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Roger White is Professor of Economics at Whittier College, USA, where he holds the Douglas V. Ferguson Chair in International Economics. His research largely focuses on international trade, migration, cultural economics, and economic globalization. White is the author of four books, and he has published more than three dozen peer-reviewed articles and book chapters.

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global perspectives on wealth and distribution

Measuring Multidimensional Poverty and Deprivation

Incidence and Determinants in Developed Countries

EDITED BY
Roger White

Global Perspectives on Wealth and Distribution

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Roger White
Editor

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CHAPTER 9

US Multidimensional Poverty by Race, Ethnicity and Motherhood: Evidence from Pennsylvania Census Data

Feridoon Koohi-Kamali and Ran Liu

9.1 Introduction

A major question in poverty analysis is whether poverty should be examined in terms of an inadequacy of income or, more directly, by looking at welfare indicators such as nutritional status. Arguing that poverty has many relevant dimensions besides income, Sen (1985) presents a far-reaching theoretical approach to welfare comparison in terms of achievements and capabilities. Multidimensional poverty (MP) measurement is the applied expression of this approach and is a direct result of addressing the shortcomings of measuring poverty in terms of income. By shifting the emphasis from people's income to their achievement as a more accurate indicator of their welfare, the MP applications have led to many new insights into poverty, especially with regard to developing countries. Although application of MP measurement to the USA has produced

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some illuminating results, the *combined* effects of race, ethnicity, and motherhood on poverty have been marginal to these studies. This is an important shortcoming, since the available literature on income poverty in the USA has consistently highlighted female-headed African–American and Hispanic households as constituting the core of chronic poverty.[1]

The advantages of the MP methodology for the analysis of deprivation in the USA have been aptly demonstrated in Alkire and Foster (2010) (henceforth A&F).[2] These studies demonstrate many useful properties of the MP approach for the design of public policies; in particular, the approach allows for the decomposition of aggregate poverty measures into the share of each population group, and one can deconstruct the overall index to identify particular dimensions of deprivation that contribute most to the aggregate measure. Finally, one of the least-discussed features of capability-based measures of poverty is their potential to provide guidance for designing effective poverty reduction policy tools. A well-known problem in designing policies targeted at alleviating extreme poverty is that the less poor or the non-poor typically claim a greater share of resources allocated to poverty reduction schemes because the availability of these resources creates new incentives that result in changed behavior by the non-poor. Public policies based on achievement that results from better or worse capabilities do not induce such behavior change. For example, it would be hard to change one's health status in order to qualify for public health care! Thus, the MP approach offers a more secure basis for public policies that effectively target those in extreme poverty (Sen 1995). While these studies take into account the impact of race, ethnicity, and gender on MP measures for the USA, no prior work analyzes these effects based on the *intersection* of race/ethnicity and gender, particularly when combined with the presence of children, namely single mothers with a "minority" background. Therefore, the notable feature of this chapter is its focus on the analysis of the key critical features of the poverty profiles in the USA based on that combination, namely the African–American and the Hispanic female-headed households.

The intersection of race, ethnicity, and motherhood is the focus of this chapter's application of MP methodology to the USA. To our knowledge, this critical dimension of MP measurement has so far not been addressed, or at least not adequately, in the emerging literature on MP

poverty in the USA. More specifically, we present evidence that bridges this existing gap by providing an MP analysis of census data for one US state with features that are similar to those of the entire country, namely the Commonwealth of Pennsylvania. We chose Pennsylvania because this state is close to the mid-values of the household poverty rate and household total income across all fifty states of the USA and, hence, may offer preliminary results that are applicable for the entire country. For example, in 2009, the household poverty rate for the USA was 12.6%, while it was 11.2% for Pennsylvania, with a rank of 21st among all the US states; similarly the average US 2009 household income was $50,221, while that for the state of Pennsylvania was $49,520, with a rank of 22nd among all the US states.

Section 9.2 examines the literature on MP and our particular approach to the topic. Section 9.3 spells out the methodology, the dimensions of deprivation, and the indicators employed in this chapter. In Sect. 9.4, we discuss the data used. Section 9.5 presents our results starting from the state level and then at the level of the most-deprived cohorts within the state, including the results by decomposition. Section 9.6 concludes by summing-up our main findings and corresponding policy implications.

9.2 Literature

The multidimensional poverty approach has its origin in debates on Rawls (1971, 1982) who suggested that, in a just society, all citizens should have equal access to what he calls primary goods, including adequate nutrition and education and the right to vote in elections. Welfare comparison by primary goods assumes citizens are all in a "normal range" of health and capability, and this raises two issues. Arrow (1973) first pointed out that the basic shortcoming of this concept as a means of welfare comparison is that equality on the commodity level does not necessarily imply an equal material living standard if there is substantial variation in the health status of the population; a disabled person can achieve less with the same commodity basket than a healthy person. A similar alternative with a more far-reaching theoretical approach to welfare comparison, in terms of achievements and capabilities, is put forward by Sen (1985, 1992). A major implication of Sen's approach is that poverty has many relevant dimensions besides income.

Sen argues that welfare analysis should be based on differences in individual achievements, not solely in terms of income command over commodities, because market purchases and income-level data exclude relevant information to the measurement of poverty on desirable living conditions. An example is the lower longevity of African–Americans as compared to the general population of some of the much poorer (in income terms) neighboring countries of the USA.[3] Moreover, unlike income data, much information about deprivation is inherently cardinal and categorical. Demographic data provide a good deal of categorical information relevant to the assessment of well-being, usually called measures of deprivation rather than achievement. It is often the case, however, that non-market data may be unavailable or may provide a poor approximation for the assessment of some types of achievements; hence, market purchase data are commonly used to bridge the gap. Examples include the ability to dress or the adequate use of electricity or heating. However, Sen maintained the derived informational roles of income and market data in such exercises is distinct from the claim that income-based approach constitutes the fundamental method of poverty analysis. Therefore, poverty must be assessed in terms of multiple welfare indicators and then suitably aggregated into an overall index.

This discussion makes clear that the multidimensional approach to living standards is concerned with the expansion of the informational basis of the assessment of well-being and is not intended as a method of measurement independent from the income dimension. Some degree of overlap between the income dimension and other dimensions is inherent to this approach. Nonetheless, applications of multidimensional poverty measurement often employ both income and non-income dimensions that require guarding against possible distortions from an undue influence of income on the aggregate poverty measurement (see below for an example).

The second issue is whether the basis of comparison consists of the same set of universal capabilities or should be allowed to differ across communities depending on the importance attached to those goods. Nussbaum (2000) argues that a fixed list of universal capabilities should be employed. The boundaries for such a list may be hard to define—emotional security might be considered a capability, for example—and still harder to incorporate properly into an implementable measure of poverty. On the other hand, Sen (1992) avoids a list of the central capabilities and argues in favor of a flexible list. See also Alkire (2008) who also takes a pluralistic view of MP poverty measurement.[4]

Multidimensional poverty differs from income-based poverty in that deprivation in one dimension alone, without additional information across other dimensions, cannot adequately identify the poor. Its methodology overcomes the dilemma posed by two other alternatives that are based on capability dimensions. One method, the *union* procedure, identifies a person as being poor if she is deprived in at least *one* of the indicators of capability. The other, the *intersection* method, identifies a person as poor if she is deprived in *all* capability indicators. The union method is excessively broad and leads to MP measures that are arguably too high, while the intersection method is excessively narrow and results in poverty measures that are possibly too low (see Atkinson (2003) and Bourguignon and Chakravarty (2003)). The multidimensional method examined below is an intermediate method of poverty measurement between the union and intersection approaches.

The methodology of multidimensional poverty employed in the main part of this chapter follows an approach to measurement that is similar to the income poverty approach in that it first identifies the poor and then aggregates individual poverty to create an overall index. The former is based on an ordinal index that takes the value of 1 if the person (or household) is deprived in a given dimension of capability and is 0 if the person is not deprived in that dimension. The aggregation then obtains a weighted total index for all dimensions of deprivation based on a second criterion of poverty threshold.

Note, however, that the calculation of MP by each welfare indicator is dependent on its overlap with deprivation in other indicators; the greater the overlap, the larger the contribution of that indicator to the overall index. This suggests that indicators that are given greater weight by the researcher will demonstrate a larger contribution to the overall index (see Wagle (2014) and Ravallion (2011)). Inherent in this procedure is the assumption of high substitutability among a heterogeneous range of capabilities, for example, that good sanitation can compensate for poor nutrition. However, each dimension of capability may well be valuable independently, regardless of other dimensions. While we acknowledge such drawbacks in the method employed here, we believe that the alternative of defining the index on some universal basis has its own difficulties where the boundaries of deprivation/achievement are concerned; in any case, the limitation of our data prevents us from taking such an approach.

9.3 Methodology

To identify the poor, we record the achievement or deprivation of a population of n households or individuals in d dimensions of deprivation. This results in a matrix of $n*d$, where each row i represents individuals and each column j provides the distribution of deprivation/achievement across individuals, where 1 defines deprivation and 0 indicates non-deprived status. The approach allows weighting deprivation in each dimension differently, and one option is to make the dimensional weights add up to the total number of columns, i.e., $\sum_{j=1}^{a} w_j = d$. This results in a matrix of deprivation with elements defined by $z_{ij} = w_j$ that is equal to 1 if i is deprived and 0 if not, with the total count equal to $C_i = \sum_{j=1}^{a} z_{ij}$. A second cut-off value k is then applied to this total to determine who is multidimensionally poor: the person counts as poor if the weighted count is greater than or equal to k. Note that this *dual cut-off* method filters out those who may be deprived in some dimensions but with an aggregate deprivation count less than k. The aggregate multidimensional poverty is then defined as follows.

$$M_0 = \frac{\sum_{i=1}^{n}\sum_{j=1}^{d} z_{ij}}{nd} \tag{9.1}$$

A&F demonstrate that Eq. (9.1) can be expressed as the product of the multidimensional head-count index (H) and the average index of poverty intensity (A):

$$M_0 = H * A \tag{9.2}$$

Equation (9.2) has the properties of *decomposability* and *breakdown* (Tsui 2002). The decomposability property allows separate poverty measures for each of the population sub-groups (e.g., race) that make up the aggregate index. This property states that the sum of the population sub-groups x and y, weighted by their population share, is equal to the aggregate index (Eq. 9.3).

$$M_0 = \frac{n(x)}{n} M_{0(x)} + \frac{n(y)}{n} M_{0(y)} \tag{9.3}$$

The second useful property of (Eq. 9.2) is that it can be deconstructed into its constituents to obtain the contribution of each indicator in a dimension to the aggregate index (where $\bar{w}_j$, indicates its average value):

$$C_j = \frac{\bar{w}_j}{d/M_0} \tag{9.4}$$

9.3.1 *Dimensions and Their Indicators*

We identify four dimensions to set up the capability measurement framework in this study. They are what appear to us to be the most sensible indicators for Pennsylvania. We follow the weighting scheme employed in the UNDP Human Development Report (2010, especially technical note 7) that gives equal weight to each dimension of capability; each dimensional weight is further divided equally among its numbers of indicators, and the total sum of weights is equal to the total number of the ten indicators. We feel that despite its shortcomings as discussed above, such a scheme offers a better alternative to a measure of multidimensional poverty that is based on a fixed, universal set of deprivation indicators, given the limitation of the data employed here. For each dimension, the highest possible score is 2.5. Therefore, the maximum score for the capability measurement model is 10 and each dimension contributes up to 25% of the total score. Next, by setting a multidimensional deprivation cut-off point equal to 3, we calculate the proportion of the population that is defined as multidimensionally poor and, from this, a poverty intensity index A for that population. Finally, we obtain the Multidimensional Poverty Index, M_0, by multiplying the Multidimensional Poverty Headcount ratio (H) with the intensity of poverty index (A).

Defining dimensional deprivation by a (0, 1) indicator, our four dimensions are: educational attainment, employment status, supportive income, and living standard. The education attainment dimension reflects the schooling experience of the head of household. We set the cut-off condition for this dimension as the attainment of a high school diploma.[5] Any head of household who does not have a high school diploma will be considered deprived in this dimension. The employment status dimension reflects the working status of the head of household and, if married, the spouse. If neither of them is working full time, then the household is deprived in the employment dimension. The threshold adopted is whether the combined household employment amounts to at least one full-time working person. For example, if both spouses are working less than full time or the householder is working part-time while the spouse is not working at all, then they are considered deprived.

This definition of unemployment may result in a high deprivation index of the employment dimension from the inclusion of the long-term and retired-age unemployed. With respect to the first, we note that the Census surveys seem to exclude most of the long-term unemployed; hence, there is limited scope for the overstatement of unemployment.[6] Regarding the second, the retired household heads identified as unemployed constitute 8.9% of the sample in this study. This might have set the threshold for employment deprivation too high, but is unlikely to affect the poverty measures for the female-headed households with children. These expectations are supported by the evidence presented below in Sect. 9.5.3 for the effect of the long-term unemployed and the retirement-age unemployed on M_0.

The third dimension, supportive income, consists of four indicators: receipt of yearly food stamp or Supplemental Nutrition Assistance Program benefits, receipt of public assistance income, receipt of supplementary security income, and income headcount deprivation. These indicators act as proxies for the deprivation that a household may suffer indirectly. A head of household who is receiving any of these supportive incomes will be marked as deprived. The living standard dimension has three indicators: household-size-to-bedroom ratio, vehicle possession, and ownership of real estate. The household-size-to-bedroom ratio is based on the number of people in the household divided by the number of bedrooms. If the result is greater than 2, then this household will be considered a deprived unit. A household will also be considered as deprived if there is no possession of a vehicle or a housing unit.[7]

Two possible distortions from the above selection of deprivation dimensions should be noted. First, many of the income support programs are only available to families who are considered poor and some are aimed at single mothers; these may unduly affect the results, in particular they may lead to a bias in the identification of single mothers as the most-deprived group. We will present some robustness evidence in Sect. 9.5.3 on the exclusion of the income dimension to support our main results. Second, measuring deprivation by household size relative to the number of bedrooms may identify too many larger households, relative to those with no child, as being deprived. This conclusion does not necessary follow because larger households also benefit from economies of scale in shared consumption, most notably in housing, that are

unavailable to smaller households. While the measurement of the household size effect on the standard of living has proved challenging, there is little doubt that economies in consumption can take a household above the poverty threshold once its size goes beyond a certain limit (Lanjouw and Ravallion 1995).

A&F employ personal survey samples, and the research they have conducted reflects individual capability. Thus, they present the poverty allocation among all groups studied, but do not decompose the general index in terms of the gender of the head of household and the presence of children. To examine the deprivation allocation among the ethnicities *and* household types, we must employ household-level data. Hence, the focus of this chapter is on that combination, namely, the African–American and the Hispanic female-headed households. As discussed above, the existing evidence by the income-based headcount measurement suggests that these groups constitute a key component of chronically poor US households and the extent of their deprivation is related critically to the presence of children in the household.

9.3.2 Quadruple Decomposition Model

In order to examine the allocation of deprivation in Pennsylvania, we employ a procedure that decomposes the MP index of the full sample at four different levels: (i) race or ethnicity of household head, (ii) household gender/marital status, (iii) intersection of (i) and (ii), and (iv) presence of children in (iii). We call this procedure *Quadruple Decomposition*. Decomposition of population sub-groups is a way to break down the overall index and examine ethnic sub-groups and the gender of the household head with respect to the presence/absence of children. For example, the decomposition of the Hispanic sub-group will generate three new sub-groups, namely the Hispanic married couple household, the Hispanic female-headed household, and the Hispanic male-headed household. Figure 9.1 explains the procedure employed for the case of Hispanic households.

Since the interest of this chapter is primarily on the (*iii*) and (*iv*) decompositions, the results presented below are also confined to (*iii*) and (*iv*) stages with a brief summary of (*i*) and (*ii*) to save space and maintain focus.[8]

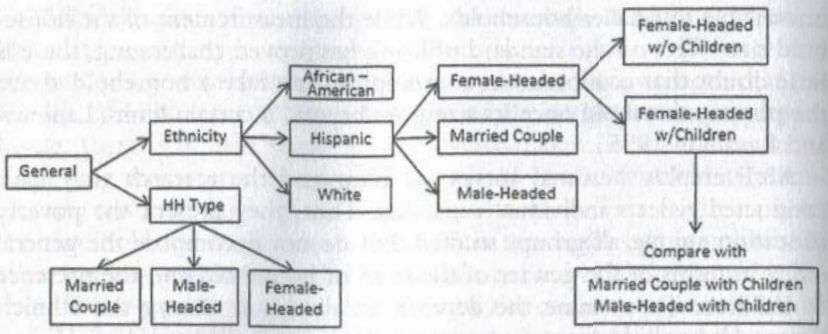

Fig. 9.1 Hispanic MP decomposition by population sub-group

9.4 Data Description

The 5-year data we use in this project are a modification of the American Community Survey (ACS) Public Use Micro Sample (PUMS) for the State of Pennsylvania from 2006 to 2010 provided by the Census Bureau. The original sample is separated into two parts. One part provides the records of demographic features of each housing unit, such as the number of people in the household, household family type, household equipment, and household income; the other part provides individual responses from the members of housing units (e.g., age, gender, educational attainment, and social supportive income). To implement our multidimensional capability analysis, we match (for the same household) the individual response of the head of household (when available) with the same householder's housing unit from the data set. By adding dummy variables for time, we generate a "super-PUMS" variable and then obtain a matrix containing 280,225 observations (households) with 272 variables. Since there are fewer than 5000 households of other races and ethnicities, which represent less than 2% of the full sample, we decided to focus on three main ethnicities: African–American, Hispanic, and White, and drop the observations of other races. Moreover, the Hispanic sub-group consists of only 7104 household observations, that is, all the household heads who responded *yes* to the survey question "white-alone or in combination with one or more other races?". As a preliminary exercise, we decided to retain all such observations to avoid too small a Latino cohort.[9]

We finally obtain our modified sample of 269,316 households, which represent a population of 613,611.[10]

9.5 Analysis

A few features of the population sample of 613,611 should be noted. Its multidimensional Poverty Index (M_0) is 0.076 compared to its income poverty headcount (YPH) of 0.094. The breakdown of M_0 shows unemployment to be the highest contributor (41%), with educational deprivation accounting for another 30%. Decomposition of M_0 by household type identifies female-headed families as the largest population sub-group of the poor by M_0, accounting for 42% of the poor population while constituting only 22% of the sample. Finally, ranking poverty by ethnicity and race indicates that Hispanics and Whites are the most- and least-deprived sub-groups, respectively, with African–Americans in-between in terms of both M_0 and YPH.[11] We now turn to an examination of this sample by separately examining M_0 for each sub-group.

9.5.1 Decomposition by Household Type Sub-groups Within Ethnic Sub-groups

Panel A of Table 9.1 shows that, among African–Americans, female-headed households are more deprived (47%) as compared to the married couple sub-group (31%). The M_0 value for African–American married couple households is 0.09, whereas the corresponding value for African–American female-headed households is 0.25. The higher M_0 value for the latter results from African–American female-headed households accounting for the greatest portion (64%) of the deprived African–American population.

Looking to Panel B of Table 9.1, we see that the Hispanic female-headed household sub-group constitutes 33% of the total Hispanic population and accounts for nearly 50% of the deprived Hispanic population. The reason is that the Hispanic female-headed household has a M_0 index of 0.332. Compared to the indices of the married couple household sub-group (0.15) and the male-headed household sub-group (0.22), the Hispanic female-headed household sub-group is more severely deprived. From part (a), we see that the female-headed households in the Hispanic sub-group are more deprived than the female-headed households in the African–American sub-group (0.33 as opposed to 0.25).

Table 9.1 Decomposition, by sub-group

Sub-group	*Population*	*Contrib. (%)*	*MPH*	*A*	M_0	*Contrib. (%)*
Panel A: The African-American sub-group						
Married-couple	12,843	31.10	0.1995	0.4626	0.0923	15.93
Male-headed	9098	22.03	0.3483	0.4616	0.1608	19.67
Female-headed	19,352	46.87	0.479	0.5167	0.2475	64.40
Total	41,293	100	0.3633	0.4958	0.1801	100
Panel B: The Hispanic sub-group						
Married-couple	8935	47.59	0.3116	0.4854	0.1512	32.05
Male-headed	3600	19.17	0.4628	0.476	0.2203	18.81
Female-headed	6240	33.24	0.5986	0.5549	0.3321	49.15
Total	18,775	100	0.436	0.5152	0.2246	100
Panel C: The White sub-group						
Married-couple	374,794	67.71	0.1072	0.4342	0.0465	49.90
Male-headed	68,302	12.34	0.1581	0.4265	0.0674	13.17
Female-headed	110,447	19.95	0.2607	0.4484	0.1169	36.93
Total	553,543	100	0.1441	0.4383	0.0631	100

With am M_0 value of 0.12, the White female-headed sub-group is the most-deprived household type within the White population (Panel C of Table 9.1). As is the case for the African–American and Hispanic sub-groups, the M_0 index for White female-headed households is still notably higher than the M_0 value for the other White sub-groups. This results from this type of household occupying 20% of the population but accounting for 37% of the deprived population. However, the index of the White female-headed household sub-group is lower than the index of the Hispanic married couple household sub-group at 0.15.

9.5.2 *Decomposition by Presence of Children Within Ethnic-Household Decomposition*

As shown in Panel A of Table 9.2, when the African–American female-headed household sub-group is further decomposed, we notice that the M_0 index for the sub-group of African–American female-headed households with children increases to 0.31 as compared to the index of the female-headed household sub-group as a whole (0.25, Panel A of Table 9.1). By contrast, the M_0 index for the African–American female-headed household sub-group without a child declines to 0.17. This suggests that the presence of children in African–American female-headed

Table 9.2 Decomposition, the African–American sub-group

Sub-group	*Population*	*Contrib. (%)*	*MPH*	*Contrib. (%)*	*A*	M_0	*Contrib. (%)*
Panel A: The African-American sub-group							
Fe-H w/child	10,899	56.32	0.5676	66.73	0.5394	0.3061	69.67
Fe-H w/ochild	8453	43.68	0.3648	33.27	0.471	0.1718	30.33
Total	19,352	100	0.479	100	0.5167	0.2475	100
Panel B: The African-American sub-group, with children only							
Mar-C w/child	7736	37.73%	0.1788	16.40%	0.4599	0.0822	14.41%
Ma-H w/child	1870	9.12%	0.461	10.22%	0.512	0.236	10.00%
Fe-H w/child	10,899	53.15%	0.5676	73.37%	0.5394	0.3061	75.59%
Total	20,505	100%	0.4112	100%	0.5236	0.2153	100%
Panel C: The Hispanic sub-group							
Fe-H w/child	4326	69.33	0.6826	79.06	0.5701	0.3892	81.23
Fe-H w/ochild	1914	30.67	0.4086	20.94	0.4974	0.2032	18.77
Total	6240	100.00	0.5986	100.00	0.5549	0.3321	100.00
Panel D: The Hispanic sub-group, with children Only							
Mar-C w/child	6819	55.41	0.3201	37.93	0.4828	0.1546	34.39
Ma-H w/child	1161	9.43	0.5332	10.76	0.529	0.282	10.68
Fe-H w/child	4326	35.15	0.6826	51.31	0.5701	0.3892	54.93
Total	12,306	100	0.4677	100	0.5326	0.2491	100.00
Panel E: The White sub-group							
Fe-H w/child	34,883	31.58	0.4296	52.05	0.4663	0.2003	54.12
Fe-H w/ochild	75,564	68.42	0.1827	47.95	0.4291	0.0784	45.88
Total	110,447	100	0.2607	100	0.4484	0.1169	100
Panel F: The White sub-group, with children only							
Mar-C w/child	1,94,206	79.56	0.0877	47.49	0.4201	0.0368	45.27
Ma-H w/child	15,018	6.15	0.2561	10.72	0.4327	0.1108	10.53
Fe-H w/child	34,883	14.29	0.4296	41.78	0.4663	0.2003	44.20
Total	244,107	100	0.1469	100	0.4407	0.0647	100

households is a significant factor in explaining chronic poverty in the USA.

Considering only the three types of African–American households with children by marital status (Panel B of Table 9.2), we find that female-headed households constitute 53% of the sub-group. These same households account for 76% of the deprived population by M_0. The M_0 index value of 0.31 demonstrates the severe deprivation of these households as compared to the sub-group of married couples with children (0.08) and the sub-group of male-headed households with children (0.24).

To further examine the extreme deprivation of the Hispanic female-headed household sub-group, we also decompose this sub-group according to the presence of children in the household (Panel C of Table 9.2). The M_0 index value for the sub-group of Hispanic female-headed households with children nearly equals 0.4, which is notably higher than the corresponding value for the female-headed households without children (i.e., 0.20). Hence, Hispanic female-headed households with children are the most-deprived sub-group in this sample. As with the African–American sub-group, we see that the presence of children in the Hispanic female-headed households is a significant factor for the presence of chronic poverty. Putting all Hispanic types of household with children together, Panel D of Table 9.2 shows that the female-headed households with children constitute 35% of the population but contribute 55% of all deprived households with children by M_0 index value

For the White sub-group, we see that female-headed households with children are substantially more multidimensionally deprived as compared to the childless female-headed households (Panel E of Table 9.2). The former sub-group has an M_0 index equal to 0.20, well above the M_0 value for the latter (0.08). By putting all the with-children categories of the White sub-group together in Panel F of Table 9.2, we observe that female-headed households are still the most-deprived cohort among the White sub-group, with M_0 value equal to 0.20 which is nearly twice the M_0 value for the male-headed households (0.11).

9.5.3 *Comparison Between the African–American, Hispanic, and White Female-Headed Households with Children*

In the new combined sample given in Table 9.3, the Hispanic female-headed household has a higher rate of deprivation than the

African–American sub-group.[12] This sub-group has an M_0 index that is equal to 0.39 and that is greater than the M_0 value for the sub-group of the African–American female-headed households with children (0.31, Table 9.3). Hispanic female-headed households with children account for 8.63% of the female-headed population but contributes 14.02% of the total population in poverty. By comparison, the African–American sub-group contributes 27.79% to the M_0 but has a population share of 21.75%. Thus, relative to their population share, the Hispanic female-headed households with children are typically more deprived than the African–American female-headed households with children *both* in terms of the Multidimensional Poverty Headcount measure (MPH column) and the Multidimensional Poverty Index (M_0 column). Finally, the M_0 for the White female-headed households is much lower than that of non-White households, generally speaking.

We find that employment status provides a plausible explanation for the above outcome. Table 9.4 shows that the incidence of labor market non-entry is higher for Hispanic single mothers as compared to their non-Hispanic counterparts, especially with respect to the White single

Table 9.3 Female-headed households with children: Hispanic versus African–American[a]

Sub-group	*Population*	*Contrib. (%)*	*MPH*	*A*	M_0	*Contrib. (%)*
H Fe-H w/child	4326	8.63	0.6826	0.5701	0.3892	14.02
AA Fe-H w/child	10,899	21.75	0.5676	0.5394	0.3061	27.79
W Fe-H w/child	34,883	69.62	0.4296	0.4663	0.2003	58.19
Total	50,108	100	0.4814	0.4912	0.2365	100

[a]Sample consists exclusively of a combination of the racial/ethnic subpopulation households with children

Table 9.4 Female-headed households, employment status

Sub-group	*w/child under 6*		*w/o child*	
Employment Status	Incidents (%)	Hours	Incidents (%)	Hours
AA Fe-H	29	36.7	12	37.4
H Fe-H	34	36.2	11	37.9
W Fe-H	23	35.9	7	37.6

Table 9.5 Dimension breakdown, the African–American sub-group—female-headed only

Sub-group	M_0[a]	*Contrib. (%)*	*D1 E*	*Contrib. (%)*	*D2 W*	*Contrib. (%)*	*D3 Υ*	*Contrib. (%)*	*D4 LS*	*Contrib. (%)*
Fe.H w/ child	0.3061	69.67	0.1666	13.61	0.5372	43.87	0.2596	21.20	0.2612	21.33
Fe.Hw/ ochild	0.1718	30.33	0.2174	31.63	0.1983	28.84	0.1064	15.48	0.1653	24.04
Total	0.2475	100	0.1888	19.07	0.3892	39.31	0.1927	19.46	0.2193	22.15

[a] M_0 values taken from Table 9.4

Table 9.6 Dimension breakdown, the Hispanic sub-group—female-headed only

Sub-group	M_0[a]	*Contrib. (%)*	*D1 E*	*Contrib. (%)*	*D2 W*	*Contrib. (%)*	*D3 Υ*	*Contrib. (%)*	*D4 LS*	*Contrib. (%)*
Fe.H w/ child	0.3892	81.23	0.3465	22.26	0.5982	38.43	0.3219	20.68	0.29	18.63
Fe.Hw/ ochild	0.2032	18.77	0.2962	36.45	0.1923	23.65	0.1519	18.69	0.1724	21.21
Total	0.3321	100	0.3311	24.92	0.4737	35.66	0.2698	20.31	0.254	19.12

[a] M_0 values taken from Table 9.4

Table 9.7 Female-headed households with children, Hispanic, African–American, and White[a]

Sub-group	*Population*	*% Contrib.*	*MPH*	*A*	M_0	*% Contrib.*
H Fe-H w/child	4326	8.63	0.7252	0.5824	0.4224	12.78
AA Fe-H w/child	10,899	21.75	0.6223	0.5425	0.3376	25.74
W Fe-H w/child	34,883	69.62	0.5556	0.4536	0.252	61.48
Total	50,108	100	0.5847	0.4862	0.2843	100

[a]Sample consists exclusively of the subpopulation of female-headed households by race with children

mothers, who have a distinctly lower incidence of labor market absence. Note, however, that the racial differences in hours worked, around 36 h for all three groups, disappear once we confine the comparison to those who are already in the labor market.

To discover the reasons behind the difference in deprivation across the African–American and Hispanic single-mother sub-groups, we decompose the aggregate index to represent the contribution of each dimension to see where the capability deprivation is most acute. That is, we take the M_0 values reported for the different types of female-headed households from Table 9.2 for African–Americans and for Hispanics and identify the contribution of each dimension of deprivation of their aggregate M_0 indices.

We further disaggregate the M_0 indices by race and ethnicity for the two types of female-headed household sub-groups depicted in Table 9.5 (African–Americans) and in Table 9.6 (Hispanics). We note that African–American female-headed households with children suffer from a very high deprivation level score in the dimension of employment status (0.54). However, the Africa-American index for the educational dimension, at 0.17, is lower than the index for the dimension of welfare income support (0.26) and the living standard dimension (0.26).

Table 9.6 shows an index value of 0.6 in the dimension of work status for the sub-group of Hispanic female-headed households with children; hence, we see that the Hispanic female-headed household sub-group displays more extreme deprivation in employment than in education (0.35). In particular, we note that educational deprivation has a greater impact on the Hispanic single mothers as compared to African–American single mothers (0.35 relative to 0.17 in Table 9.5).

We interpret this finding as suggestive of the presence of children in the African–American and Hispanic female-headed household sub-groups corresponding with mothers spending more time in the household rather than in the labor market. Without the presence of a spouse, this becomes a serious disadvantage that decreases the competitiveness of the single mothers in the labor market. However, the presence of children still leaves unexplained the notable differences in unemployment status, particularly between Hispanics and African–Americans. It is worth noting in this respect that a quarter of the Hispanic single mothers in the sample who do not participate in the labor market do not possess fluency in English based on the linguistic skill grades recorded in the PUMS. Hence, in addition, lack of linguistic skills in the educational dimension appears to play a critical role in the poverty the Hispanic single mothers.

Two further questions were examined. First, we tested the robustness of our poverty rankings by race and motherhood with two alternative methods. We checked the ranking by values for k greater than and less than 3. We also checked the ranking using an alternative—the *fuzzy set theory* method, which defines a household as poor if its members are deprived in two out of the four above dimensions and as extremely poor if deprived in all four dimensions. The poverty ranking of female-headed households with children, by race or ethnicity, remained unchanged by both methods regardless of the poverty thresholds employed and regardless of using income or deprivation measures.[13] Second, we also conducted a probit analysis of poverty profiles to find out how effectively the set of factors identified above can predict the probability of being in poverty by M_0 and YPH.[14] The results indicate that being a household in Pennsylvania, headed by a non-White single mother, has the largest impact on poverty status defined either multidimensionally or by income.

9.5.4 *Robustness to Income Dimension*

As discussed earlier, the extensive overlap of income with other dimensions of deprivation may unduly influence the effects of non-income factors on the measurement of MPI. We have checked our results for sensitivity to income deprivation by repeating the above analysis based solely on the three *non-income* dimensions employed above. To save space, Table 9.7 presents the evidence for the African–American single mothers compared to the Hispanics single mothers by excluding the

income dimension and repeats the steps that resulted in Table 9.3 above but without showing the intermediate steps involved.

The first two columns of Tables 9.3 and 9.7 represent the same populations. The population of Hispanic female-headed households with children account for 8.63% of the female-headed population but now represent 12.78% of the total population in poverty, as compared to 14.02% in Table 9.3 where income is included as an additional dimension. By comparison, the African–American sub-group contributes 25.74% to the M_0 but has a population share of only 21.75%, in comparison with 27.79% in Table 9.3. Thus, relative to their population share, the Hispanic female-headed households with children are more deprived than the African–American female-headed households with children *both* in terms of the Multidimensional Poverty Headcount measure (MPH column) and the Multidimensional Poverty Index (M_0 column). The M_0 for the White female-headed households is much lower than for the non-White. Hence, although the absolute size of M_0 differs somewhat across the three population sub-groups, poverty rank by M_0 remains unchanged. Indeed, the poverty ranking in every table reported above remains unchanged regardless of inclusion or exclusion of the income dimension. Thus, we conclude that the income dimension of this study has not unduly affected the reported measures MPH and M_0.

The second issue is the sensitivity of our results to the inclusion of those retired household heads who registered as unemployed. The four-dimension M_0 values, when calculated while excluding the unemployed retired-heads, are almost *identical* to those in Table 9.3, except for small decrease in the index for White female-headed households with children (to 0.1983 from 0.2003) and, hence, are not reported here. Therefore, it appears that the unemployment values for female-head households are influenced marginally by the effects of the long-run or retired-aged unemployment status.[15]

9.6 Conclusion

The MPI is a complement to income-based poverty measures, not an alternative to them. The MPI has its own weaknesses, but its method can also be illuminating. In this chapter, we analyze the key features of the US poverty profile suggested by the Income Poverty Headcount in the USA, namely the chronic poverty of African–American and Hispanic

female-headed households with children. We also obtain the same deprivation ranking for our sample of US single-mother sub-groups by race as is reported by Alkire and Foster (2010) for each of the three aggregate US racial groups. The Hispanic single-mother sub-group is the most deprived, while the African–American single-mother sub-group is second most deprived. Moreover, we also find that the Hispanic sub-group is more deprived in the educational dimension, while the African–American sub-group is more deprived in employment status. This too follows the same pattern as Alkire and Foster's (2010) more aggregate results by race. However, our model has developed a different framework centered on decomposition according to the gender of the head of the household. This allows us to provide direct evidence that African–American and Hispanic female-headed households with children are the most-deprived sub-groups. Of course, the period covered in this chapter is such that it includes the Great Recession. Accordingly, it remains for further research to find out if the recovery significantly changes the above results or whether the factors responsible for the US chronic poverty are institutional. Our analysis suggests that targeting these segments of the Pennsylvanian population would be an effective method of poverty reduction, especially with regard to work status, for instance the improved provision of child care facilities. Moreover, given that Hispanics are the fastest growing segment of the US population, the provision of English-language-improving centers for the Hispanic single mothers may turn out to be an effective tool of poverty reduction public policy.

Notes

1. There is a long history of research on the U.S. income poverty profile that relates to the issues examined in this chapter from a multidimensional perspective. See, for example, Moore et al. (2009) on female-headed African–American and Hispanics households being the largest population sub-group in poverty in the post-2000 period. According to Gardin (2012), these sub-groups display poverty rates that are 2–2.5 times greater than that observed for the White sub-group. See also Seccombe (2000) and Rodgers and Rodgers (1993) among others.
2. See also Wagle (2007, 2014).
3. By income, African–Americans are decidedly richer than the population of most developing economies. However, the U.S. African–American life expectancy in 2011 was 74.3 years (Social Science Research Council

2011), behind Ecuador (76.5 years), Panama (77.1 years) and Costa Rica (79.5) (UN Development Program 2013).

4. For instance, the A&F multidimensional approach for the U.S. has four dimensions (i.e., income, health, health insurance, and schooling), whereas the capability study for Indonesia provides three dimensions—expenditure, Body Mass Index, and years of schooling.
5. Inadequate education reinforces household poverty in many ways other than lower success in the labor market; for example, children with low parental education are less likely to do well at school and are more likely to have low human capital.
6. Only 483 of the household heads in our Census data picked the option "Unemployed and last worked 5 years ago or earlier or never worked", while 73,789 household heads, affecting 124,541 people, left this question blank.
7. One may expect that the greater the age of the head of household, the higher the likelihood that the household head possesses a housing unit. However, our data shows that the correlation coefficient between ownership of a real estate and the age of the head of household is, at 0.1988, rather weak.
8. See Appendix 1 for (*i*) and (*ii*) decompositions details.
9. Hispanic sub-group in the data file has 7104 households, population = 18.775. Hispanic and white-alone has 3,836 households, population = 9960. Hispanic and "white alone or in combination with one or more other races" has 4.100 households, population = 10,627.
10. The U.S. 5-year Census has an important shortcoming in that it lacks health insurance data for the household head, a significant indicator of deprivation in the U.S. The information is available with the 3-year PUMS data, but provides only half the number of observations as compared to the 5-year PUMS. The 3-year PUMS would have been too small a sample for reliable examination of the non-White population. Since these population groups are the main focus of this study, the M_0 indices presented in this chapter use the 5-year PUMS without health insurance data.
11. See Appendix 1 for details.
12. See Appendix 1 on the aggregate M_0 poverty ranking.
13. See Appendix 2.
14. Results are presented in Appendix 3.
15. The full results for sensitivity to both effects are available from the authors.
16. See Lelli (2001) or Qizilbash and Clark (2005) for applications.
17. For similar partial fuzzyset measures see also Wagle (2009).

Appendix 1: Aggregate Level Decomposition

From our modified sample given in Appendix Table 9.8 (bottom row), we obtained an Income Poverty Headcount (*YPH*) of approximately 0.094, while the Multidimensional Poverty Headcount (*MPH*) according to our indicators is *0.168* along with a Poverty Intensity (*A*) of 0.453. Thus, we obtain our Multidimensional Poverty Index M_0 as the multiple of *MPH* and *A*, namely, 0.0*76*.

1. Decomposition by Racial and Ethnic Sub-groups

To examine the distribution of deprivation among ethnicities, we decompose the index by ethnic sub-groups. Appendix Table 9.8 shows that the M_0 has the same poverty ranking as the *YPH*. Hispanics are the most deprived of the sub-groups, Whites are the least deprived of the sub-groups, and the African–American sub-group is in the middle. Similar to the general index, the M_0 index for each sub-group is smaller than its *YPH*. Statistically, we observe that the M_0 indices of African–American and Hispanic sub-groups are three and three and one-half times greater, respectively, than the M_0 index of the White.

2. Breakdown of the Dimensions

We decompose the aggregate M_0 as indicated by Eq. (9.4). For the full sample (which has the M_0 index as 0.076), the most significant dimension is the dimension of work status (i.e., the employment status of husband and wife) with a non-deprived household defined as having at least one member employed full time. It has an index of 0.12, which contributes 41% of the total deprivation. The second one is the dimension of education, which captures 30% of the deprivation with an index of 0.09. The other two dimensions, dimension of income deprivation and dimension of living standard, with their indices from 0.04 to 0.05, have less impact than the work and educational dimensions (Table 9.9; Fig. 9.2).

In the remainder of this Appendix, as in the main text, we discuss the results of applying our Quadruple Decomposition Model to the above sample.

3. Decomposition by Household Type Sub-groups

Examining Appendix Table 9.10 for household type decompositions, we obtain an index for the married couple household sub-group

Table 9.8 Decomposition, ethnic subgroups

Sub-group	*Population*	*Contrib. (%)*	*YP H*	*Contrib. (%)*	*MPH*	*Contrib. (%)*	*A*	M_0	*Contrib. (%)*
Hispanic	18,775	3.06	0.2625	8.57	0.436	7.95	0.5152	0.2246	9.05
White	553,543	90.21	0.0779	75.00	0.1441	77.48	0.4383	0.0631	75.00
African–American	41,293	6.73	0.2288	16.43	0.3633	14.57	0.4958	0.1801	15.96
Total	613,611	100	0.0937	100	0.1678	100	0.4528	0.076	100

Table 9.9 General dimension breakdown

Dimension	M_0	*Contrib. (%)*	*D1 E*	*Contrib. (%)*	*D2 W*	*Contrib. (%)*	*D3 Y*	*Contrib. (%)*	*D4 LS*	*Contrib. (%)*
Total	0.076	100	0.0901	29.65	0.1242	40.88	0.0391	12.86	0.0505	16.61

Fig. 9.2 Breakdown, general

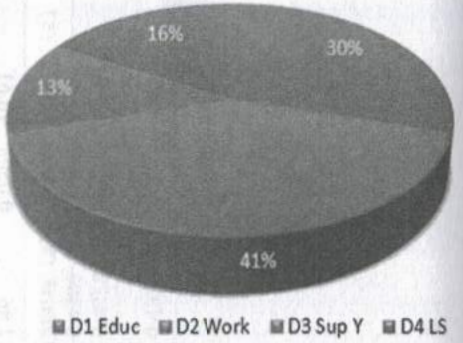

Table 9.10 Decomposition, African–American sub-group

Sub-group	*Population*	*Contrib. (%)*	*MPH*	*A*	M_0	*Contrib. (%)*
Married couple	396,572	64.63	0.1148	0.4389	0.0504	42.86
Male-headed	81,000	13.20	0.193	0.4389	0.0847	14.72
Female-headed	136,039	22.17	0.3072	0.4731	0.1453	42.42
Total	613,611	100	0.1678	0.4528	0.076	100

andwmale-headed household sub-group of 0.05 and 0.08, respectively. By contrast, the index for the female-headed household sub-group (0.15) has a notably higher ranking than the M_0 index of the married couple household sub-group and twice as large as the index of the male-headed household sub-group. Female-headed households are 22% of the sample; they contribute 42% to the deprived population, whereas the married couple households are 64% of the population, yet their contribution to the deprived population is just under 43%; the male-headed households' percentage contribution remains unchanged. Therefore, the female-headed household sub-group is the most-deprived sub-group in this decomposition.

4. Summary: Aggregate Level Decompositions

From the two decompositions above, we observe that the most-deprived sub-groups are the following: Hispanics, African–Americans, and female-headed households.

Appendix 2: Robustness Test

An alternative approach to MP is fuzzy set theory. Its application draws strength from the idea that it is futile to attempt exact measurement of poverty since the concept is inherently ambiguous. The fuzzy set approach takes into account the vagueness of the distinction between the poor and non-poor, allowing partial membership in a poverty set based on a membership function, $F^*\pi$, where F is the degree of membership in the [0, 1] interval, with $\pi = 1$ for those definitely poor and with $\pi = 0$ for those definitely non-poor. For those who are poor to *some degree,* $0 < \pi < 1$ (Cerioli and Zani 1990). The in-between set then allows for different definitions of poverty groups.[16] A simplified version of this approach is to focus only on the lower end of the poverty scale and to examine changes in the measurement of poverty resulting from degrees of high chronic poverty (Wagle 2009).

We examine two alternative methods to check for the robustness of our M_0 results when determining the poor *vs.* non-poor boundary. One method is to adopt a different value for the poverty threshold k in

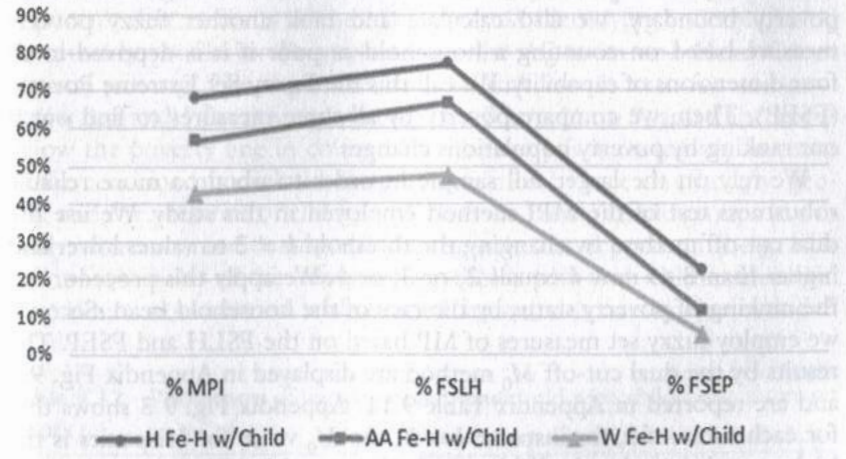

Fig. 9.3 Robustness of Female-headed households with child. (a) % MPI: percentage of population deprived by MPI standard. (b) % FSLH: percentage of population deprived using. (c) % FSEP: percentage of population deprived using fuzzy set extreme poverty standard

Table 9.11 M_0 according to different k

M_0	$k=2$	$k=3$	$k=4$
African–American	0.2152	0.1801	0.1427
Hispanic	0.256	0.2246	0.1809
White	0.1101	0.0631	0.0398

the dual cut-off method. The other is to allow for fuzziness or vagueness in the poverty boundary by the fuzzy set methodology discussed above. We employ both approaches for robustness to the ranking of high chronic poverty population groups. However, since the main purpose of our fuzzy set measures is to check for poverty rank robustness rather than obtaining a full set of fuzzy poverty calculations, we rely on simple fuzzy set measures of MP for two different types of boundaries separating the poor from the non-poor.[17] The first measure is based on counting a household as poor if deprived in at least two of the four capability dimensions. We call this the Fuzzy Set Lower Half (FSLH) measure of standard of living. Given our limited purpose in employment of the FSLH, we set the threshold for the FSLH at 0.375. This threshold value results in an aggregate FSLH population in poverty similar to that obtained by the M_0 index. To check for robustness in vagueness in the poverty boundary, we also calculate and rank another fuzzy poverty measure based on counting a household as poor if it is deprived in all four dimensions of capability. We call this the Fuzzy Set Extreme Poverty (FSEP). Then, we compare poverty by all three measures to find out if our ranking by poverty populations changes.

We rely on the larger full sample in order to obtain a more reliable robustness test of the MPI method employed in this study. We use the dual cut-off method by changing the threshold $k = 3$ to values lower and higher than 3 so now k equals 2, or 3, or 4. We apply this procedure to the ranking of poverty status by the race of the household head. Second, we employ fuzzy set measures of MP based on the FSLH and FSEP. The results by the dual cut-off M_0 method are displayed in Appendix Fig. 9.3 and are reported in Appendix Table 9.11. Appendix Fig. 9.3 shows that for each value of k, for instance $k = 2$, the M_0 value for Hispanics is the highest and the value for Whites is the lowest with African–Americans in between. Note, however, that Appendix Table 9.11 also shows that the gap between White poverty and non-White poverty becomes more pronounced as we adopt k values closer to extreme poverty (third column).

Appendix Table 9.12 and Graph IId focus on the main household populations by gender, race or ethnicity, and the presence of children that are identified above as high chronic poverty groups in Pennsylvania; comparing M_0 with FSLH and FSEP values. Once again, allowing for vagueness in separating the poor and non-poor by FSLH and FSEP produces the same ranking as M_0. That is, Hispanics have the highest poverty ranking and Whites the lowest and African–American are in between; and once again the FSEP gap between the White and non-White poor is more pronounced compared to the FSLH.

We conclude that our capability-based measures of poverty appear to be robust to the cut-off point employed for M_0 calculations and are robust if we allow for a substantial degree of fuzziness in the boundary between the poor and the non-poor.

Appendix 3: Poverty Profiles: Income-Based and Multidimensional

In this Appendix, we present findings from the estimation of probit models with the goals of predicting the probability of being in poverty conditional on the variables revealed in the previous section to be the important determinants of the MP index and identifying and comparing the poverty profile for Pennsylvania by the M_0 index and Head-Count Income poverty. The dependent variable indicator is zero for non-poverty status and 1 for poverty status (if $k > 3$ in column 3, and if income is below the poverty line in column 2). The analysis is exclusively in terms of the combined household categories defined by race or ethnicity, gender, and the presence of children. With three racial/ethnic groups in this study, there are nine demographic categories that depend on the gender and marital status of the heads of households with and without children. The White non-married male-headed households act as the excluded

Table 9.12 Robustness of female-headed household with child using fuzzy set theory

Sub-groups	*% MPI*	*% FSLH*	*% FSEP*
Hispanic Fe.H w/child	68.26	76.98	22.05
African.AFe.Hw/child	56.76	66.65	11.05
White Fe.H w/child	42.96	47.56	5.00

Table 9.13 Probit estimates by income-based poverty and by multidimensional poverty for probability of falling into poverty conditional on key features of the household

Race/gender/child Presence [a]	*Income-based poverty*	*Multidimensional poverty*
Hispanic male head w/child	0.9262 (22.62)	0.5679 (16.41)
Hispanic male head w/o child	0.6303 (10.50)	0.5545 (12.39)
Hispanic married w/child	1.3464 (16.40)	1.1335 (14.93)
Hispanic married w/o child	0.9696 (27.14)	0.9416 (32.33)
Hispanic female head w/child	2.0996 (54.99)	1.5547 (40.30)
Hispanic female head w/o child	1.5401 (41.77)	0.8075 (10.51)
African–American male head w/child	0.6825 (16.27)	0.1474 (4.12)
African–American male head w/o child	0.3559 (7.77)	0.4000 (13.29)
African–American married w/child	1.4497 (24.96)	0.9803 (17.87)
African–American married w/o child	0.8995 (41.49)	0.6331 (36.77)
African–American female head w/child	1.7880 (73.11)	1.2424 (53.83)
African–American female head w/o child	1.3206 (67.11)	0.6591 (37.93)
White male head w/child	0.2288 (16.01)	−0.3171 (−30.92)
White married w/o child	0.9029 (35.66)	0.4184 (19.60)
White married w/o child	0.7822 (62.32)	−0.0336 (−3.48)
White female head w/child	1.4960 (94.10)	0.8946 (66.56)
White female head w/o child	0.9277 (80.28)	0.1600 (19.26)
Constant	−1.9812 (−205.32)	−1.1152 (−198.60)
Log-Likelihood	−77,796.36	−112,958.74
N	269,316	269,316
McFadden pseudo R^2	0.1166	0.0654
% Success Predicted	0.899	0.837

[a]Reference missing group: White single male-headed households without children. Absolute values of z scores in parentheses

base category. The results appear in Appendix Table 9.13, the second column for income-based poverty and the third for M_0 poverty.

The poverty profiles suggested by the two approaches have a great deal in common, and both are highly consistent with the M_0 analysis and results reported above. First, all categories in both models, with the exception of White male-headed households with children and White female-headed households without children in the third column, affect the poverty profile in the expected positive direction. Second, note that within each racial/ethnic category, the coefficient estimates for female-headed households with children are the largest in size and are the most

significant. This suggests single motherhood is the most important feature that increases the chances of being poor in terms of income or M_0. Still, there are equally significant racial/ethnic differences within the female-headed households with children in terms of the increased chance of being poor. This brings us to the third aspect: the estimated coefficient size for the female-headed households with children can be ranked as the largest for Hispanic, the next largest for African–Americans, and the smallest for Whites, with their statistical significance levels following the same ranking. In general, however, there is a considerable degree of agreement between the earlier M_0 analysis and the probit results here; the latter confirm and reinforce the main results of the above M_0 calculations.

The probit analysis for the likelihood of being poor, based exclusively on the intersection of race/ethnicity, gender, and marital status of heads of households, indicates that the demographic variables identified above are effective conditional variables for obtaining probability estimates of household poverty status in Pennsylvania.

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CHAPTER 10

Assessing Multidimensional Deprivation Among the Elderly in the USA

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10.1 Introduction

Aging is not a single process but one that is influenced by multiple economic, social, and psychological factors. The number of Americans aged 65 or older is projected to exceed 70 million, or 20% of the population, by 2030 (CDC 2013). The economic costs of dependency and underlying medical conditions at older ages are large and are projected to grow rapidly as the number of older adults in the United States of America (USA) continues to increase in the coming decades. Hence, measuring deprivation among elderly adults provides valuable guidance for the provision of health care and the estimation of health care costs. This information will be critical to the formulation of smart public policies since it effectively allows for the simultaneous targeting of multiple dimensions.

In the last few decades, the literature on multidimensional deprivation has been at the frontier of poverty research. Several methodologies, such as the latent variables analysis, factor analysis, fuzzy set, and information theory, have been used to formulate multidimensional deprivation measures (Kakwani and Silber 2008). The most widely used index is the one adopted by the United Nations to measure multidimensional poverty across countries. The United Nations Multidimensional Poverty Index

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