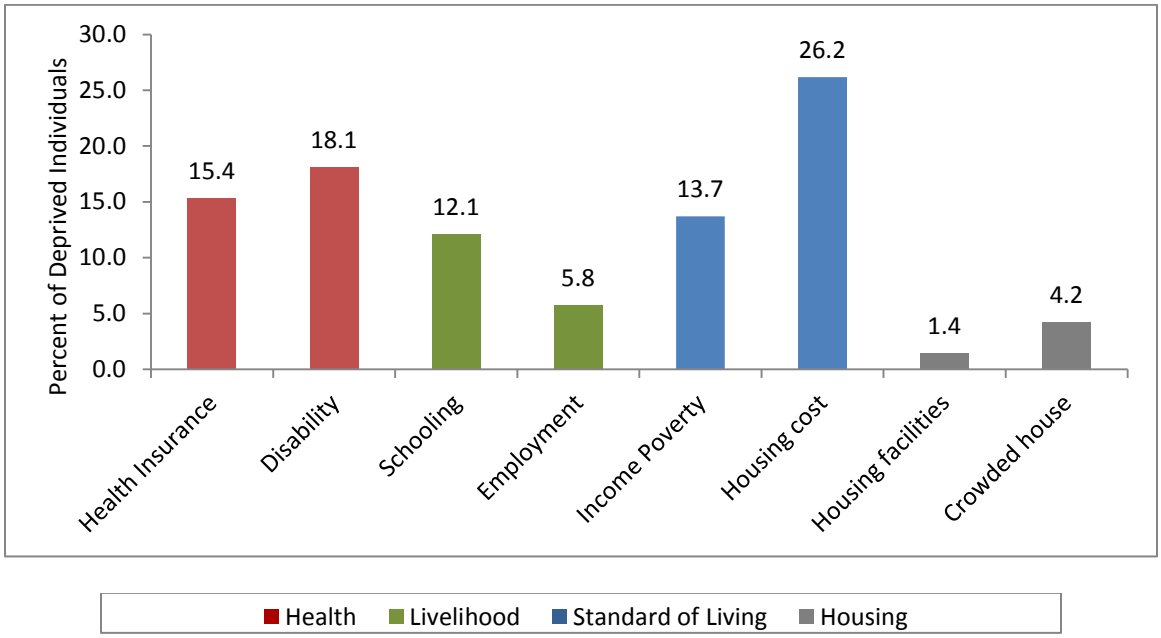
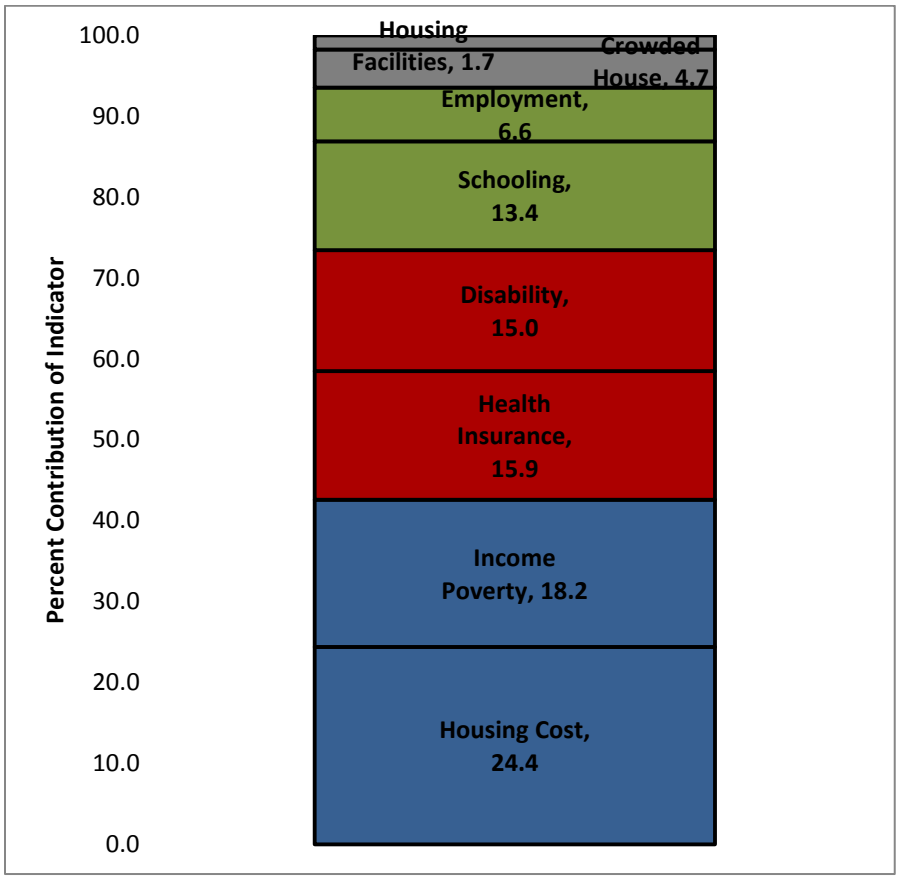


Figure 2 Decomposition of the Benchmark MPI by Indicators and Dimensions



Appendix

Educational Attainment

Educational attainment data is collected by the ACS for people 18 years old and over. Respondents are classified according to the highest degree or the highest level of school completed. The question included instructions for persons currently enrolled in school to report the level of the previous grade attended or the highest degree received. The educational attainment question included a response category that allowed people to report completing the 12th grade without receiving a high school diploma. Respondents who received a regular high school diploma and did not attend college were instructed to report "Regular high school diploma." Respondents who received the equivalent of a high school diploma (for example, passed the test of General Educational Development (G.E.D.)), and did not attend college, were instructed to report "GED or alternative credential."

Disability Status

In an attempt to capture a variety of characteristics that encompass the definition of disability, the ACS identifies serious difficulty with four basic areas of functioning – hearing, vision, cognition, and ambulation--supplemented by difficulty in self-care and independent living. Hearing difficulty was estimated by asking respondents if they were "deaf or … [had] serious difficulty hearing." Similarly, vision difficulty was derived by asking respondents if they were "blind or … [had] serious difficulty seeing even when wearing glasses." Cognitive difficulty question asked respondents if due to physical, mental, or emotional condition, they had "serious difficulty concentrating, remembering, or making decisions." Ambulatory difficulty was derived from question which asked respondents if they had "serious difficulty walking or climbing stairs." Self-care difficulty was estimated by asking respondents if they had "difficulty dressing or bathing." Difficulty with these activities are two of six specific Activities of Daily Living (ADLs) often used by health care providers to assess patients' self-care needs. Independent living difficulty question asked respondents if due to a physical, mental, or emotional condition, they had difficulty "doing errands alone such as visiting a doctor's office or shopping." Difficulty with this activity is one of several Instrumental Activities of Daily Living (IADL) used by health care providers in making care decisions.

Health Insurance Coverage

Health insurance coverage in the ACS and other Census Bureau surveys define coverage to include plans and programs that provide comprehensive health coverage. Plans that provide insurance for specific conditions or situations such as cancer and long-term care policies are not considered coverage. Likewise, other types of insurance like dental, vision, life, and disability insurance are not considered health insurance coverage. The Census Bureau broadly classifies health insurance coverage as private health insurance or public coverage. Private health insurance is a plan provided through an employer or union, a plan purchased by an individual from a private company, or TRICARE or other military health care. Public health coverage includes the federal programs Medicare, Medicaid, and VA Health Care

(provided through the Department of Veterans Affairs); the Children's Health Insurance Program (CHIP); and individual state health plans. The types of health insurance are not mutually exclusive; people may be covered by more than one at the same time.

Income Poverty Ratio

Poverty statistics in ACS adhere to the standards specified by the Office of Management and Budget in Statistical Policy Directive 14. The Census Bureau uses a set of dollar value thresholds that vary by family size and composition to determine who is in poverty. Further, poverty thresholds for people living alone or with nonrelatives vary by age. The poverty thresholds for two-person families also vary by the age of the householder. The income-poverty ratio is estimated by comparing the person's total family income in the last 12 months with the poverty threshold appropriate for that person's family size and composition. If the total income of that person's family is less than the threshold appropriate for that family, then the person is considered "below the poverty level," together with every member of his or her family. If a person is not living with anyone related by birth, marriage, or adoption, then the person's own income is compared with his or her poverty threshold. Since ACS is a continuous survey, people respond throughout the year. Because the income questions specify a period covering the last 12 months, the appropriate poverty thresholds are determined by multiplying the base-year poverty thresholds (1982) by the average of the monthly inflation factors for the 12 months preceding the data collection. Income is obtained by summing eight different types of income: 1. wage or salary income, 2. (farm and non-farm) self-employment income, 3. interest, dividends, net rental income, royalty income, or income from estates and trusts, 4. social security income, 5. public assistance income, 6. retirement, survivor or disability income, and 8. all other incomes. Monthly Consumer Price Indices (CPI) factors are used to inflation-adjust these components to a reference calendar year (January through December).

Employment Status

The ACS defines the "Employed" as all civilians 16 years old and over who either (1) were "at work,"" that is, those who did any work at all during the reference week as paid employees, worked in their own business or profession, worked on their own farm, or worked 15 hours or more as unpaid workers on a family farm or in a family business; or (2) were "with a job but not at work". The "Unemployed" consist of all civilians 16 years old and over who (1) were neither "at work" nor "with a job but not at work" during the reference week, and (2) were actively looking for work during the last 4 weeks, and (3) were available to start a job. Also included as unemployed are civilians who did not work at all during the reference week, were waiting to be called back to a job from which they had been laid off, and were available for work except for temporary illness. The reference week is the calendar week preceding the date on which the respondents completed their questionnaires or were interviewed. This week is not the same for all respondents since the interviewing was conducted over a 12-month period.

Since employment data from the ACS are obtained from respondents in households, they differ from statistics based on reports from individual business establishments, farm enterprises, and certain government programs. People employed at more than one job are counted only once in the ACS and are classified according to the job at which they worked the greatest number of hours. In statistics based on

reports from business and farm establishments, people who work for more than one establishment may be counted more than once. People who had a job but were not at work are included with the employed in the ACS, whereas many of these people are likely to be excluded from employment figures based on establishment payroll reports. Furthermore, the employment status data in ACS include people on the basis of place of residence regardless of where they work, whereas establishment data report people at their place of work regardless of where they live.

Occupants per Room

This data is the basis for estimating the amount of living and sleeping spaces within a housing unit. These data allow officials to plan and allocate funding for additional housing to relieve crowded housing conditions. The number of occupants per room is obtained by dividing the number of people in each occupied housing unit by the number of rooms in the unit. The figures show the number of occupied housing units having the specified ratio of people per room. Although the Census Bureau has no official definition of crowded units, many users consider units with more than one occupant per room to be crowded.

Kitchen Facilities

Kitchen facilities provide an indication of living standards and assess the quality of household facilities within the housing inventory. These data provide assistance in determining areas that are eligible for programs and funding, such as Meals on Wheels. A unit has complete kitchen facilities when it has all three of the following facilities: (i) a sink with a faucet, (ii) a stove or range, and (iii) a refrigerator. All kitchen facilities must be located in the house, apartment, or mobile home, but they need not be in the same room. A housing unit having only a microwave or portable heating equipment such as a hot plate or camping stove should not be considered as having complete kitchen facilities. An icebox is not considered to be a refrigerator.

Plumbing Facilities

Plumbing facilities provide an indication of living standards and assess the quality of household facilities within the housing inventory. These data provide assistance in the assessment of water resources and to serve as an aid to identify possible areas of ground water contamination. Complete plumbing facilities include: (a) hot and cold running water, (b) a flush toilet, and (c) a bathtub or shower. All three facilities must be located inside the house, apartment, or mobile home, but not necessarily in the same room. Housing units are classified as lacking complete plumbing facilities when any of the three facilities is not present.

Selected Monthly Owner Costs

Selected monthly owner costs as a percentage of household income provide information on the monthly housing cost expenses for owners. The information offers an excellent measure of housing affordability and excessive shelter costs. Selected monthly owner costs are the sum of payments for mortgages, deeds of trust, contracts to purchase, or similar debts on the property (including payments for the first

mortgage, second mortgages, home equity loans, and other junior mortgages); real estate taxes; fire, hazard, and flood insurance on the property; utilities (electricity, gas, and water and sewer); and fuels (oil, coal, kerosene, wood, etc.). It also includes, where appropriate, the monthly condominium fee for condominiums and mobile home costs (installment loan payments, personal property taxes, site rent, registration fees, and license fees). Selected monthly owner costs were tabulated for all owner-occupied units, and usually are shown separately for units “with a mortgage” and for units “not mortgaged.”

Gross Rent

Gross rent provides information on the monthly housing cost expenses for renters. When the data is used in conjunction with income data, the information offers an excellent measure of housing affordability and excessive shelter costs. Gross rent is the contract rent plus the estimated average monthly cost of utilities (electricity, gas, and water and sewer) and fuels (oil, coal, kerosene, wood, etc.) if these are paid by the renter (or paid for the renter by someone else). Gross rent is intended to eliminate differentials that result from varying practices with respect to the inclusion of utilities and fuels as part of the rental payment. The estimated costs of water and sewer, and fuels are reported on a 12-month basis but are converted to monthly figures for the tabulations. Renter units occupied without payment of rent are shown separately as “No rent paid” in the tabulations.