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Multidimensional Poverty in Seychelles

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Abstract:

The typically used multidimensional poverty indicators in the literature do not appear to be relevant for middle-income countries like Seychelles and can yield unrealistic estimates of poverty. In particular, the deprivations typically considered in such measures little occurs in middle-income economies. In this paper, we propose a new approach to measuring multidimensional poverty in Seychelles based on a mix of objective and subjective information about households living conditions, and on how these households view their spending priorities. The empirical results based on our new approach show that a small but non-negligible minority of Seychellois can be considered as multidimensionally poor, mostly as not being able to satisfy their shelter and food basic needs. Finally, the Seychelles social aid programs run by the Agency for Social Protection is poorly targeted whether evaluated in terms of multidimensional poverty or in terms of one-dimensional monetary poverty.

Keywords: Poverty, Multidimensional Wellbeing, Destitution, Seychelles

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1. Introduction

Poverty measures focused on income and expenditures are widely recognized as not fully taking into account the extent and sensitivity of poverty[1]. Over the past decade, there has been a growing interest among researchers and policy makers in the concept of multi-dimensional poverty. This was spurred by the seminal work of Nobel Laureate Amartya Sen, which underpins the concept and measurement of human development. The writings of Sen and others drew attention to the multiple deprivations suffered by many of the poor and the interconnections between these deprivations and thus provided the normative basis for a multi-dimensional approach to poverty.

However, the multidimensional poverty measures used in the applied literature are based on diverse arbitrary methodological assumptions. In particular, the deprivations typically considered in such measures little occur in middle income economies. Our first contribution is to solve this shortcoming by using a mix of objective and subjective information, including the views of households about their priorities. This delivers credible figures for multidimensional poverty in Seychelles, with an incidence of multidimensional poverty not far away for the estimate of the monetary poverty rate. Our second contribution is to exhibit the main deprivations suffered by Seychelles households, as they themselves state them: shelter and food. We also provide detailed analysis of the components of multidimensional poverty in this context. Our third contribution is to reveal the dramatically low targeting performance of social programs in Seychelles, whether in terms of monetary poverty and multidimensional poverty.

We base our study on Sen's capability approach which views poverty as the lack of multiple freedoms that individuals value and have reason to value (Alkire 2007), and a review of the limitations of the typically used multidimensional poverty indicators. This paper argues for the use of a new approach for measuring multidimensional poverty in Seychelles which can

[1] Notably in Africa, for example with Ramessur (2009) who emphasizes the role of transport deprivation in urban poverty.

influence the government's capacity to monitor and improve social protection programs and policies in Seychelles.

Seychelles is a small, open upper middle-income country with high standards of living and social indicators. It has a high gross national income (GNI) per capita of US $ 11,130[2] and is classified as a high human development country (UNDP HDI Report, 2011). Seychelles had the highest Human Development Index (value of 0.773) in all of Africa in 2011 and ranked 52nd out of 187 countries. The country has already achieved most of the Millennium Development Goals (MDGs), including those relating to education, health, women's empowerment, and the environment.

While it is claimed that abject visible poverty does not exist in Seychelles, there are still pockets of relative poverty (MDG Status Report 2010). Results from the 2006-2007 Household Expenditure Surveys showed that 18% of Seychellois households were unable to meet basic calorie requirements. On average, 21% of households' income was spent on food purchases. According to the National Statistics Bureau, the food poverty line was set at SR 38.90 per day which was above US$ 3. Thus, the absolute poverty line of US$ 1.25 did not apply to Seychelles. However, it is quite likely that there would be very few (statistically negligible) persons, living below the set absolute poverty line. The minimum salary is set at SR19.50 (or US$1.50) per hour for casual work or SR22.50 (or US$1.75) per hour for a full day's work (MDG Status Report, 2010).

Seychelles is currently undergoing a transition from a welfare state to a market-based economy. As a small, open and service-based economy, it remains vulnerable to global economic shocks and variability in terms of trade, which affects tourist arrivals, the main source of foreign exchange earnings for the country. Following a huge balance of payments and debt crisis in 2008, Seychelles embarked on an IMF-supported comprehensive macro-economic reform strategy. The bold fiscal reforms and fundamental exchange rate liberalization helped to restore macro-economic balance and stabilize the economy. However, several developments such as the downsizing of the public sector, higher inflation due to exchange rate depreciation and increase in the global food and fuel prices have all led to increase in the cost of living, while their impact on poverty is unclear.

The results of the May 2012 Living Conditions Survey, funded by UNDP, brought to attention the consequences of the latest food price hikes and the current global financial crisis

[2] In 2011; World Bank

for Seychelles. For example, it has been found that 43% of households consider the price hikes as the main shock they had to suffer in the last two years (The Living Conditions in Seychelles, UNDP 2012 report). Moreover, the consequences of these shocks have been found to affect diverse dimensions of household well-being and living conditions. For example, nearly 20% of the surveyed households say that they do not have enough income to satisfy their basic food needs. Moreover, natural linkages between different policy sectors emerge when considering this diversity. Government social programs are generally specialized to meet specific needs and support requirements of the population. In contrast, family issues, poverty, and gender issues are directly linked with social programs supporting unemployed single mothers – an important group for social welfare in the Seychelles. Seychelles has a generous social security system, though it is plagued by inefficient targeting of social transfers.

An Agency for Social Protection (ASP) was created in January 2012 by the Government of Seychelles by merging the Social Welfare Agency and Social Security. The Agency for Social Protection, is now directly funded by personal income taxes. However, the agency lacks information on its target population, and how to reach and support it efficiently. Capacity building and enhancing the ability of the ASP to provide an effective welfare system is a primary area of focus for the UNDP in the Seychelles. UNDP has been supporting reform of the social welfare system and modernization of the Social Welfare Agency.

Against the above, the motivation for this study has come from the need to better understand the nature and the extent of multidimensional poverty, and thereby assist the country in better targeting the poor and enhancing the efficacy of social programs in Seychelles. The Poverty Alleviation Committee is currently looking for guidance on to how to produce a national index of multidimensional poverty. They consider that the typically used global MPI does not fit the Seychelles context and needs. The Agency for Social Protection has also expressed concern about the use of indicators that cannot be adapted to the Seychelles context.

In Section 2 of the paper we discuss the methodology of the typically used global multidimensional poverty indicators and the reasons why they are not relevant for Seychelles. In Section 3, we present the methodology for a new multidimensional poverty index for Seychelles. In Section 4, we discuss the previous work carried out on diverse dimensions of poverty in Seychelles. The estimation results of the Seychelles multidimensional poverty indices are presented in Section 5. In Section 6, we discuss the results of gender disaggregated MPI. We report our estimation results of multidimensional targeting of the

social welfare programs in Section 7. In the last Section we conclude with a discussion of the implications of our findings for measurement of poverty and targeting of social welfare in Seychelles.

2. Methodology of Multidimensional Poverty Indices

This section briefly describes and reviews the methodology for the Multidimensional Poverty Index (MPI) indicators and discusses the reasons why they are not relevant for an upper middle-income country like Seychelles.

2.1 Review of multidfimensional poverty indices

Various measures of aggregate well-being have been used in poverty literature. Although, measures based on income dominate economic literature, many authors suggest that relative deprivation consideration [3] and multidimensional dimensions must be accounted for in poverty evaluations. It is often claimed that welfare measures solely based on income provide a distorted picture of the situation of the poor, notably for poverty comparisons across countries[4].

Alkire and Foster (2007), Alkire and Santos (2010) and Belhadj (2012) propose 'Multidimensional Poverty Indices' that aggregate individual discrete poverty features into a synthetic 'individual poverty score'. These scores can then be aggregated at country level as it is finally a one-dimensional welfare index.

Alkire and Foster (2007) provided an alternative methodology for the measurement of multidimensional poverty and the identification of those deprived in multiple dimensions by proposing a new Multidimensional Poverty Index, which we denote AF-MPI.

The AF-MPI comprises of 10 indicators within three dimensions of Health, Education, and Living Standards. Within education, there are two indicators each weighted at 16.7%: "No one has completed five years of schooling" and "At least one school-age child not enrolled in school". Health also has two indicators weighted at 16.7% each: "At least one member is malnourished", and "One or more children have died". Living standards has six indicators, but carries equal overall weight in relation to the other dimensions as each indicator is weighted at 5.9%: "No electricity", "No access to clean drinking water", "No access to adequate sanitation", "House has a dirt floor", "Household uses "dirty" cooking fuel", and

[3] Desai and Shah (1988), Foster (1988), Sen (1983, 1997).
[4] Bourguignon and Chakravarty (2003), Atkinson (2003).

"Household has no car and owns at most one of: bicycle, motorcycle, radio, refrigerator, telephone or television" (UNDP 2010).

The Alkire and Foster method has a dual cutoff point system in which each individual indicator has a deprivation cutoff point, and then the aggregate AF-MPI has a poverty cutoff point. If a household is deprived of 20%-33.3% of the weighted indicators it is considered to be at risk; if deprived of 33.3% or more of the weighted indicators, it is considered to be multidimensionally poor; and lastly if a household is deprived of 50% or more of the indicators it is considered as severely multidimensionally poor (UNDP 2011). The results of the MPI are then reported using the Foster-Greer-Thorbecke poverty measures (Foster, Greer & Thorbecke, 1984, denoted FGT); estimates are given representing the poverty headcount (estimated total poor population), and the poverty severity (depth of poverty of the average poor person).

The AF-MPI was incorporated in the UNDP's Human Development Reports for the first time in 2010 following the work of the Oxford Poverty and Human Development Initiative, and the UNDP's Human Development Report Office. The AF-MPI is the successor to the Human Poverty Index (HPI) that was used from 1997, but with some notable methodological improvements. Whereas the HPI was calculated using national averages, the AF-MPI uses household level data for estimates. This has the added benefit of allowing identification and estimation of the poor at the national, regional, group, or household level.

On the other side of the analytical spectrum, sophisticated country welfare comparisons can be performed by assuming large degrees of generality and diversity in the design of decision criteria. In particular, stochastic dominance techniques have been proposed to encompass broad sets of opinions about the poverty criteria (e.g., Atkinson and Bourguignon, 1982, Muller and Trannoy, 2011).

However, the typically used multidimensional poverty indicators in the literature do not appear to be relevant for middle-income countries like Seychelles and even yield unrealistic estimates of poverty. Indeed, in Seychelles the general living conditions are good and almost nobody or very few people are found to be living in a shack, having an outdoor toilet, having a house with dirt floor, or malnourished children. This is not to say that poverty is not a matter of concern to Seychelles households, particularly after the IMF-supported structural adjustment programme and the ongoing global and Euro-zone crisis. Many people have lost their employment, their purchasing power has dropped with rising prices, and social problems

are on the rise. Also, explicit requests for multidimensional approaches to welfare have been voiced by government agencies (Agency for Social Protection, 2012). Clearly, more appropriate indicators of multidimensional poverty are needed that would better reflect the concerns and living conditions of Seychelles households.

A general concern in the literature about multidimensional poverty is the arbitrariness in the choice of attributes. Researchers like Ravallion (2011) have raised concerns about the arbitrariness of hypotheses and would rather prefer adding attributes than adding deprivation indices, or considering dimension-specific indicators and favour the utility-consistent poverty measures. Second, the weights used to construct the scores in the AF-MPI are also considered to be arbitrary. Although, a lot of different ways to derive the weights have been suggested in literature, there is no consensus. The most popular approach is to have equally weighted dimensions. This neglects the obvious fact that some deprivations are much more important than other ones.

The typical approaches to measuring multidimensional poverty are denoted through the Intersection approach (a person is poor in all the poverty dimensions) and the Union approach (a person is poor in at least one of the poverty dimensión). However, in middle-income countries like Seychelles, when considering more than two or three dimensions, the Intersection approach yields an estimation of poverty rates equal to zero or almost zero, while the Union approach yields estimates of the majority of the population being poor, which is grossly counterintuitive for these countries.

The typical application of the Alkire and Foster method (AF-MPI) in these countries meet with other problems. The typically used wellbeing indicators for each dimension correspond to almost zero population of destitute households, at least that is the case in Seychelles for 9 of the 10 basic indicators. This would correspond to almost zero poverty, which is not factually correct and therefore of little practical relevance as a social indicator for Seychelles. Moreover, the notion of poverty developed is intimately connected to counting dimensions, which is perhaps a debatable way of defining it. Finally, there is some arbitrariness in various steps (choice of the dimensions, weights for each of the dimensions, poverty thresholds) suggesting that the results too may be arbitrary.

Various policy-makers, officials and experts in Seychelles considered the used AF-MPI as not relevant or useful for the country. One reason is that for many of the selected attributes/indicators, almost no Seychelles household can be found destitute. They have

highlighted the need for a multidimensional poverty measure which better reflects the concerns and living conditions of Seychelles households.

In this context, our strategy is to take advantage of a new data collection instrument developed for Seychelles, the 'Living Condition Survey', which provides subjective, though relatively reliable, information about the unsatisfied needs of households in diverse welfare dimensions (Muller, 2012a, b) and is now the basis of the multidimensional poverty index for Seychelles. We denote the new indicator merely 'MPI'.

2.2 Methodology of the MPI

In this Section we discuss the methodology for the multidimensional poverty index in several steps: (1) Selection of the welfare dimensions, (2) Specification of the observed welfare variable for each dimension and the corresponding individual deprivation indicators, (3) Definition of the set of the poor, (4) Specification of the aggregation function of the individual deprivation indices.

2.2.1 The Selection of the Welfare Dimensions

A major issue in the context of choosing multidimensional indicators is selecting the most contextually relevant welfare dimensions to consider. The selection should be based on the following considerations. First, the basic dimensions must be meaningful and recognized as central to the definition of poverty. This, for example, is the case for income and health status. Second, quality and availability of data are crucial. There is no use, at least for policy guidance, to develop theories on indicators that cannot be calculated in practice. Finally, one should only incorporate dimensions for which non-negligible poverty has been observed. This is particularly important for Seychelles where many typical deprivation indicators would yield negligible estimates.

The choice of indicators (those embodying command over well-being and those directly delivering well-being) is an important consideration for MPI. In principle, welfare attributes should be intrinsically good and directly deliver well-being or utility. In practice, some variables used as welfare attributes, starting with income and perhaps education, rather represent command over commodities, while other variables produce well-being directly. There are additional reasons to exclude income as a welfare dimension in this study. First, the country has already produced extensive data on income-poverty, more accurately 'living standard poverty' for the poverty profile of Seychelles (Muller, 2011). Second, the monetary information that was used for poverty profile was extracted from the 2005-06 Household

Budget Survey. As these data are rather old, we prefer to base most of our analysis on the 2011 Living Conditions Survey. However, this survey data does not include precise income or consumption expenditure information, which is also the case for many 'poverty alert surveys'.

For estimating the welfare dimensions we consider a population of n individuals. Individual i is characterised by n-row vector of welfare attributes, x_i which corresponds to m non-negative numbers. We consider that all the attributes are non-negative as is generally the case in applied work. The row-vector x_i is the i^{th} row of matrix X in M^n that is the set of all n x m matrices of nonnegative numbers. Let x_{ij} be the quantity of the welfare attribute j possessed by individual i.

Matrix X is a convenient notation as each of its columns provides the information on the distribution of a specific welfare attribute in the population. Let x^j be the j^{th} column of X. It describes the distribution of the j^{th} attribute.

Consider for example the following sub-matrices. Let $x^1 = (x_{11}, x_{12}, x_{13}, x_{14}, x_{15})'$ that describes the column vector of shelter endowment for a population composed of n = 5 individuals; $x^2 = (x_{21}, x_{22}, x_{23}, x_{24}, x_{25})'$; the corresponding vector of food consumption; and $x^3 = (x_{31}, x_{32}, x_{33}, x_{34}, x_{35})'$; the corresponding vector of health statuses. The matrix X, composed of all the x_{ij}, with i from 1 to 3 and j from 1 to 5, describes all these three welfare attributes for all the individuals in the population. In particular, $x_i = (x_{i1}, x_{i2}, x_{i3})$ shows the shelter, food and health attributes characterising the welfare of individual i, for i from 1 to 5.

We now need to define formally the poverty lines and deprivation notions. Let z be the m-vector of the m dimension-specific poverty lines (z_j, for j = 1,…, m). An individual is said to be 'poor in the j^{th} attribute' if $x_{ij} < z_j$. She is non-poor if x_{ij} is greater or equal to z_j.

2.2.2. Definition of the Poor

The poor have been variously defined in the literature on MPI. In a one-dimensional poverty analysis, a person is deemed poor if she/he falls below a pre determined poverty line. In multidimensional approaches, some economists (DasGupta, 1993) have indicated that to be poor a person has to be deprived in all dimensions (the 'Intersection' approach). However, a limitation of this approach is that even with a few dimensions, it leads to a very small number of people categorised as poor based on actual data. Moreover, one would like to deal with households who may not have a very low income but may be considered as poor based on

other grounds. One of the main justifications for constructing multidimensional indicators is to identify the deprived households who would pass a means test.

Alkire and Foster (2011) propose to define as poor a household who is deprived in more than a given number of dimensions. Bourguignon and Chakravarty (2003) propose to consider instead that a person is poor if she/he falls below at least one of the dimension-specific poverty lines (the 'Union' approach). We follow their approach, while only for the dimensions corresponding to the main priorities.

3. A New Multidimensional Poverty Index for Seychelles

We now present a new approach to multidimensional poverty that solves some of the problems discussed above. To summarise, for our proposed new methodology for Seychelles the idea is: (1) to base the identification of the poor on the highest stated priorities by the monetary poor households, (2) to aggregate all the dimensions according to their priority percentages in household responses, (3) to propose an aggregation formula. The shortcomings mentioned earlier with existing methodology are addressed by using the self-stated priorities of Seychelles households.

While several alternative methods for computing weights for MPI have been proposed by researchers, one way of specifying the priority weights is to account for explicit statements of households in the population, which we have adopted for our study. For example, the percentage of households stating a given priority could be used as a natural of way of specifying weights. This has the advantage of providing non-arbitrary weights.

The data that is used to calculate the proportion of households for each priority for this study is drawn from the answers to the question 'On what would you spend a small additional sum of money?' However, as we want to have a criteria reasonably representative of the general population of the poor, we only use the answers for the income-poor households, as defined by comparing their 1996 per adult-equivalent total expenditure with the Seychelles national poverty line deflated to correspond to 2012.

We propose using the 'priority discounting' of deprivations, which has the advantage of reducing the extent of the Union approach head count index, often found excessive (for example, 42 % with 5 dimensions in Seychelles). Doing so also makes less dramatic the omission of one or several dimensions in the index due to observation obstacles.

The identification of the poor in Seychelles is based on the Union rule defined on a few highest priority dimensions. In the case of Seychelles, according to household responses, there are two high priority dimensions on which household would spend an additional amount of resources if they could: shelter and food. An indicator akin to the head-count index in one-dimensional poverty is the following proportion of the poor:

$$IM(X ; z) = 1/n \ \sum_i \ \{ 1[x_{i1} < z_1] + (1 - 1[x_{i1} < z_1])1[x_{i2} < z_2] \},$$

which can of course be adapted to any other set of 'highest priorities'. The formula expresses recursively the union criterion dummy variable.

Another issue we deal with is that most available deprivation indicators are categorical or even binary. Then, the approach of specifying more or less 'poverty severity' sensitivity by using a poverty severity function in the formula of the poverty indicators is not going to yield much interesting empirical results. Alkire and Foster address this difficulty by counting dimensions. Our approach is instead to introduce further deprivation indicators corresponding to a second level of priority. Our intensity of poverty indicator is therefore based on a weighed sum of deprivation indicators, although only when counting the poor as defined by their highest priorities. We obtain:

$$M(X ; z) = 1/n \ \sum_i \ \{ 1[x_{i1} < z_1] + (1 - 1[x_{i1} < z_1])1[x_{i2} < z_2] \} \{ \sum_j \ w_j \ 1[x_{ij} < z_j] \},$$

where w_j is the weight allocated to dimension j. That is: $\sum_i \sum_j \ w_j$ over all the destitute dimensions of the poor divided by the number of individuals. This formula weights the above union criterion dummy at the individual level by a numerical indicator that cumulates the priority weights of all deprivations for this individual.

Consistent with our concern for welfare priorities of the poor, we choose as w_j the proportion of monetary poor households who stated j as their first priority. Of course, other rules could also be used for the weights.

For our new approach to multidimensional measure for Seychelles, by accounting only for the basic needs and using the monetary poor ranking, we obtain 5 dimensions : (i) Shelter; (ii) Food; (iii) Water/electricity; (iv) Health; and (v) Education as explained in Section 4. Though debt repayment, acquisition of household appliance and saving-insurance are also important for these households, we did not include them as they are not basic needs in the conventional sense.

We now discuss the construction of the deprivation indices for each of the five identified dimensions. The shelter dimension is based on the number of rooms of the dwelling. We define the variable 'dwelling density', or 'density, as the ratio of household size to the number of rooms which is the number of persons per room. We then, define the variable '*shelter destitution*' as the indicator variable of households such that their density is greater than 3. The *food destitution* variable is based on the question about the 'ease of obtaining food' in the LCS. The *water-electricity destitute* households are defined as households who cannot pay either for their electricity or for their water. Households are said to be '*destitute in health*' if they had stated that there was at least one person with health problem in their household. Households are said to be'*destitute in education*' if their head had no education or only primary education. We first define the population of the poor on the highest household priorities only: food and shelter.

We use the respective percentages based on the priority responses as weights so as to incorporate some information about the multidimensionality of poverty in our poverty indicator. However, we perform this operation only for our identified set of the poor corresponding to the households that are destitute in shelter or/and in food. Introducing this additional information makes our approach distinct from the pure Union approaches.

The formula for our estimator is therefore obtained by the following two steps:

First, we define P5 = (34.49 d_shelter + 12.20 d_food + 9.06 d_waterelec + 6.97 d_health +1.74 d_educ) / (34.49 + 12.20 + 9.06 + 6.97 + 1.74),

where the variables with a prefix 'd_' are the corresponding dummies for each dimension-specific destitution. That is, P5 is a mean destitution variable, weighted by the priority percentages for each dimension.

However, as mentioned earlier we need to restrict our set of the poor households to the one being destitute only in shelter or in food. This is done by defining our multidimensional poverty (intensity) measure as:

$$M = IM \times P5$$

where the variable IM is 1 for poor households who are destitute in shelter or/and food, and 0 otherwise.

The method used in the paper innovates in that it is based on the notion of priorities expressed by households and not merely on counting weighted dimensions. The elementary welfare indicators used for our study are the few ones for which there are available data.

Thus, we use a 'modified Union method' in two respects: First, the Union method based on shelter and food is only used for the identification of the poor, not for the aggregation of dimensions that incorporate all dimensions. Second, we leave open the initial set of dimensions to account for in the identification of the poor. That is the priorities elicited in the household answers that determine what are the priority dimensions to use.Thus, in fact we have something different from the oft used Union approach that is based on an a priori fixed set of dimensions. For example, in our new methodology, if households had answered that health, education and transport are their highest priorities; we would have had a very different set of poor.

4. Some One-Dimensional Statistical Results

For monetary one-dimensional poverty, the estimated poverty line, worked out to 13,554 Seychelles Rupees per adult-equivalent per year for 2006. The monetary poverty rate was estimated at 17 percent of the population, which corresponds to 12 percent of monetary poor households (Muller, 2012a). These figures correspond to a broad notion of poverty based on the opinions of Seychelles households on subsistence minima expressed in terms of total consumption expenditure, including housing expenses. This is not comparable with the poverty measures based on nutrient minima that are used for some extremely poor countries, which is not the case for Seychelles. Indeed, poverty based on notions of hunger would yield almost nil estimates in a country like Seychelles, and therefore would be irrelevant for managing social programs.

Poverty was found higher in households led by unemployed heads, or by female or heads with little education. Other categories of households especially affected by poverty are the large families and fishermen families.

The Data

The data for our empirical analysis was drawn from the 2011 Living Conditions survey designed so as to provide information on basic needs by consumption category (Muller, 2012a, b). The Living Condition Survey (LCS) re-surveyed the same households who had

been randomly selected for the 2006/07 Household Budget Survey (HBS). A total of 1,225 households were contacted among whom 1,125 households were finally interviewed. The sample covered Mahe, Praslin and La Digue islands, excluding households headed by expatriates as well as institutional populations (i.e. individuals living in hospitals, military barracks, and prisons) and households on outer islands. The survey dealt with all members of the household and the geographic unit for data collection was the district. The survey took place from February to June 2011.

First, we examine the objective dwelling dimension of household welfare. Some households may have a dwelling in a bad state: 7% for stone/block houses, and 5% for wood/iron dwellings. However, such a general piece of information is insufficient to define shelter destitution. Moreover, 2% of households live in a single room (not very statistically significant, especially when accounting for possible measurement errors) and 8% in only two rooms. On average more than three persons live in one of these typical one-room dwellings.

These objective measures of housing are confirmed by 29% of households who felt that they don't have an adequate number of rooms. Interestingly, these households are often living in dwelling with three to five rooms.The type and location of kitchen and toilet facilities are often used to measure destitution in terms of housing. In Seychelles, 15% of households have a kitchen improvised inside the house, although this may not necessarily be a serious welfare issue. The situations of households with an improvised kitchen outside the house are very rare, accounting for only 1.3 % of the households concerned. The type of toilet facility is less discriminating, as almost all families in Seychelles enjoy flush toilet. Only 1.2% of the surveyed households have only pit latrines or even no toilet at all. However, the percentage is so small here that it is not very statistically significant, especially when accounting for possible measurement errors.

The earlier public policy of providing free or low cost accommodation to destitute households has now been withdrawn. It is therefore possible that the percentage of households living in mediocre dwellings, and especially in limited dwelling space, would have gone up in the context of the macro-economic reform and the recent global economic crisis.

A dimension where destitution is sometimes severe is that for food consumption. Indeed, one third of households surveyed stated that they sometimes faced some difficulty in obtaining daily food, and another 5% considerable difficulty. The responses to other queries give us

more insight in this seemingly important issue. For example, premium rice may sometimes be considered as being of bad quality which may perhaps hint at poverty status as 13 % of households consume it. Moreover, 19% of households state that they don't have the ability to buy sufficient fruit and vegetables, while 21% of households state that they don't have the ability to buy sufficient fish and meat, and they are generally the same households. This food deprivation must be understood in terms of tastiness and quality of food, rather than caloric intakes. Indeed, obesity has been found an important health problem in the Seychelles (Yepes et al., 2015).

We now discuss the basic clothing needs. More than 28% of households state that they don't have enough clothing, but only 1.2% 'not enough at all'. Responses from female headed households are only slightly higher, hinting at possible destitution in clothing. About 7% of households admit to wear worn clothes, and 10% not to have adequate clothing for outings.

When dealing with health destitution, it is natural to first look at the information about health status. 15% of persons have stated health problems in the last twelve months in the surveyed households. Furthermore, this proportion reaches 47% for elderly persons above sixty years old. Interestingly, 40% of all observed health problems corresponds to these elderly persons.

However, simple statements of health problems need to be interpreted with caution. Typically, less educated, poorer and less healthy respondents have been found in the literature to underestimate their health problems in such answers. It is, therefore, useful to complement the information about health with data about the perceived health expenditure needs of households. In Seychelles, 60% of households stated that in the last 12 months they needed to buy medicines over the counter, a much larger percentage (12 %) than that for health problems. Only very few, less than 1%, however indicated that they don't have the means to buy medicines. This is consistent with the fact that health care is mostly free in Seychelles. On the whole, all these frequencies suggest that not everybody can meet his or her basic health needs in Seychelles, even though basic health care is free.

Diverse categories of consumption expenditures are grouped under utilities. In Seychelles almost all households use gas or electricity as the energy source for cooking or lighting. Only less than 1% of the households use wood for cooking, or candles for lighting. The extent of destitution in energy may therefore seem to be negligible. However, the picture appears to be less positive when considering that as much as 7% of households admit to have had electricity disconnected because of failure to make payment during the past 12 months.

Besides 11% of households declared that they had not been able to pay for electricity on time every month during this period.

Looking at water access needs yield similar results. Almost all households have access to treated water, with less than one percent not having access. However, more than 6% of households indicated using a private source of water, such as a river, which may raise doubts about the quality of this water. Yet, on the whole, it seems fair to say that the water quality is satisfactory in Seychelles. Nonetheless, 10 % of the households stated that they did not have the means to pay their water bill every month in the last 12 months, and almost 5% of households suffered water disconnection in the same period.

Transportation is another area of concern. One fifth of households meet some difficulty in meeting their transport needs, and another 3% face considerable difficulty or cannot at all meet such requirements. These difficulties are partly explained by the dwelling location and the work location of households. The mode of transportation is another major explanatory factor. Most households encountering such difficulties are found to have no means of transport or to be using buses.

Education needs are also hard to assess. First, it may be almost non-existent when there is no child of school-going age in the household. Even when there is, the number and the ages of the children matter, making the comparison of different household needs difficult. 21% of households have stated that they cannot buy school items or have to sacrifice other things to do it. In particular, 5.5% of the households say that they don't have the means to buy lunch for their children to take to school. This is worrying in a country like Seychelles where education is mostly free of charge. Public support to education appears all the more crucial as only 5% of the households answered that they have the means to pay for private school for children. However, these statistics reveal schooling needs for children rather than current education deprivation for adults, which can be better described by the constrained adult education level.

5. Estimates of Multidimensional Poverty Indices for Seychelles

5.1. Definitions of indicators

The variables *a priori* selected for the wellbeing dimensions are limited by the availability of data/information. Moreover, we prefer using basic needs information over command variables. One advantage of this is that much of the information used is in the form of self-

stated destitution, which avoids availing of information on needs heterogeneity. The sample had to be reduced further to 783 observations because of missing values for some of these well-being variables.

When households were asked what their spending priority would be if they were given some additional amount of money, 32.3% answered that they would spend it on shelter, 14.1% on food, 14% that it would be set aside for worst times, while the other categories were less often chosen. The importance of food needs for a non-negligible proportion of households confirms the severity of food destitution in Seychelles. Table 1 shows the percentage of answer for each category by the monetary poor. The analysis of the individual occurrences within the category 'Others' revealed that it would not change much the picture for the main priorities.

These responses lead us to give more importance to shelter needs than in typical poverty analyses in LDCs. Food also appears as a major dimension of the expressed needs. We regroup water and electricity deprivations as in the priority questions. Health and education are still important, but perhaps for direct description of the destitution rather than budget information, as many health and education related expenses are free in Seychelles as mentioned earlier. Clothing needs are too rarely mentioned by the surveyed households to make sense to include them. Thus, based on expressed priorities, we are left with five dimensions, with two appearing as prominent: shelter and food. It is interesting to note that our choice of the welfare dimensions is based on an empirical argument. Note that we have avoided 'command variables' like income, to arrive at a list of destitution variables more directly related to basic needs. It is therefore different, but complementary to previous MPI or HDI estimations. Other answers such as debt reimbursement or saving are important but as they do not necessarily correspond to commonly referred basic needs, we do not consider them in our analysis. Incidentally, 12% of households were found to be monetary poor in Seychelles (Muller, 2012a).

Table 1: Priorities of the Monetary Poor

If had some additional money	Freq.	Percent
Food	35	12.20
Water/Electricity bill	26	9.06
Household appliances	16	5.57
Health	20	6.97

Shelter	99	34.49
Uniforms/Shoes/School necessities	4	1.39
Private school	1	0.35
Clothing	1	0.35
Transportation	3	1.05
Debt repayment	28	9.76
Set aside for worst times	40	13.94
Don't know	1	0.35
Holiday	3	1.05
Other	10	3.48
Total	287	100.00

Thus, by accounting only for the basic needs of the monetary poor, we obtain 5 dimensions: (i) Shelter; (ii) Food; (iii) Water/Electricity; (iv) Health and (v) Education. Though debt and household appliance and saving-insurance are also important for these households, we did not include them in the list of basic needs.

5.2. Deprivation Indices

We now discuss the construction of the empirical deprivation indices for each of the five identified dimensions. The shelter dimension is based on the number of rooms of the dwelling. We define the variable 'dwelling density', or 'density, as the ratio of household size to the number of rooms which is the number of persons per room. This variable ranges from 0.125 to 7. It has a mean of 1.05 and a standard deviation 1.07. We then, define the variable '*shelter destitution*' as the indicator variable of households such that their density is greater than 3. That is: a household is deemed 'shelter destitute' when a person lives in a dwelling with 4 persons per room, or more. We obtain 3.69 percent of households in such case.

The *food destitution* variable is based on the question about the 'ease of obtaining food' in the LCS. A household is deemed 'food destitute' if it was stated as having 'considerable difficulties in obtaining food. There are 4.72 percent of such households. The *water-electricity destitute* households are defined as households who cannot pay either for their electricity or for their water. There are 11.72 percent of such households.

Households are said to be '*destitute in health*' if they had stated that there was at least one person with health problem in their household. There are 26.75 percent of such households, often composed of elderly persons. Households are said to be'*destitute in education*' if their

head had no education or only primary education. There are 35.89 percent of such households. Obviously, much more accurate specification of the destitution variables would be desirable, and we suggested that this could be pursued by Seychelles authorities along with further data collection.

5.3 Estimation of MPI

We use the above information for the estimation of multidimensional poverty in Seychelles. It is noted that first, there is no observed household in the LCS with all the five selected dimensions of destitution. This corresponds to the Intersection approach to poverty identification. It is therefore obvious that this approach is not applicable to Seychelles. Second, the Union approach, which identifies the poor households as the ones destitute in at least one dimension among the five selected dimensions, yields a percentage of 42%, too high a figure for Seychelles, a middle-income country with high human development indicators. This exaggerated figure shows that using this approach for so many dimensions may not be practical for Seychelles. Such high estimates of the extent of poverty are a common and well-known shortcoming of the Union approach.

However, reducing the number of dimensions in the Union approach, according to their revealed priorities, progressively yields more sensible estimates. Indeed, omitting education reduces the percentage of multidimensionally poor households to 38.9%. Further, eliminating health yields 17.6% using only two priority destitution dimensions, our proposed approach, leads to a more reasonable figure of 8.16 %. Note that alternatively, keeping water-electricity expenses in the first priority set of destitutions would still deliver a reasonable magnitude (17.6%). Interestingly, these two estimates rather closely bracket the percentage of the monetary poor households (12 %).

It is observed that shelter-destitute households are also often water-electricity destitute (24 %) and especially health destitute (41%), but rarely food destitute (6.9%) and never education destitute.

Table 2 shows the correlations of the destitution variables, which are denoted with a prefix ‘d_’ in the tables and formulae. Interestingly, no strong correlation emerges, with the larger one being the correlation of food destitution with water-electricity destitution (14%). This weak link between the various dimensions of basic needs is a further motivation for the multidimensional poverty.

Table 2: Correlations of the Destitution Variables

	d_shelter	d_food	d_waterelec	d_health	d_educ
d_shelter	1.000				
d_food	0.020	1.000			
d_waterelec	0.075	0.143	1.000		
d_health	0.064	0.028	-0.005	1.000	
d_educ	-0.047	0.025	-0.053	0.043	1.000

While discussing the basic needs stated by the monetary poor households, we found that shelter comes as the first priority corresponding to 34.5%of the answers, food comes second with 12.2 % of answers, followed by water-electricity (9.1%), health (6.9%), and education (1.7%).

We now use these respective percentages as weights so as to incorporate some information about the multidimensionality of poverty in our poverty indicator. However, we perform this operation only for our identified set of the poor corresponding to the households destitute in shelter or/and in food. As mentioned above, the formula for our estimator is therefore obtained in two steps.

First, P5 = (34.49 d_shelter + 12.20 d_food + 9.06 d_waterelec + 6.97 d_health +1.74 d_educ) / (34.49 + 12.20 + 9.06 + 6.97 + 1.74)

The mean of this variable, P5, is 0.076, with a standard deviation of 0.13. For 58% of the households this indicator is nil, which corresponds to an Union criterion based on five dimensions.

Second, our multidimensional poverty (intensity) measure is

$$M = IM \times P5,$$

where the variable IM is 1 for poor households who are destitute in shelter or/and food, and 0 otherwise. Variable IM represents the incidence of food-shelter deprivation and allows us to define correspondingly our set of poor households.

We estimate our new multidimensional poverty indicators, IM and M, using Seychelles data. The resulting multidimensional indicator M has a mean 0.036 and standard deviation 0.13. It reaches its maximum at 0.86 and is non-zero only for 8.1 percent of the observed households. Some household are shelter-food poor but not destitute in other dimensions. Some households are not only shelter-food poor, but also destitute in other dimensions. However,

the linear correlation coefficient of M and IM is very high (0.90), even when restricting to the population destitute at least in one of the five considered dimensions (0.89). This is because most of the destitution originates from food and shelter in Seychelles and adding the other dimensions to the analysis does not affect much the diagnosis. This is an interesting result, not easy to detect by using only one-dimensional statistics. Besides, the correlation coefficient of these measures with the Union poverty rate based on five dimensions is much lower: 0.31 with M and 0.35 with IM.

5.4 Decomposed MPI

On decomposing, we find that shelter contributes to 56.1 percent of M, food to 25.4 percent, water and electricity to 9.1 percent, health to 9.0 percent, and finally education to 0.2 percent. As expected, shelter and food are the dominating dimensions of multidimensional poverty in Seychelles. Education makes a negligible contribution to multidimensional poverty because very few households are simultaneously food-shelter destitute and education destitute (only 3 such observed households in the sample). This may be partly due to the free accommodation policy followed earlier that allocated accommodation to households led by heads with low education level (instead of using unobserved income). Of course, such a situation is a peculiarity of Seychelles and may not be found in many other contexts.

5.5 MPI by Household Size, Region and other characheristics of Household Head

We also analysed MPI in terms *of household size, region, and other characheristics of household head.* We found that multidimensional poverty increases with household size. It is relatively stable at low levels for households under four members, and increases at size four (due to the threshold chosen for the shelter destitution), and fluctuates thereafter (Table 3). Multidimensional poverty is higher in Central and East-South regions, and lower in Praslin/La Digue (Table 4).

Table 3: Multi Dimensional Poverty By Household Size

Household_size	M	IM
1	0.010	0.031
2	0.011	0.044
3	0.013	0.052
4	0.055	0.106
5	0.047	0.122
6+	0.068	0.125
Total	0.035	0.081

Table 4: Multi Dimensional Poverty by Region

Region	*MPI_Intensity*	*MPI_Rate*
Central	0.035	0.108
East/South	0.067	0.126
West	0.033	0.059
North	0.015	0.047
Praslin/La Digue	0.006	0.027
Total	0.035	0.081

Multidimensional poverty appears to be higher in households where the head is a manual worker or is unemployed, and lower when the head is a manager or a technician (Table 5). In terms of education, our analysis reveals that multidimensional poverty is lower for heads with primary education as compared to heads with secondary education (Table 6). Let us put aside the households whose heads have no education or have university level education as they correspond to few observed households only, and concentrate on the central three education levels. When estimating one-dimensional monetary poverty, we found that poverty was inversely related to the education level of the head which is not the case with multidimensional poverty. This may be because shelter and food are the dominating dimensions. When crossing the level of education of the household head variable with the shelter destitution variable we find that those with primary education live indeed less often in crowded dwellings. This seems to be the consequence of government policies towards providing free accommodation to low education adults. In that sense, having primary education only becomes an advantage for multidimensional poverty, as compared to secondary education, which however, may not sound intuitive without the insight about the previous government housing policy.

Table 5: Multi Dimensional Poverty by Occupation of Head

Occupation	M	IM
Managers Professionals & Technicians	0.019	0.040
Clerical & Service Workers	0.038	0.087
Manual Workers	0.047	0.108
Unemployed	0.059	0.100
Other Inactive	0.032	0.081
Total	0.036	0.081

Table 6: Multi Dimensional Poverty by Level of Education of Head

Education of Head	M	IM
No Schooling	0.018	0.069
Primary	0.038	0.083
Secondary	0.040	0.100
Vocational/Polytechnic	0.031	0.058
University (&pre)	0.027	0.065
Total	0.036	0.081

Analysis of MPI by occupational sector of the household head reveals that the sector hotels and restaurants stands out as being little affected by multidimensional poverty (Table 7). This may be because many employees are getting free meals at work, and are therefore less likely to be food deprived. It is also noticeable that households whose heads are working in agriculture, especially fishing activities, are not particularly affected by multidimensional poverty, as compared to what was found for monetary poverty. It is plausible that these households, mostly led by fishermen, can provide food to their family from the fish they catch, and are therefore less likely to be food deprived.

Table 7: Multi Dimensional Poverty by Occupational Sector of the Head

Sector of Head	M	IM
No Sector	0.040	0.090
Agriculture/Fishing/Quarry	0.034	0.080
Manufacturing/Energy/Water/Construction	0.030	0.090
Trade, repairs & Transport	0.056	0.100
Hotels and Restaurants	0.019	0.041
Other Services	0.038	0.117
Professional, scientific, administration	0.031	0.070
Education & Health	0.052	0.111

5.6. Regressions of Destitution Indicators

Table 8 shows the regression estimation results of the main destitution indices and multidimensional poverty measures over a list of socio-economic and regional variables. Only a few coefficients emerge as significant. Household size is positively correlated with shelter destitution, shelter-food poverty and multidimensional poverty. The education of the head only negatively affects health destitution, while the age of the head as well as the unemployment of the head is positively correlated with health destitution. There is a regional

pattern of the diverse destitutions with the East/South region suffering more from multidimensional poverty, whereas North and Praslin/La Digue are the less affected regions.

Table 8: Probit Regression Estimates (and OLS estimates for Column M)

	(1) d_shelter	(2) d_food	(3) d_water-elec	(4) d_health	(5) IM	(6) M
Gender	0.074	0.21	0.21*	0.074	0.11	0.0066
	(0.73)	(0.23)	(0.099)	(0.49)	(0.46)	(0.49)
Household Size	0.24***	0.027	0.041	-0.016	0.13***	0.013***
	(1.8e-07)	(0.49)	(0.19)	(0.51)	(0.000022)	(5.8e-08)
Head's Education	0.069	-0.055	-0.0042	-0.062**	0.012	-
	(0.19)	(0.30)	(0.91)	(0.034)	(0.77)	
Head's Age	-0.0020	-0.011	-0.0070	0.026***	-0.0031	-0.00034
	(0.86)	(0.28)	(0.32)	(0.00001)	(0.70)	(0.47)
Manager/Professional	0.099	-0.59*	0.18	-0.096	-0.45	-0.018
	(0.82)	(0.098)	(0.49)	(0.63)	(0.13)	(0.32)
Clerical & Service Work	0.50	-0.48	0.39	0.085	-0.095	-0.0098
	(0.24)	(0.14)	(0.11)	(0.66)	(0.73)	(0.59)
Manual Workers	0.68	-0.16	0.35	-0.18	0.16	0.010
	(0.11)	(0.60)	(0.15)	(0.34)	(0.54)	(0.55)
Unemployed	0.47	-0.57	0.10	0.68**	-0.059	0.012
	(0.41)	(0.28)	(0.77)	(0.013)	(0.88)	(0.65)
East/South	0.74***	-0.31	0.47***	0.0087	0.057	0.032**
	(0.0059)	(0.12)	(0.0040)	(0.95)	(0.74)	(0.015)
West	0.30	-1.21***	-0.11	0.11	-0.48**	-0.0051
	(0.34)	(0.0030)	(0.60)	(0.49)	(0.035)	(0.73)
North	-0.23	-0.53**	-0.31	-0.16	-0.54**	-0.023*
	(0.54)	(0.029)	(0.14)	(0.31)	(0.016)	(0.098)
Praslin/La Digue		-0.61**	0.29	-0.35*	-0.71**	-0.028*
		(0.031)	(0.14)	(0.056)	(0.010)	(0.067)
Intercept	-3.74***	-0.61	-1.49***	-1.69***	-1.63**	0.0058
	(0.00015)	(0.43)	(0.0094)	(0.00022)	(0.010)	(0.87)
Observations	675	784	785	785	784	782

p-values in parentheses: *** p < 0.01, ** p < 0.05, * p < 0.10

6. Gender Disaggregated MPI

As women are the primary recipients of social welfare in Seychelles, and women headed-households are typically perceived in the literature to be more likely to be in poverty we disaggregate the multidimensional poverty measures by gender.

Monetary one-dimensional poverty was found notably higher in female-headed households than in male-headed households (Muller, 2012a). This is a common feature found in most of the economic literature on poverty. However, the gender situation is special in Seychelles. In most of the poor countries of the world, this observed feature is much due to the fact that households led by female heads are mostly led by widows, and widows are often poor since they are inactive and there is no adult male bread-winner in the family. In contrast, in Seychelles a majority of households are led by female heads even when they are not single mothers, widows or on their own. This seems to result from the traditional gender-sharing in household decisions in Seychelles which bestows an important role to women. However, it is likely that the higher poverty levels of households led by female heads is associated with a non-negligible proportion of lone mothers raising their children on their own and the difficulty for them in having a productive activity because of this burden; or with gender-wage segregation in the labour market. However, there is a need for further investigation of the factors responsible for this.

Looking at multidimensional poverty and crossing it with other poverty correlates may help us in better understanding what is happening to the relationship between gender and poverty. However, as the Tables 9 illustrates, the notion of household head appears to be blurred in Seychelles by the relative equality of family status of women and men. This may perhaps be due to the fact that the person who was indicated as the household head during the survey was just the person who was interviewed, or was present, and had no particular leading role within the family. This may explain why in the following tables the gender of the household head is much less clearly related to other correlates of poverty and to poverty itself than in other countries. This situation also calls for further investigation of the decision making roles within households in Seychelles.

Table 9: Multi Dimensional Poverty by Household size and Gender

Household Size	*MPI_Intensity*			*MPI_Rate*		
	Male	Female	**Total**	Male	Female	**Total**
1	0.005	0.020	**0.011**	0.017	0.052	**0.031**
2	0.010	0.012	**0.011**	0.040	0.045	**0.044**
3	0.021	0.009	**0.014**	0.083	0.032	**0.052**

4	0.047	0.064	**0.056**	0.082	0.127	**0.106**
5	0.042	0.052	**0.048**	0.100	0.136	**0.121**
6+	0.070	0.070	**0.070**	0.133	0.118	**0.123**
Total	0.032	0.038	**0.036**	0.075	0.086	**0.081**

It is observed that multidimensional poverty is slightly higher for households led by a woman (M = 0.038, IM = 0.075) than by a man (M = 0.032, IM = 0.075). Furthermore, multidimensional poverty is much higher for women living on their own, as compared to men in the same situation. Poverty is slightly higher in households led by women for household sizes four and five. It is lower for household size over five, and equivalent for households made of two persons. No obvious explanations emerge from what appears to be a complex demographic situation.

Households led by female managers, technicians and unemployed are less affected by multidimensional poverty than their male counterpart (Table 10). In the case of unemployed women, they may often benefit from social support from the state, for example through schemes assisting 'abandoned women'. On the opposite, households led by female clerical, service and manual workers as well as other inactive workers suffer more from poverty than their male equivalents.

Table 10: Multi Dimensional Poverty by Occupation and Gender of Head

Occupation of the Head	*M*			*IM*		
	Male	Female	**Total**	Male	Female	**Total**
Managers Professionals & Technicians	0.028	0.011	**0.019**	0.063	0.021	**0.040**
Clerical & Service Workers	0.026	0.044	**0.038**	0.040	0.109	**0.087**
Manual Workers	0.039	0.058	**0.047**	0.094	0.126	**0.108**
Unemployed	0.074	0.052	**0.059**	0.111	0.090	**0.096**
Other Inactive	0.024	0.036	**0.032**	0.073	0.085	**0.081**
Total	0.032	0.038	0.036	0.075	0.086	0.081

Analysis by level of education reveals that female-led households are more affected by multidimensional poverty when the head has primary/secondary education, or university level diploma (Table 11). In contrast, when the head has no schooling, or has a vocational diploma, multidimensional poverty is higher for male-led households.

Agriculture-Fishing and Trade-Transport sectors show higher multidimensional poverty for female-led households (Table 12). This may be related to the physical strength disadvantage of female workers for many activities in these sectors. In contrast, there is more such poverty in male-led households working in 'Other Services'. It is noticeable that in sectors where wages do not depend on gender, such as for civil services, education and health sectors, there is not much difference in poverty between female-led and male-led households.

Table 11: Multi Dimensional Poverty by Education of Head and Gender

Education of the Head	*M*			*IM*		
	Male	Female	**Total**	Male	Female	**Total**
No Schooling	0.025	0.013	**0.018**	0.117	0.038	**0.069**
Primary	0.032	0.042	**0.038**	0.067	0.095	**0.082**
Secondary	0.037	0.042	**0.040**	0.101	0.100	**0.100**
Vocational/Polytechnic	0.036	0.028	**0.031**	0.071	0.050	**0.058**
University (&pre)	0.019	0.040	**0.027**	0.035	0.111	**0.065**
Total	0.032	0.038	0.036	0.075	0.086	0.081

Table 12: Multi Dimensional Poverty by Occupation and Gender of Head

Sector_Head	*M*			*IM*		
	Male	Female	**Total**	Male	Female	**Total**
No Sector	0.036	0.042	**0.040**	0.085	0.094	**0.090**
Agriculture/Fishing/Quarry	0.011	0.074	**0.034**	0.062	0.111	**0.08**
Manufacturing/Energy/Water/ Construction	0.036	0.022	**0.030**	0.090	0.090	**0.090**
Trade, repairs & Transport	0.016	0.135	**0.056**	0.05	0.2	**0.1**
Hotels and Restaurants	0.023	0.014	**0.019**	0.039	0.043	**0.041**
Other Services	0.073	0	**0.038**	0.2	0	**0.111**
Professional, scientific, administration	0.031	0.030	**0.031**	0.061	0.075	**0.070**
Education & Health	0.059	0.050	**0.052**	0.111	0.111	**0.111**
Total	0.032	0.038	**0.036**	0.075	0.086	**0.081**

On the whole, no pervasive evidence of gender-biased poverty emerges from these data, although, as mentioned before, this may be on account of the ambiguity of the notion of household head in Seychelles

7. Estimates of Multidimensional Targeting Performance

Based on the available data, we now discuss the targeting of the social welfare support in Seychelles. Because of the lack of adequate administrative data, we use the information about Social Welfare Agency support (SWA) collected from the Living Condition Survey for our analysis. Indeed, at present no similar information can be obtained from the Agency for Social Protection.

Our analysis reveals that even if some households are in dire straits, they do not always feel comfortable to apply for social aid from SWA (Table 13). 20% of respondents would find it embarrassing 'for a less fortunate family' to seek SWA aid. However, as many as 35% of the households have already sought support from SWA. Besides, 16% of households who had sought SWA assistance said that they currently had no financial problems. This may be because their situation has improved, or because they wanted to take advantage of social aid though they never really needed it. This suggests reviewing the social wefare system to plug loopholes. On the other hand, only 3% of households responded that they were not aware whether government benefits exist or how to get them.

Table 13: Responses Relating to Social Aid in Seychelles

Not on Welfare because	*Percentage*
No need	38.2
Do not know if benefits exist	0.76
Do not know how to get benefits	1.91
Embarrassed to ask	3.44
Do not qualify	31.34
Other	10.57
Not Stated	13.76
Total	100

12% of households surveyed stated that they were receiving SWA aid. This figure however, needs to be compared with official SWA statistics which are not readily available as such information from surveys may underestimate the actual extent/coverage of welfare programs.

Our analysis shows that the main source of income of the households is predominantly wage earnings (68%). In contrast, the households who received social aid in the past, or are currently receiving it, often stated that this aid is their main source of income (69% and 81%, respectively). This result indicates long-term dependence of some households on social welfare .

The information about the type of social aid being received is far from accurate in the LCS data. We therefore use the data on the assistance provided by SWA for working out targeting indicators for the Agency for Social Protection in Seychelles. Multidimensional (IM) and monetary (M) poverty indicators have been multiplied by 100 in the Tables 14, 15 and 16 to make them more comparable. Thus, IM is the percentage of the multidimensional poor. (M is not a percentage, though).

Table 14: Responses regarding receipt of Social Benefits

Receiving Welfare at Present	*M*	*IM*
Yes	6.3	15.3
No	3.2	7.2
Total	3.6	8.1

Table 15: Responses regarding receipt of Social Benefits –Poor & Non Poor

Receiving Welfare at present	*IM*		*Monetary Poverty*	
	Not Poor	Poor	Not Poor	Poor
Yes	10.69	21.88	11.22	14.58
No	88.75	78.13	88.34	84.38
Not Stated	0.56	0	0.44	1.04
Total	100	100	100	100

Table 16: Percentage of Social Welfare Beneficiaries

Receiving Welfare at	*IM*	*Monetary Poverty*

present				
	Not Poor	Poor	Not Poor	Poor
Yes	84.62	15.38	84.62	15.38
No	92.74	7.26	88.21	11.79
Total	91.84	8.16	87.72	12.28

It is reassuring to find that the multidimensional poverty is almost twice higher for people receiving social benefits (15% of them are multi-dimensionally poor) than for the population at large (8%) (Table14).

Table 15 shows the percentage of the poor and non-poor households that receive or do not receive social benefits, for our two alternative notions of poverty - multi-dimensional and monetary. Only about 22 % of the multidimensional poor households receive social assistance, which is quite low. However, in terms of monetary poverty, only 15 % of the poor households benefit from social welfare programs. Clearly, there is much need for reviewing and reforming social welfare programs in Seychelles. Notwithstanding this, there still appears to be some useful selection of applicants as the number of non-destitute households receiving welfare is slightly lower. The very low coverage in the case of monetary poverty may be on account of the fact that it is based on 2006 data, while the information about multidimensional poverty and social programs corresponds to 2011. Besides, some households may have escaped monetary poverty between the two periods, and therefore may no longer need social support. However, on the whole, the coverage of the poor by social welfare appears to be considerably low. Adopting a multidimensional approach may only help to alleviate the coverage problem to limited extent as this is probably the consequence of the piece-meal approach historically adopted for social programs in Seychelles, without any clear-cut targeting.

85 % of the SWA beneficiaries are not multidimensional poor, in the sense that they are not shelter-food destitute (Table 16). Interestingly, the same percentage of non-poor households receiving social aid is also observed in the case of monetary poverty. Even if a large degree of leakage of welfare benefits is relatively common, the situation in Seychelles should raise special concerns warranting further investigation and corrective action. Our analysis reveals that a large majority of households benefiting from social welfare in Seychelles are just not poor according to the new MPI measures, which suggests that they may not be the relevant target group for social programs.

8. Conclusion

We have argued for the adoption of a new approach to measurement of multidimensional poverty in Seychelles and identified several methodological limitations of previous studies in this regard. The typical approaches to measuring multidimensional poverty are denoted through the Intersection approach (a poor person is poor in all dimensions) and the Union approach (a poor person is poor in at least one dimension). However, in middle-income countries, when considering more than two or three dimensions, the Intersection approach yields an estimation of poverty rates equal to zero or almost zero, while the Union approach yields estimates of the majority of the population being poor, which is grossly counterintuitive for these countries.

The typical application of the Alkire and Foster method (MPI index) in these countries meet with other problems too. The typically used wellbeing indicators for each dimension correspond to almost zero population of destitute households. Zero poverty in Seychelles is not factually correct and therefore of little practical relevance as a social indicator. There appears be some arbitrariness in various steps (choice of the dimensions, weights for each of the dimensions, global poverty thresholds) suggesting that the results too may be arbitrary.

The methods used in the literature all amount to proposing different arbitrary weighed averages of destitution indicators. The methodology used in this paper is different and innovative in that it is based on the notion of priorities expressed by households and not merely on counting weighted dimensions. Our choice of welfare indicators are largely based on available data.

Our results show that there is a non-negligible amount of multidimensional poverty in Seychelles, which mostly corresponds to shelter and food destitution. Several correlations of multidimensional poverty have been analysed, although gender is surprisingly little correlated to such poverty.

When assessing the performance of the social program, whether in terms of multidimensional poverty or monetary poverty, we find that the coverage of the poor by social welfare programs is significantly low in Seychelles, while the amount of leakage of social benefits to the non-poor is very large.

Our proposed new methodology is simple, globally replicable and can be applied to other country contexts. The only requirement being that a survey is conducted incorporating some

of the questions about destitutions and priorities of the Living Conditions Survey. This is a cost effective tool for data collection as the questions can be incorporated in any household survey routinely carried out in different countries. The advantage of this proposed approach is that each country would have a definition of multidimensional poverty capturing better both its household opinions and priorities and its policy context. Besides enhanced targeting efficiency, formulating social welfare policies could become much easier as the poverty measure would reflect better the poor households priorities and choices, and thus better support the programs for upliftment of the poor and vulnerable.

We have no pretentions that our multidimensional poverty measure helps in fully addressing all the shortcomings of the global MPI in the context of a middle-income country. The main limitation of our proposed new methodology relates to availability of data/information. For our methodology to be applied, a specific household survey must be carried out that provides information on the diverse dimensions of welfare destitutions and on household welfare priorities.

Let us turn to a few policy recommendations. First, there is a need for building a better and comprehensive data system in Seychelles in order to improve targeting efficiency and guide and facilitate evidence-based social policies. In particular, asking questions about the decision making role of the diverse members in the household would help in clarifying statistical results typically based on the characteristics of the household head. Moreover, more accurate information on the characteristics of the dwelling and occupation variables would facilitate review of social programs and also help the ASP to adopt better selection criteria to plug leakages and improve efficiency and effectiveness of social welfare programs in Seychelles.

Indeed, one of the main policy recommendations in order to raise the overall performance of social welfare programs in Seychelles, and notably increase the coverage of the poor by social welfare programs, is to develop a fully-fledged social database in which all the necessary characteristics of the applicant and of her/his household could be recorded. Only then, could the ASP hope to gain the capacity to select applicants based on robust statistical techniques. For example, various accurately defined categories of potential beneficiaries could be used on the basis of easy-to-observe characteristics. In particular, knowing more about household demographics and dwelling and economic activities of the household members would be crucial.

One implication of our findings is that it is possible, and relatively cheap to implement, to produce multidimensional poverty measures for middle-income countries that not only can be justified methodologically instead of based on arbitrary rules, and also can deliver relevant and realistic estimates for poverty alleviation policies.

Other methodological lessons emerge. On the one hand, developing a rigourous axiomatic setting for these new estimators seems to be important, and is currently under progress. On the other hand, there is clearly some potential of poverty measurement improvement by developing innovative questionnaires that help analyst to extract more information about basic needs from household answers.

However, one main lesson is about policy. Clearly, our empirical results show that broadening the scope of poverty measurement with realistic methods suggests to question and reorient traditional poverty alleviation policies that are often exclusively based on monetary poverty indicators.

Nonetheless, our approach also meet some limits. As regards the robustness of our new methodology, there are many different notions of robustness. For example, one is robustness with respect to the set of chosen welfare dimensions. Our approach is robust to this since we leave the households free to tell what their welfare priorities are. So, *a priori* any set of dimensions could be included, depending on household answers. Of course, we recognize that different ways of asking the questions may deliver slightly different results. However, for Seychelles we are confident about the fact that the main welfare issues have been captured. Another area for robustness relates to the choice of the destitution indicators for each dimension. Here, we believe that further investigation with more up-to-date and detailed data could lead to more precise results. In the case of Seychelles, ultimately, the choice and definition of these destitution indicators is a decision to be taken by the local authorities, and notably, the Steering Committee on Multidimensional Poverty.

Further robustness with respect to the choice the poverty line is not as serious an issue for our multidimensional poverty measure as in most other poverty analysis. Indeed, several of our destitution indicators, notably food, are directly based on the subjective statements of destitution rather than comparisons of levels of welfare attributes with dimension-specific poverty lines. However, robustness is not necessarily a quality. For example, it is worrying that largely changing the level of the poverty line in some studies does not change much the results of the analysis. This may suggests that the poverty lines are not really important for

poverty analysis, which does not sound logical, and perhaps indicates that inequality analyses would be more appropriate in such cases.

One issue is that here, as in most poverty analyses, we can only consider one period. However, the surveyed household statements show that saving, insurance and credit are important concerns for some households, hinting at the need to incorporate some kind of intertemporal information in the measurement of poverty.

Despite the considerable effort made in the specification of the destitutions, more justification of the specification of these destitution variables would be useful, and could be a standard object of investigation by social security administrations. Finally, collecting quantitative data on deprivations, and not only on the incidence of these deprivations, would allow analysts to compute and provide more precise indicators of the size of multidimensional poverty. Ultimately, the responsibility of such data requirements dwells in governments and donors, while it must not be underestimated.

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