The University of Manchester
Brooks World Poverty Institute

MANCHESTER 1824

Assessing wellbeing and deprivation in later life: A multidimensional counting approach

Armando Barrientos [1*]

Casilda Lasso de la Vega [2]

[1] University of Manchester, UK

* Corresponding author

a.barrientos@manchester.ac.uk

[2] University of the Basque Country, Bilbao, Spain

June 2011

BWPI Working Paper 151

Brooks World Poverty Institute
ISBN : 978-1-907247-50-7

Creating and sharing knowledge to help end poverty

Abstract

The paper applies a multidimensional and comparative approach to the assessment of wellbeing and deprivation among a panel of older people in Brazil and South Africa. It develops and justifies a counting approach to rank order wellbeing and deprivation distributions. An application of this approach generates substantive findings on the dynamics of the distribution of wellbeing and deprivation in later life, on stratification, and on the importance of social policy addressing ageing.

Keywords: multidimensional deprivation, pensions, South Africa, Brazil

Armando Barrientos is Research Director of the Brooks World Poverty Institute, the University of Manchester, UK.

Casilda Lasso de la Vega is Professor at the Department of Applied Economics IV, University of the Basque Country, Bilbao, Spain.

Acknowledgements

Armando Barrientos gratefully acknowledges support from the cross-UK Funding Council Programme on New Dynamics of Ageing.

Casilda Lasso de la Vega gratefully acknowledges the hospitality of the Brooks World Poverty Institute (BWPI) of the University of Manchester, where the first version of this paper was prepared. Her research has been partially supported by the Ministerio de Educación y Ciencia of Spain under project SEJ2009-11213, co-funded by FEDER.

Rapid population ageing in developing countries is a strong indicator of economic and social development. The speed of demographic change poses significant policy challenges for developing countries.[1] Building a knowledge base capable of supporting effective policies addressing rapid population ageing in the South is urgent. The paper aims to contribute to this knowledge base by developing and applying a multidimensional approach to assessing the distribution of wellbeing and deprivation in later life. It proposes and justifies a multidimensional counting approach to rank order wellbeing and deprivation outcomes in later life. Using comparable panel datasets for Brazil and South Africa, an application of this approach provides substantive findings on the dynamics of wellbeing and deprivation, on stratification, and on the impact of social policy addressing ageing in the two countries.

Measuring wellbeing in a multidimensional framework draws on a long tradition of social research greatly enriched by Sen's capability approach (Sen, 1985, 1993, 1999). From his perspective, wellbeing describes people's capacity to achieve the beings and doings they value. The recognition in the literature that wellbeing is intrinsically multidimensional provides a prima facie case for the appropriateness of multidimensional approaches to measurement (Kakwani & Silber, 2007, 2008).

However, consensus over appropriate methodologies to assessing wellbeing using multidimensional indicators lags behind that for single-dimensioned indicators. There remain large areas of potential disagreement over social judgements in assessing multidimensional wellbeing. A rapidly growing literature has emerged addressing the methodological challenges.[2] This literature has focused on identifying the properties of multidimensional indicators, their aggregation, and the evaluation of partial orderings. Atkinson (2003) contrasts the social welfare and counting approaches to multidimensional wellbeing measurement. The social welfare approach focuses on assessing multidimensional wellbeing by measuring the impact of changes in wellbeing on a social welfare function. The counting approach examines each dimension of wellbeing before aggregating them based on some counting exercise. The social welfare approach is used extensively in theoretical work, while the counting approach dominates applied work. Recent developments have greatly strengthened the analytical basis of the counting approach (Alkire & Foster, 2009; Bossert, et al., 2007; Lasso de la Vega, 2010). The paper develops a multidimensional counting approach to the assessment of wellbeing, and applies this approach to the study of wellbeing and deprivations among older people (Barrientos, 2003; Lloyd-Sherlock, 2002).

The paper aims to demonstrate that a multidimensional approach is particularly relevant, and useful, in assessing the wellbeing of older people. Researchers often remark on the apparent divergence of subjective and objective wellbeing indicators in later life. Self-reported life satisfaction often rises, on average, with age; just as conditions of daily living indicators appear to deteriorate. The panel data used in the paper has the advantage in this context that it was collected from older people directly, through a household survey, with an additional supplement collected on each person aged 55 and over. The counting approach offers a robust and informative approach to assessing wellbeing and deprivation in later life.

[1] A doubling of the share of a country's population aged 65 and over, from seven percent to 14 percent, took 115 years in France, 69 years in the USA and 45 years in the UK; but it will take 19 years in Singapore, 21 years in Brazil, and 26 years in China (Kinsella & He, 2009).

[2] There are several key contributions (Atkinson, 2003; Atkinson, Cantillon, Marlier, & Nolan, 2002; Bossert, Chakravarty, & D'Ambrosio, 2009; Bossert, D'Ambrosio, & Peragrine, 2007; Bourguignon & Chakravarty, 2003; Chakravarty & D'Ambrosio, 2006; Chakravarty & Silber, 2008).

As the discussion in the paper demonstrates, the counting approach has the additional advantage of enabling a direct evaluation of stratification and of the effectiveness of social policy addressing ageing. Pension programmes constitute everywhere the most distinctive policy instrument addressing the impact of individual ageing on wellbeing. In developing countries, and especially among low-income countries, non-contributory pension schemes are in practice social transfers to poor households channelled through older persons. Diversity in intrahousehold allocation of resources could potentially introduce a wedge between pension receipt and older people's wellbeing, with the implication that pension benefits might be less effective in improving wellbeing in old age than the financial transfer would suggest.[3] There is a strong public policy justification for a multidimensional assessment of the study of the effectiveness of non-contributory pensions.

The paper divides into four sections. Section 1 elaborates on the appropriateness of multidimensional approaches to the study of wellbeing in later age and to the assessment of social policy. Section 2 develops a conceptual framework and a methodological approach. Section 3 describes the data and the wellbeing and deprivation indicators. Section 4 applies this approach to the assessment of wellbeing and deprivation among a panel of older people in South Africa and Brazil, and assesses stratification and the effectiveness of pension provision. A final section summarises the main findings.

1. Why a multidimensional approach?

In an influential review of poverty research, Ravallion argues for the need to supplement monetary indicators of wellbeing with non-monetary indicators (Ravallion, 1996). He recommends the inclusion of indicators of access to public goods and services, indicators of personal attributes, like disability, which particularly constrain individuals, and indicators of intrahousehold distribution of resources. The rationale for the inclusion of non-monetary indicators is evident from the list. Monetary indicators are effective in showing ability to pay for available market goods, but less effective where markets are highly imperfect or non-existent. Monetary indicators are also imperfect in situations where there is significant heterogeneity in individuals' capacity to transform income into wellbeing. They are also imperfect where inequalities in power and influence within the household complicate inferences of individual wellbeing from household income or expenditure.[4] From Ravallion's perspective, the justification for multidimensional analysis is grounded in the relative (in)effectiveness with which monetary indicators capture wellbeing.

A more fundamental case can be made for measuring wellbeing and poverty using multidimensional indicators. The basic needs approach 'regards development as an improvement in a array of human needs and not just growth in income' (Bourguignon & Chakravarty, 2003, 4). It follows directly from this that wellbeing, and therefore deficient levels of it, should be evaluated on the extent to which satisfaction is achieved on this array of needs. Sen (1985, 1993) goes a step further. He argues that wellbeing refers to people's capacity to achieve the beings and doings they value. Evaluating wellbeing involves measuring people's command over assets and entitlements, together with their capacity to transform these into functionings. The extent to which they are able to exercise control in selecting those functionings they value is also important. From this perspective, wellbeing must be evaluated in a

[3] There is anecdotal evidence that pensioners may be open to abuse from relatives, loan sharks and others (Heslop & Gorman, 2000).

[4] There are also the complications arising from economies of size and demographic composition, but these can be adjusted for with the use of equivalence scales.

multidimensional framework, because it is intrinsically multidimensional. His approach pays due attention to heterogeneity in people's ability to transform assets into functionings, and also to agency.

There are important advantages arising from an evaluation of social policy in multidimensional space. They apply particularly to the assessment of non-contributory pensions. Pension entitlements consist of cash transfers to beneficiaries, and it is reasonably straightforward to evaluate the effects on pension receipt on household income (Case & Deaton, 1998). However, some factors add complexity to the relationship existing between cash transfers and older people's wellbeing. To the extent that indicators of wellbeing are imperfectly correlated with income, it can be questioned whether cash transfers to the old are effective in improving their wellbeing. This issue has arisen in different contexts. Given that non-market services and care are of special importance to older people, it can be questioned to what extent transfers in cash alone constitute the right policy instrument.[5] It has been suggested that pension entitlements may simply 'crowd out' informal networks of support for the elderly, including private transfers, reducing the net impact of cash transfer programmes on wellbeing (Jensen, 2004).

A high proportion of older people in developing countries live in extended households, and there is evidence of widespread pension sharing across the household. Altruistic grandmothers or grandfathers may use their pensions to improve the wellbeing of other household members before their own (Barrientos, et al., 2003). There is also a concern that pension entitlements, while improving the wellbeing of co-residents, could impose a heavy burden on recipients in terms of increased responsibility and exposure to mistreatment and crime (Møller & Sotshangaye, 1996; Sagner & Mtati, 1999). Household composition responses to pension receipt are also an important issue (Bertrand, Mullainathan, & Miller, 2003; Edmonds, Mammen, & Miller, 2001). Where pension income flows lead to increases in household size, or in the proportion of dependants, cash transfers may not result in significant improvements in the wellbeing of older people (C. Ardington, Case, & Hosegood, 2007). To the extent that these issues are empirically significant, evaluating the effects of non-contributory pensions on the wellbeing of older people using single indicators of wellbeing, particularly income, may well provide useful, but partial, information.[6]

In sum, the need for a multidimensional analysis of the wellbeing of older people emerges from theoretical and public policy reasons. Wellbeing is intrinsically multidimensional and therefore a prima facie case for employing multidimensional approaches is justified. This can be especially relevant to assessing wellbeing in later life. There is also a public policy justification for multidimensional analysis of the effectiveness of social policy addressing ageing.

[5] Fiscal constraints in low income countries enforce difficult trade-offs between public expenditure on public services or direct transfers (Smith & Subbarao, 2003).

[6] A number of studies evaluating non-contributory pensions in Brazil and South Africa have identified positive secondary effects associated with pension entitlements, some of which apply to non-monetary variables. These show that pension entitlement is associated with an improved distribution of income (Case & Deaton, 1998; Committe of Inquiry into a Comprehensive System of Social Security for South Africa, 2002; Delgado & Cardoso, 2000); improved health status of recipients and their households (Case, 2001); improved health and nutritional status of children (Duflo, 2003); improved housing (Schwarzer, 2000); improved status and participation of elders within their households and communities (E. Ardington & Lund, 1995; Camarano, 1999; Møller & Sotshangaye, 1996; Sagner & Mtati, 1999); and improved access to credit (Delgado & Cardoso, 2000).

2. Methodological approach

This section develops and justifies the multidimensional counting approach to wellbeing measurement followed in the paper.

2.1 Counting deprivations at the level of the individual or household

A multidimensional approach to wellbeing implies that for a population *n*, the wellbeing of person *i* can be described by an J-row vector x_i of non-negative attributes *j*, $j \in J$, with x_i being the ith row of an *n x J* matrix *X*. The (*i,j*) cell in this matrix describes the quantity of an attribute *j* observed for person *i*. The jth column of this matrix describes the distribution of attribute *j* in the population. The approach adopted in the paper aggregates attributes at the individual level, and then combines these across the population.[7]

The analysis in the paper focuses on deprivations, which are 'best seen in terms of the failure of certain basic functionings' (Dreze & Sen, 1989, 42). Deprivation d_{ij} is a function of individual *i*'s observed level of a particular attribute *j*, or $d_{ij} = f(x_{ij})$. An individual *i* is considered to be deprived with respect to an attribute *j* providing that the quantity of an observed attribute is at or below a minimum level z_j established for that attribute. In the simple case where $f(.)$ is a binary function, $d_{ij} = 1$ if $x_{ij} \leq z_j$, and 0 if $x_{ij} > z_j$.[8]

A key issue is the aggregation of the different indicators to obtain a single measure of deprivation for individuals. Two alternative strategies are followed in the literature, the social welfare approach and the counting approach. The social welfare approach links social judgements on the aggregation of indicators to the properties of a social welfare function (Bourguignon & Chakravarty, 2003; Duclos, Sahn, & Younger, 2003). The implementation of this approach to aggregation requires cardinal variables. The applied work mainly follows the counting approach, focusing on the number of dimensions in which a person shows deprivation. The counting approach is appropriate when deprivation is measured by cardinal and/or ordinal variables (Atkinson, 2003; Townsend, 1979).[9] This paper follows the latter approach and draws explicit attention to the social judgements involved.

Aggregating the different indicators into a single measure of deprivation involves social judgements, and it is important to bring these into the open. This can be done by assuming constant elasticity of substitution (CES) across deprivations. A synthetic index of deprivation based on this assumption could be represented as $d_{\beta i} = [\Sigma_j w_j d(x_{ij})^{\beta}]^{1/\beta}$ where w_j represents the relative weight of the *j*th indicator in global deprivation, and β represents a parameter describing the degree of substitution across the different deprivations (Brandolini & D'Alessio, 1998). Both w_j and β embed methodological choices with strong ethical implications. In this paper, we are concerned inter alia that individuals may have insufficient levels of consumption and that they feel insecure and have little control over their finances. In the absence of reliable information on the relative contribution of different functionings to overall wellbeing, it will be safer to assume the indicators have equal weighting (i.e. $w_j = 1$ for all $j \in J$). This implies that deprivation in one

[7] According to Pattanaik et al. (2007) this strategy is alone able to produce indices satisfying desirable properties, for example sensitivity to possible correlation between dimensions.

[8] Brandolini and d'Alessio discuss in some detail alternative specifications for this function and for the determination of the deprivation threshold z_j (Brandolini & D'Alessio, 1998).

[9] A recent literature explores deprivation indexes using the counting approach (Alkire & Foster, 2009; Bossert, et al., 2009; Bossert, et al., 2007; Chakravarty & D'Ambrosio, 2006).

dimension, say health status, is as important as deprivation in another, say personal security.[10] Equal weighting has obvious drawbacks, among them the possibility that highly correlated variables could lead to bias in the counting. Some of these weaknesses will be minimised through the implementation of robustness tests. It is equally hard to establish with any degree of confidence the extent to which different deprivations could be substituted for one another, or whether deprivation along one dimension compounds deprivation along a different dimension. For the purposes of the synthetic measure to be constructed below, it will be assumed that $\beta = 1$. This amounts to assuming perfect substitution across deprivations.

The aggregation strategy adopted in the paper will be to count the binary indicators of deprivation at the level of the individual, summarised in an individual's deprivation score $D_i = \Sigma_{j \in J} d_{ij}$. Across individuals, deprivation scores could be interpreted in an ordinal scale, an individual showing a higher number of deprivations than another could be considered to be more acutely deprived. This is sufficient to generate a ranking of individuals according to their deprivation $D_1 < D_2 < \ldots\ldots < D_J$, from least to most deprived.

2.2 Aggregating individual counts at a group/population level

A further step of aggregating individual deprivations will need to be considered and implemented, to enable comparisons across groups or populations. It will be useful to use the term 'poverty' to indicate deprivations above a particular threshold. In the union approach, an individual is in poverty if she is deprived in at least one dimension (Di>1), whereas in the intersection approach an individual is in poverty if she is deprived in all dimensions (Di=J). An alternative is to adopt a threshold of deprivations *m* such that a person can be considered to be in poverty if she is experiencing deprivations equal to or greater than this threshold (Di≥m).

We are now in a position to generate summary measures of deprivation for a group or population. The analysis will focus on two multidimensional counting poverty measures.

The 'multidimensional headcount deprivation rate' $P_m(\mathbf{D})$ describes poverty in a population by identifying the share of the population with deprivation scores equal or greater than m. This counting measure captures the incidence of poverty in multidimensional space. Denoting Q_m as the set of people in poverty and q_m as the cardinality of Q_m, it can be written as:

$$Pm\ (\mathbf{D}) = q_m / n \tag{1}$$

The second measure, $M_m(\mathbf{D})$ captures instead the 'multidimensional deprivation shortfall ratio', defined as the ratio of the average number of deprivations among those in poverty to the maximum possible deprivations the entire population could experience. This measure suggests a multidimensional version of the poverty gap ratio in single-dimensioned poverty measures. It provides an indication of the depth of deprivation experienced by those below the threshold m. It can be written as:

$$Mm(\mathbf{D}) = \left(\sum_{i \in n} D_m \Big/ q_m J \right) (q_m / n) = \sum_{i \in n} D_m \Big/ nJ \tag{2}$$

[10] Most authors adopting a counting approach adopt this strategy, see footnote. 7.

The first argument on the RHS measures the ratio of average deprivations among the poor to the maximal number of deprivations they can experience. This is weighted by the share of the population in poverty, $P_m(\mathbf{D})$.

It is possible to conceive of several other multidimensional poverty measures, perhaps generating different multidimensional poverty scores. Looking into the axiomatic properties of the poverty measures helps to assess the impact on measured poverty of selecting one or other poverty measures. Lasso de la Vega develops an axiomatic characterisation of these two counting poverty measures (Lasso de la Vega, 2010). She finds that both these measures satisfy the Poverty Focus, Symmetry and Replication Invariance axioms.[11] The $M_m(\mathbf{D})$ measure also satisfies Monotonicity, but violates Distribution Sensitivity.[12] The $P_m(\mathbf{D})$ measure violates Monotonicity and Distribution Sensitivity. This is significant because alternative poverty measures sharing the same axiomatic characterisation will rank order wellbeing and deprivation outcomes in the same way.

2.3 Multidimensional comparisons: a graphical approach

There is also a source of arbitrariness in the choice of m. Given that the poverty threshold m is set by the researcher, it is possible that different settings of the threshold could reverse the rankings of vectors of deprivation counts. Focusing on partial ordering of the vectors of deprivation counts with respect to the counting poverty measures in (1) and (2) above enables robust comparisons for all feasible thresholds. This can be facilitated with a graphical representation (Lasso de la Vega, 2010). Defining the partial orderings of deprivation counts with respect to P_m as **T**, the rule is

(3) $\mathbf{D}'\mathbf{T}\mathbf{D}$ *iff* $Pm(\ \ ') \geq Pm(\ \ )$ *for all* $m \in (0, J]$.

For any vector of deprivation counts, it is possible to graph Pm(**D**) as a function of m ranked in decreasing order; this will be referred to as an FD curve and defined as:

(4) $\mathrm{FD}(\mathbf{D}; Pm) = P_{J-m}(\ \ )$, $m \in (0, J]$.

For vectors of deprivation counts **D** and **D'**, say for the same population at different points in time, if a curve F(**D'**) is everywhere to the left and above F(**D**), then it can be concluded that **D** has lower deprivation than **D'** for any multidimensional deprivation measure satisfying Focus, Symmetry and Replication Invariance.

If F(**D**) and F(**D'**) intersect, it is not possible to maintain the rank order these two vectors of deprivation. In this situation, two options can be explored. First, a threshold m* ∈ (0, J] can be defined, corresponding to the threshold after the intersection, and dominance can be established for m ∈ (m*, J]. This result is

[11] Poverty focus requires that the index remains unchanged if the poverty score of a non-poor person decreases. Symmetry requires that no characteristics other than the number of weighted deprivations in which a person is deprived matters for the counting poverty measure. Replication Invariance allows comparisons of populations of different sizes.

[12] Monotonicity requires that the index decreases if the deprivation score of any poor person decreases. Distribution Sensitivity requires that a decrease in the poverty score of a poorer person should count for more than the same decrease experienced by a less poor person.

particularly useful, because not all admissible thresholds are equally meaningful in the context of assessing deprivation. Second, a more restricted measure of deprivation like the multidimensional deprivation shortfall ratio could be applied to the deprivation vectors. In the analysis below an SD curve is defined as

$$\text{(5)} \qquad \mathrm{SD}(\mathbf{D};q)=\left(1/nJ\right)\left(\sum_{1\le i\le n} D_i\right).$$

Recall that the deprivation vectors for the individual observations have been ranked from most to least deprived. Starting from SD(0,0), successive individual observations are added and the ratio of their cumulative deprivations to the maximal number of deprivations is plotted. Note that when observations with zero deprivations are added, the ratio does not change and the curve becomes horizontal. The average number of deprivations among the poor can be shown by the slope of a ray from (0,0) to a point in the SD curve. To establish dominance conditions for vectors of deprivation counts **D** and **D',** if a curve S(**D'**) is everywhere to the left and above S(**D**), then it can be concluded that **D** has lower deprivation than **D'** for any multidimensional deprivation measure fulfilling Focus, Symmetry, Replication Invariance and Monotonicity.

To summarise, the methodological strategy to be followed in the analysis below will start by identifying deprivation counts for individuals and their households, along several dimensions of wellbeing, each producing a binary index. The individual deprivation scores will then be aggregated across individuals. The individual and their households will be identified as poor according to their deprivation count and a threshold m. Two aggregate multidimensional measures will be used: the share of the population considered to be in poverty, and the ratio of the deprivations of the poor to the maximal number of deprivations the entire population could experience. The FD curves will help assess the scope and robustness of comparisons across groups or over time. If these intersect, the SD curves will be employed. The multidimensional counting approach adopted here – involving the counting approach, binary indicators of deprivation, and the judgements regarding the weights attached to different deprivations, and their relationship, and aggregation across groups – delivers a sound, transparent and effective approach to multidimensional assessment of wellbeing and deprivation.

3. Data, wellbeing and deprivation indicators

This section describes the data employed and reports on the construction of wellbeing indicators and deprivation thresholds.

3.1 Data

The analysis below will employ a comparable panel dataset of older people and their households in South Africa and Brazil, collected as part of the *Ageing, well being and development* study.[13] The study collected a survey on a sample of older people and their households in selected locations in South Africa and Brazil in 2002. Participant households were re-visited in 2008. The survey instrument contains two parts: a household survey and a supplementary survey collected from every household member aged 55

[13] The study website is at: http://www.sed.manchester.ac.uk/research/ageingandwellbeing/index.htm .

and over. The study samples rural and urban low-income communities in Metropolitan Rio and Ilheus in Brazil and Cape Town and the Eastern Cape in South Africa. The study samples are not nationally representative and are focused on low-income households.[14] The panel data provide a unique longitudinal perspective on the wellbeing of the sampled households (Moller, 2010; Saboia, 2010).

Longitudinal household surveys are affected by attrition, as households fragment or migrate or disappear over time. This applies to our dataset. The focus on older households in low-income locations in 2002 contributed to attrition. Communities containing informal settlements added to the challenge of tracing the 2002 participant households in 2008. In rural areas, economic transformation encouraged migration and therefore led to relatively higher attrition rates among rural respondents.[15] The analysis below will focus on the panel sample. The number of households captured in the study by panel status is listed in Table 1 below.

Table 1. Household sample and attrition

	Brazil	South Africa
2002 households sample, of which:	1006	1107
Matched (2002 and 2008) households	615	719
Attrited (2002 only) households	391	388
Replacements (2008 only) households	391	254

3.2 Wellbeing indicators

The selection of indicators of wellbeing is a strongly contested territory within an emerging, largely theoretical, literature (Alkire, 2002; Doyel & Gough, 1991; Nussbaum, 1999; Sen, 1993). The approach adopted was to identify variables providing information on dimensions of wellbeing especially relevant to older people. The indicators selected reflect the theoretical and empirical literature on multidimensional measures of wellbeing and deprivation.[16] A description of the wellbeing indicators, their construction, and threshold values, is in Table 2 below.

A self-reported indicator of *health* status is included, and deprivation is associated with very poor health.[17] *Life satisfaction* reflects a self-reported assessment of household wellbeing, deprivation is given by the dissatisfied and very dissatisfied categories. *Safety* indicates perceptions of changes in personal security from crime and violence in the last two years. This is a particularly important issue for urban older groups. Deprivation is associated with worsening personal security.

[14] In South Africa, for example, the samples exclude whites and Indians. The sampling is proportionate to size for the locations selected.
[15] In the rural location in Ilheus, for example, a pest affected the local crop, cocoa, leading to extensive out-migration.
[16] See for example Bossert et al. (2007).
[17] On the advantages and validity of using self-reported health status measures, see Easterlin (2003).

Table 2. Wellbeing indicators

Label	Description	Values	Deprivation
Health	Self-reported health status	1 very poor 2 poor 3 average 4 good 5 very good	1
Life satisfaction	Self-reported assessment 'Taking everything into account, how satisfied is this household with the way it lives these days?'	1 very dissatisfied 2 dissatisfied 3 neither satisfied not dissatisfied 4 satisfied 5 very satisfied	1,2
Safety	Change in perception of safety from two years before	1 worse 2 same 3 better	1
Social participation	Number of social organisations the respondent belongs to	0-8 (Brazil) and 0-10 (South Africa). Brazil: senior centre, church group, community organisation, sports club, school organisation, political party, trade union. South Africa as Brazil plus: women's club, stokvel, burial society.	0
Financial control	Responses to the question: 'How much of own money are you able to keep for yourself?'	1 none 2 very little 3 some 4 a reasonable amount 5 all	1
Debt service	Monthly debt repayments as proportion of total debt	1 if x=>0.5; 2 if 0.5>x>=0.2; 3 if 0.2>x>=0.1; 4 if 0.1>x=>0.001;5 if 001<x	1,2
Durables	Number of durables in household	0-11 (phone, stove electric or gas, stove paraffin or wood, electricity, TV, radio or stereo, fridge or freezer, sewing machine, car, bicycle, motorcycle)	1-5
Water	Main source of drinking water	1 other (river,dam,rainwater) 2 borehole 3 public tap/water carrier 4 piped water on site, neighbour 5 piped water in dwelling	1
Expenditure	Quintiles of equivalised per capita household expenditure	1-5	1,2

The *social participation* indicator registers participation in local organisations. The *financial control* indicator captures the extent to which older people are able to use their income, largely pension benefits, for themselves. Deprivation is associated with older people not being able to keep for themselves any of their own money. Financial indicators are relevant in the context of evaluating the impact of cash transfers. The *debt service* indicator is constructed to capture access to financial services as well as financial stress.[18] It measures monthly debt repayments as a proportion of total debt. A low value for this indicator is associated with reasonable access to credit and low financial stress. Deprivation is associated with a ratio greater than 0.2.

Durables and water are resource indicators with direct and important implications for functionings. The *durables* indicator measures the number of durables in the household from a list of 11. Deprivation is associated with households reporting five durables or less. A household's source of *water* has important implications for wellbeing, and deprivation is associated with sourcing from a river or rainwater. Finally, the *expenditure* indicator represents quintiles of adult equivalent per capita household expenditure, and deprivation is associated with the lowest two quintiles.

4. Wellbeing and deprivation among a sample of older people in South Africa and Brazil

The analysis in this section compares the distribution of multidimensional deprivation among the panel of older people 2002 and 2008 in Brazil and South Africa. The main focus of this analysis is to examine the impact of individual ageing on multidimensional deprivation. The discussion then moves on to consider the impact of stratification on the distribution of multidimensional welfare among older people in the South Africa panel, and changes over time. Finally, the analysis addresses the influence of pension provision on the distribution of multidimensional deprivation in the South Africa and Brazil panels.

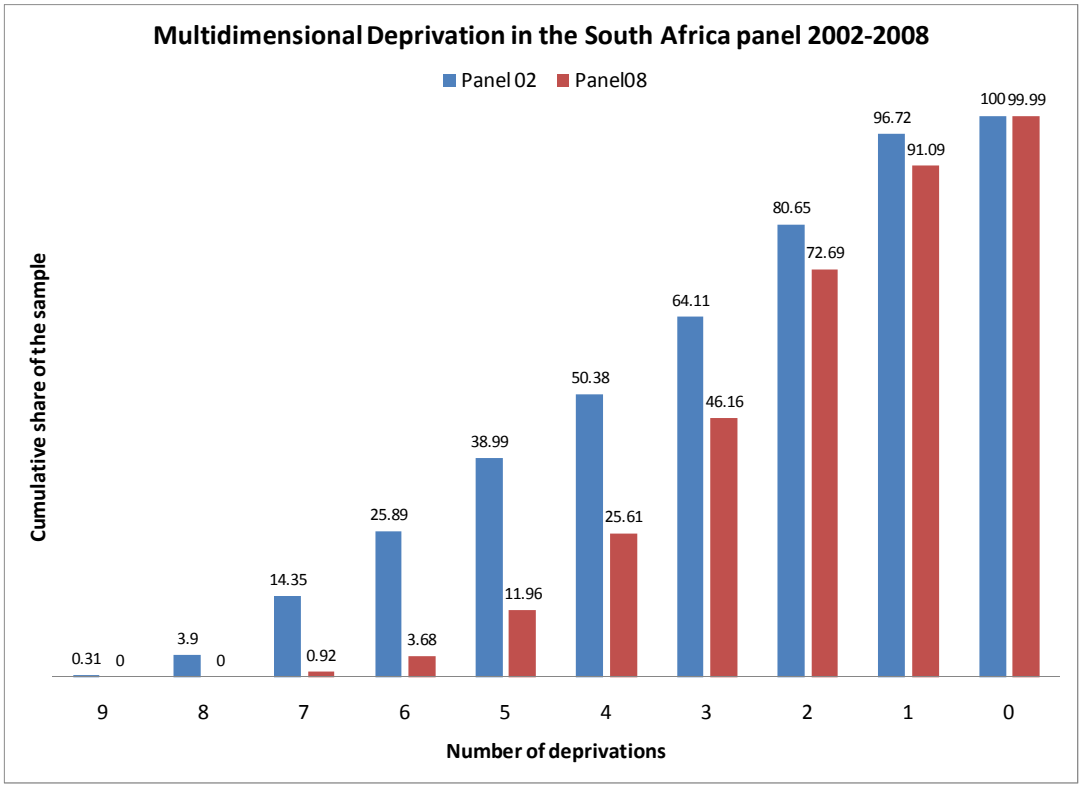
4.1 Ageing and multidimensional deprivation

The panel data contains information on individuals aged 55 and over in 2002, and their households, in the Brazil and South Africa survey locations, in 2002 and 2008. The first issue of interest is the direction of changes in the distribution of multidimensional wellbeing and deprivation for the panel between 2002 and 2008.

The FD curves plot the cumulative share of the sample against the observed number of deprivations. Each point in the curve links up on the vertical axis the share of the population experiencing at least # number of deprivations (where # stands for a given number of deprivations) in the horizontal axis. It tells us the proportion of the sample considered to be in poverty if the poverty threshold was set at # deprivations. The curves show multidimensional headcount poverty rates at all possible poverty thresholds. To facilitate the inspection of the Figures, Figure 1a shows the discrete poverty headcount rate for the nine possible poverty thresholds in the South Africa panel sample. As the Figure shows, the cumulative share of the sample in poverty is lower in 2008 for all possible poverty thresholds. Figure 1b presents the same information as Figure 1a, but now as FD curves. Figure 2 shows the FD curve for the Brazil panel.

[18] See Klasen (2000).

Figure 1a.



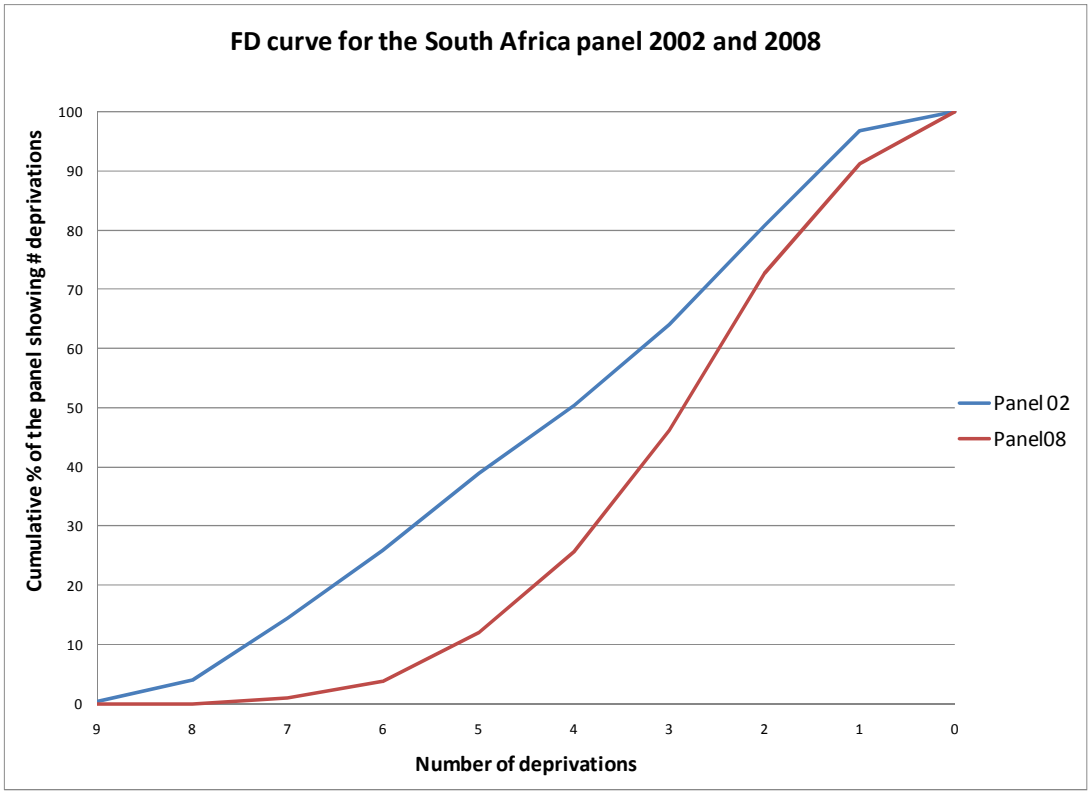
Here we are interested in whether the FD curve for the distribution of deprivations in 2008 can be said to show higher or lower poverty compared to 2002 in the two panels. Comparing the curves constructed from the information in the 2002 and 2008 panel data confirms that the distribution of multidimensional deprivation in 2008 is below and to the right of the curve from the 2002 survey at all possible poverty thresholds and for both countries. This confirms that deprivation levels (wellbeing levels) among older people in the Brazil and South Africa panels have decreased (increased) over time.

The methodological discussion in the previous section concluded that that alternative multidimensional deprivation measures satisfying Focus, Symmetry, and Replication Invariance would rank order the distribution of deprivations in the same way. The fact that the FD curves for 2008 and 2002 do not intersect demonstrates that this finding is also robust to the choice of poverty thresholds.

These findings can be interpreted to illuminate on the relationship existing between individual ageing and wellbeing. The relevant literature suggests conflicting accounts of this relationship. Studies relying on objective wellbeing indicators suggest it declines with individual ageing, whereas studies focusing on life satisfaction suggest rising life satisfaction in later life. The analysis reported here, using a mix of objective and subjective wellbeing indicators of older people and their households, finds that, for the Brazil and South Africa panels, individual ageing does not necessarily result in lower levels of multidimensional wellbeing/ increased deprivation.[19]

[19] This applies, of course, to the samples taken as an aggregate. A companion paper focuses on changes in single-dimensioned poverty status over time at the households level and shows that a significant proportion of households moved into and out of poverty (Barrientos & Mase, 2010).

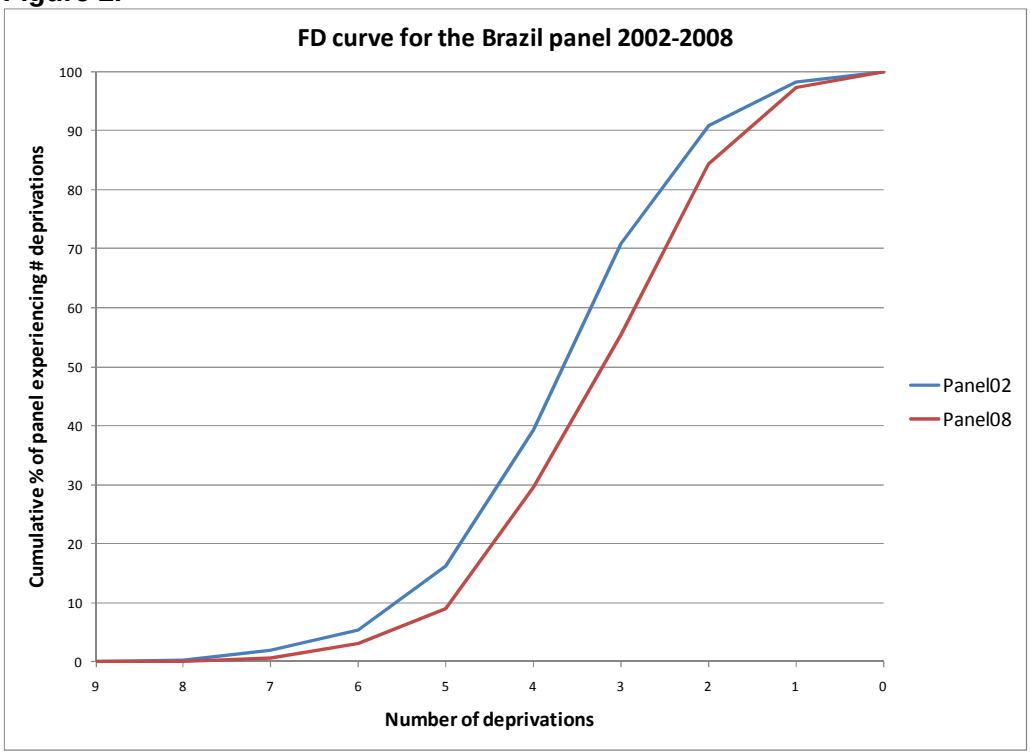
Figure 1b.



It is important to consider possible disturbing effects. In particular, improvements in the economy or in social policy could have had acted as a 'tide that lifts all boats' and masked an otherwise negative relationship between individual ageing and wellbeing. The comparative nature of the analysis is helpful on this point. Rates of economic growth have been moderate in the two countries over the past two decades. This is particularly the case for South Africa. Brazil's growth performance has lifted in the last few years. Yet the observed improvements in wellbeing apply to both countries, and if anything the observed improvements in the multidimensional distribution of wellbeing appear to have been stronger in South Africa. Over the last decade, both countries have strengthened social assistance programmes focused on households in poverty, but in the 2002 to 2008 period, the thrust of improvements in social assistance focused on households with children. Social assistance programmes supporting older people have been reasonably steady in the relevant period. There have been changes in the generosity of non-contributory pension programmes in Brazil, as the level of non-contributory pension benefits is tied to the minimum wage, which has risen by over 50 percent in real terms during the Lula administrations, and more moderate increases in the real value of the Old Age Grant in South Africa of less than five percent. Again, if anything, the improvements in multidimensional wellbeing have been greater in South Africa.

Although it is not possible to rule out all other possible disturbing effects, the view that individual ageing does not necessarily lead to deterioration in multidimensional wellbeing levels finds support from longitudinal analysis.

Figure 2.



4.2 Stratification and multidimensional wellbeing

Analysis of the 2002 data found significant differences across three groups of elderly people and their households in South Africa: rural blacks, urban blacks, and urban coloureds. Ferreira (2006) concludes that multidimensional deprivation levels were significantly higher among rural blacks than among urban blacks, and also higher among blacks than among urban coloureds. It is informative to update this analysis by considering changes in the distribution of multidimensional deprivation over time. Figure 3 shows FD curves for the three groups in 2002 and 2008. There is no change in stratification when focusing on multidimensional deprivation counts, as the FD curves for urban coloureds, urban blacks, and rural blacks are rank ordered for all possible poverty thresholds in both 2002 and 2008 taken separately.

The Figure also demonstrates that urban and rural black groups experienced improvements (decline) in wellbeing (deprivation) levels over time. The curves constructed from 2008 survey data are consistently to the right and below those constructed from the 2002 data for these two groups. The situation is more complex for urban coloureds, as their 2002 and 2008 FD curves intersect at lower levels of deprivation. In line with the discussion in the previous section, it is not possible to unambiguously rank order the multidimensional headcount derivation rate for the urban coloureds group between 2002 and 2008. The analysis can support the claim that extreme deprivation has declined for urban coloureds over time only up to a 3 poverty threshold, but not below. An option is to rank order deprivation counts by restricting the measure of deprivations to the multidimensional deprivation shortfall ratio, Mm(**D**). Figure 4 shows the SD curves for the South Africa panel by race/location groups. This shows an unambiguous decline in deprivation from 2002 to 2008 for all three groups and including urban coloureds. However, the fact

Figure 3.

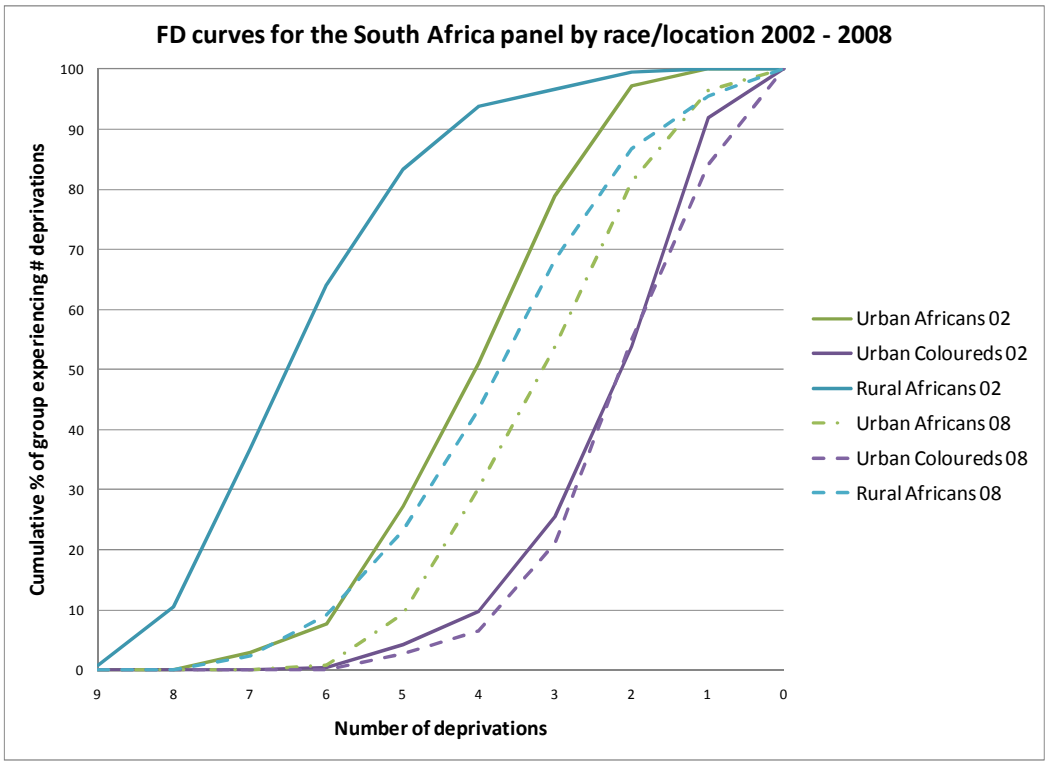
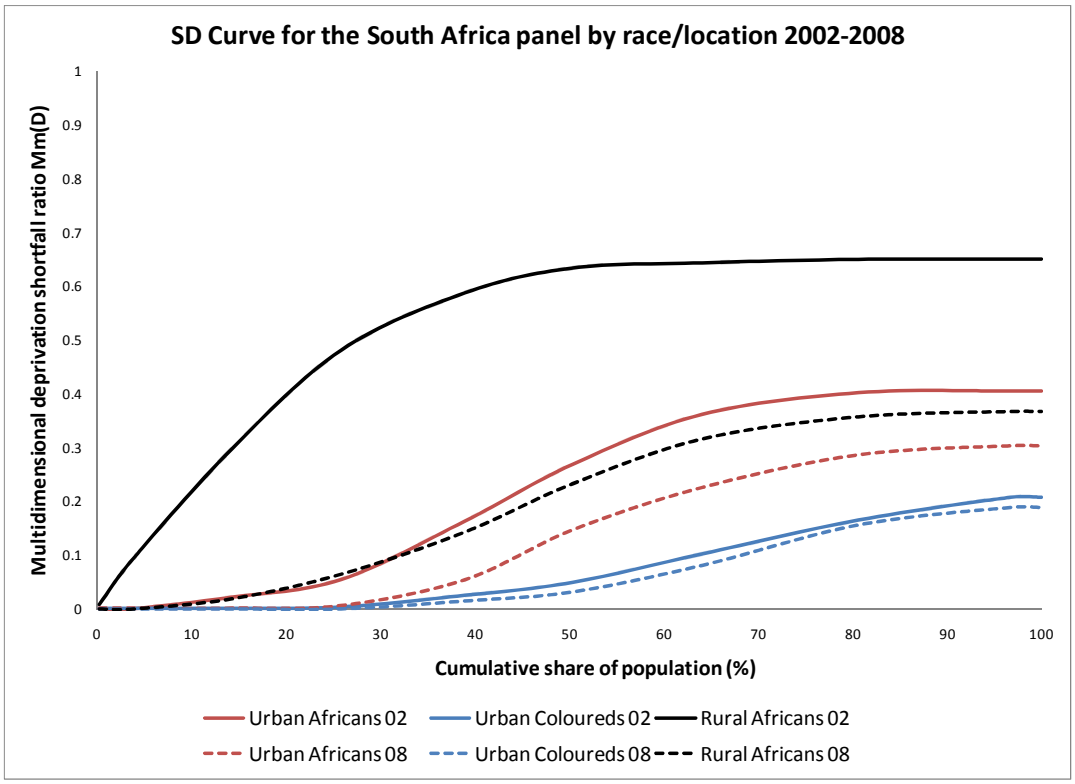


Figure 4.



remains that multidimensional deprivation counts have declined less markedly for urban coloureds in the panel. This is consistent with findings from other studies based on single-dimensioned wellbeing indicators (Leibbrandt, Woolard, Finn, & Argent, 2010). The multidimensional counting approach can be effective in studying stratification in later age.

4.3 Multidimensional deprivation and pension status

Here, the focus is on exploring the distribution of multidimensional deprivation across sub-groups defined by pension status in Brazil and South Africa. This is intended to demonstrate that the multidimensional counting approach is appropriate to the evaluation of social policy.

The analysis below compares the distribution of multidimensional deprivation across pension status groups. Three distinct groups of people aged 55 and over are identified in the Brazil sample: those who are not receiving a pension (non-pensioners or *np*);[20] those who are receiving a non-contributory pension (social assistance or SA); and those who are receiving a contributory pension (social insurance of SI). In the South Africa sample, two groups can be distinguished: those who are not receiving a pension (*np*); and those who are receiving a non-contributory pension (*n-cp*).[21] The respondents are classified into these groups according to their current pension status. Given 2002 respondents are close to six years older at the time of the 2008, some non-pensioners in 2002 will have qualified for the receipt of the pension by 2008.

Figures 5 and 6 show the FD curves for pension status groups in Brazil and South Africa, respectively.

Focusing on the Brazil panel sample first, and on the FD curve for 2002, deprivation counts among social insurance beneficiaries are lower than among social assistance pensioners and non-beneficiaries. This reflects the improved income security support provided by the contributory social insurance system. Social insurance pensions are accessed earlier than social assistance pensions and their level is related to pensioners' contribution history. The greater generosity of social insurance pensions is likely to be attenuated by the fact that over 60 percent of social insurance beneficiaries only qualify for the minimum pension equivalent to one minimum wage (Schwarzer & Querino, 2002), which is the benefit level for social assistance pensions.

Social assistance pensions are only available to older people who fail to qualify for a social insurance pension and have per capita household income below one-quarter of the minimum wage. The curves for social assistance pensioners and non-pensioners intersect. As discussed in the previous section, where FD curves intersect, it is not possible to rank order the relevant distribution of multidimensional deprivation. Two options are available. Firstly, it might be feasible to rank order distributions up to the threshold before the intersection. Social assistance pensioners have lower levels of extreme deprivation than non-pensioners, but this does not apply to moderate deprivation. The second option is to focus on the multidimensional deprivation shortfall ratio. Figure 7 shows SD curves for the 2002 and 2008 Brazil

[20] The non-pensioner category includes those aged 55 and over (in 2002) who reported not receiving a pension (in 2002 or in 2008). The bulk of individuals in this category in 2002 were those under the age of entitlement to non-contributory pensions (in South Africa women under 60 and men under 65; in rural Brazil women under 55 and men under 60, and in urban Brazil men and women under 67).

[21] The survey asked whether respondents received occupational or private pensions, but very few reported receiving one in South Africa. Employer and private pension plans in South Africa are limited to public servants and formal employees. Many plans pay a lump sum benefit on retirement (van der Berg, Siebrits, & Lekezwa, 2010).

Figure 5.

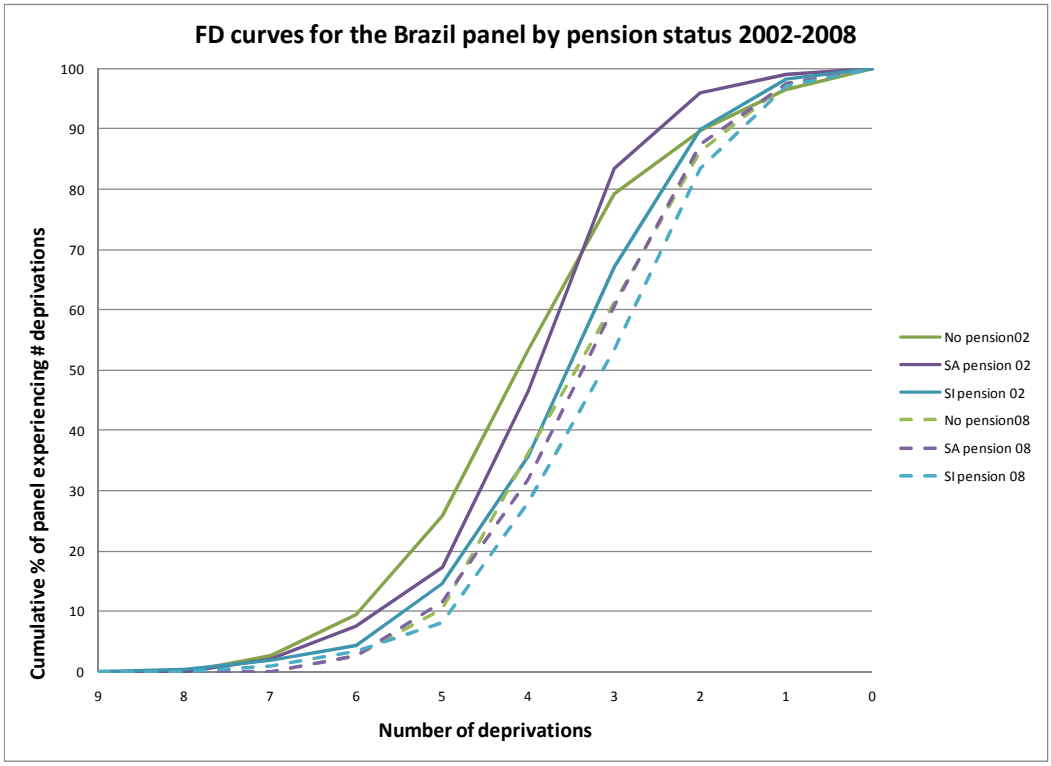


Figure 6.

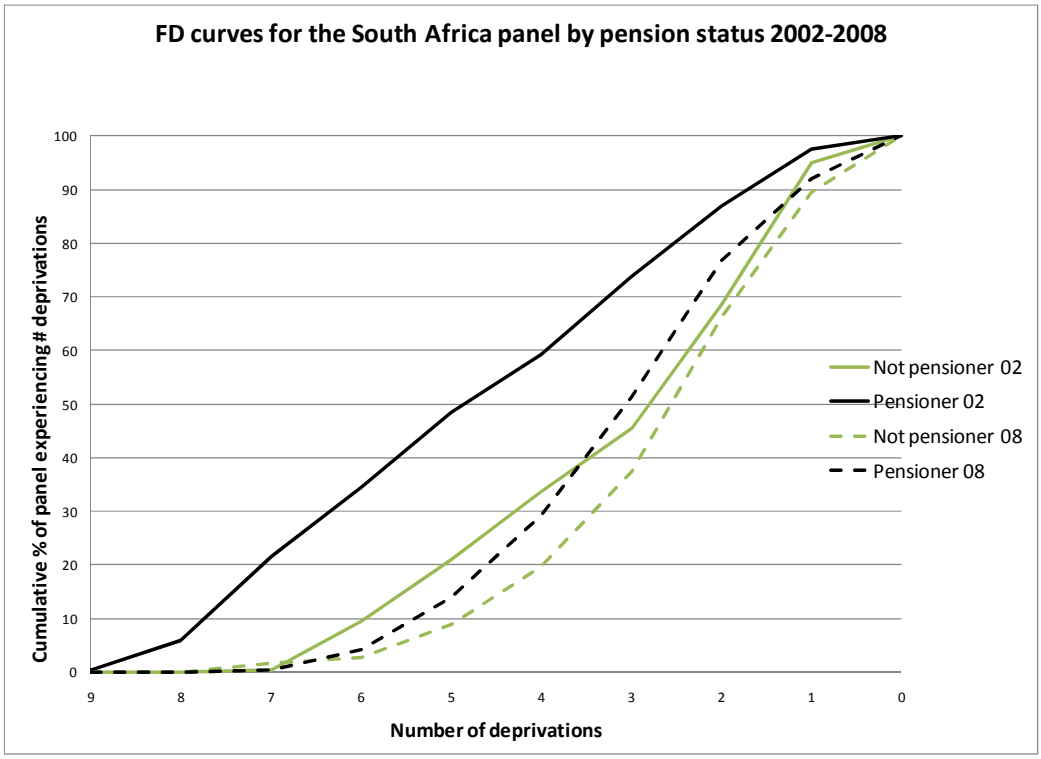
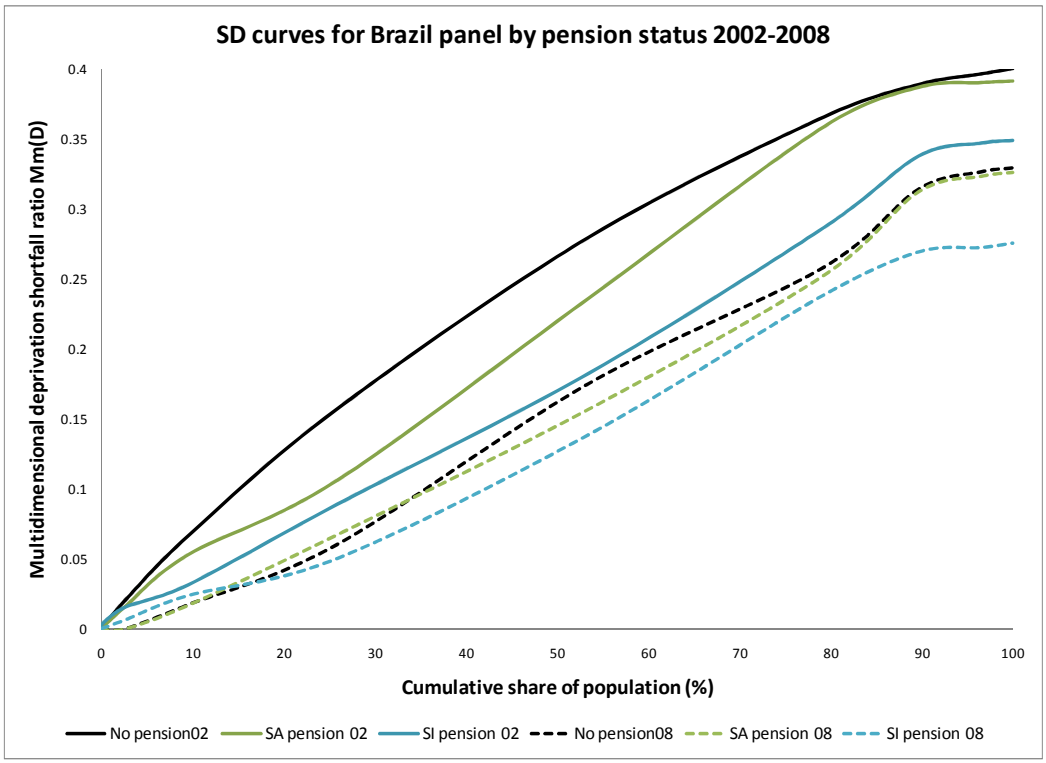


Figure 7.



panel. It does provide a clear rank order for 2002, but fails to do so for the three groups in 2008, suggesting convergence in multidimensional deprivation across the three groups.

Overall, the analysis shows that the multidimensional wellbeing (deprivation) of each of the pension status groups improves (declines) between 2002 and 2008, but the differences in multidimensional wellbeing across groups are more difficult to observe in 2008. It is not possible to rank order the distributions of deprivation counts across pension status groups in 2008.

There are competing explanations for this finding. Firstly, the passage of time enabled some of the non-pensioners in 2002 to access pension provision by meeting the age requirement for pension support. Secondly, the shared indexation of minimum guaranteed pensions under the social insurance schemes, and the non-contributory pension schemes might have contributed to levelling the income support levels for pensioners in the panel. Regardless of the weight of these different explanations, the convergence in multidimensional wellbeing across poorer older people in a country with deep inequality as Brazil is noteworthy.

Turning to the FD curves for the South Africa panel of older people in Figure 6, these show that non-contributory pensioners have lower deprivation than non-pensioners in 2002 and the rank order is maintained in 2008.

The main finding is that pension provision has an observable impact on the wellbeing of older people in Brazil and South Africa. In Brazil, the extension of the coverage and generosity of pension provision has

narrowed down the differences in the distribution of wellbeing and deprivation among older people and their households.
The analysis in this section has shown the appropriateness and usefulness of the multidimensional counting approach to assessing the wellbeing of older people and their household, its distribution and changes across groups and over time. The approach can also throw light on stratification outcomes, and on the impact and effectiveness of policies addressing ageing.

5. Conclusions

The paper set out to develop a multidimensional counting approach to study the distribution of wellbeing and deprivation in later life. Applying this methodology to a panel dataset of older people in South Africa and Brazil generated substantive findings on the dynamics of the distribution of wellbeing and deprivation in the two countries, and on changes over time in stratification, and the role of social policy addressing population ageing.

The multidimensional nature of wellbeing and deprivation justifies a multidimensional approach to measurement, but consensus around the social judgements and methodological options associated with this measurement is lacking. Among the available approaches, the counting approach has the advantage that the social judgements involved are directly accessible, and also that it can be effectively applied to both cardinal and ordinal data. Recent research has explored the axiomatic basis of the properties of multidimensional counting measures, and has thrown light on the conditions under which rank ordering of distributions can be applied consistently across deprivation measures. This research has greatly clarified and strengthened the power of the multidimensional counting approach.

This approach was then employed to study the distribution of wellbeing and deprivations for comparable panel survey data for older people and their households in Brazil and South Africa. The analysis focused on two multidimensional deprivation measures: the share of the population who can be considered in poverty, and the deprivation shortfall ratio. A graphical approach facilitates the rank ordering of distributions across time and sub-groups.

This led to three main substantive findings. Firstly, in the two panels involved, multidimensional wellbeing (deprivation) rose (fell) for the sample of older people. Taking due account of the comparative and longitudinal nature of the data, this finding supports the view that individual ageing is not necessarily associated with a decline in wellbeing. Secondly, the analysis concluded that the stratification across racial/location groups of older people in South Africa is persistent over time, but that a reduction in observed deprivation counts has been stronger among blacks than among coloureds. Thirdly, comparison of the distribution of deprivation counts across pension status groups confirms the findings from other studies concerning the important role of pension provision, and especially non-contributory pensions, in sustaining improvements in wellbeing among older people in both panels. In the context of the Brazil panel, some convergence in multidimensional wellbeing can be observed among older people receiving social insurance and social assistance pensions, but also non-pensioners, in 2008.

Some irreducible methodological and data issues remain and need to be taken together with the findings. The multidimensional counting approach adopted involved identifying and measuring wellbeing indicators, with a diversity of indicators in use in the literature. The approach in the paper was to focus on indicators most commonly used and available in the dataset. The panel data proved effective in

supporting the analysis, but the datasets are regionally bound and care must be taken in extrapolating these results to the two countries involved, and, beyond these, to other developing countries. A core issue in the analysis of multidimensional deprivation is how to aggregate the different indicators. The counting approach has an advantage in laying bare the social judgements involved, but legitimate dissension remains over the options taken. The paper applied two main multidimensional measures, the share of the population considered to be in poverty and the multidimensional deprivation shortfall ratio. Further research on these and alternative measures will pave the way for broader consensus around desirable measures of multidimensional deprivation.

References

Alkire, S. (2002). 'Dimensions of human development'. *World Development, 30*(2), 181-205.

Alkire, S., & Foster, J. (2009). 'Counting and multidimensional poverty measurement'. OPHI Working Paper 2007-7. Oxford: Oxford Poverty and Human Development Initiative.

Ardington, C., Case, A., & Hosegood, V. (2007). 'Labour supply responses to large social transfers: longitudinal evidence from South Africa'. NBER Working Paper 13442. Cambridge, MA: National Bureau of Economic Research.

Ardington, E., & Lund, F. (1995). 'Pensions and development: social security as complementary to programmes of reconstruction and development'. *Development Southern Africa, 12*(4), 557-577.

Atkinson, A. B. (2003). 'Multidimensional deprivation: contrasting social welfare and counting approaches'. *Journal of Economic Inequality, 1*(1), 51-65.

Atkinson, A. B., Cantillon, B., Marlier, E., & Nolan, B. (2002). *Social Indicators. The EU and Social Exclusion*. Oxford: Oxford University Press.

Barrientos, A. (2003). 'Non-contributory pensions and the well-being of older people: evidence on multidimensional deprivation from Brazil and South Africa'. Mimeo. Manchester: IDPM, University of Manchester.

Barrientos, A., Lloyd-Sherlock, P., Ferreira, M., Gorman, M., Legido-Quigley, H., Møller, V., Saboia, J., & Werneck Vianna, M. L. T. (2003). *Non-contributory Pensions and Poverty Prevention. A Comparative Study of Brazil and South Africa*. Report. Manchester: IDPM and HelpAge International.

Barrientos, A., & Mase, J. (2010). 'Poverty transitions among older households in South Africa and Brazil'. BWPI Working Paper 150. Manchester: University of Manchester.

Bertrand, M., Mullainathan, S., & Miller, D. (2003). 'Public policy and extended families: evidence from pensions in South Africa'. *World Bank Economic Review, 17*(1), 27-50.

Bossert, W., Chakravarty, S. R., & D'Ambrosio, C. (2009). 'Multidimensional poverty and material deprivation'. ECINEQ Working Paper 2009-129. Society for the Study of Economic Inequality.

Bossert, W., D'Ambrosio, C., & Peragrine, P. (2007). 'Deprivation and social exclusion'. *Economica, 74*777-803.

Bourguignon, F., & Chakravarty, S. R. (2003). 'The measurement of multidimensional poverty'. *Journal of Economic Inequality, 1*(1), 25-49.

Brandolini, A., & D'Alessio, G. (1998). 'Measuring well being in the functioning space'. Mimeo. Rome: Bank of Italy Research Department.

Camarano, A. A. (1999). 'Como vai o idoso Brasileiro?' Discussion Paper 681. Rio de Janeiro: IPEA.

Case, A. (2001). 'Does money protect health status? Evidence from South African pensions'. Mimeo. Princeton, NJ: Princeton University.

Case, A., & Deaton, A. (1998). 'Large scale transfers to the elderly in South Africa'. *Economic Journal, 108*(450), 1330-1261.

Chakravarty, S. R., & D'Ambrosio, C. (2006). 'The measurement of social exclusion'. *Review of Income and Wealth* (523), 377-398.

Chakravarty, S. R., & Silber, J. (2008). 'Measuring multidimensional poverty: the axiomatic approach'. In N. Kakwani & J. Silber (Eds.), *Quantitative Approaches to Multidimensional Poverty Measurement* (pp. 192-209). Basingstoke, UK: Palgrave Macmillan.

Committe of Inquiry into a Comprehensive System of Social Security for South Africa (2002). *Transforming the Present – Protecting the Future*. Draft Consolidated Report. Pretoria: Committee of Inquiry into a Comprehensive System of Social Security for South Africa.

Delgado, G. C., & Cardoso, J. C. (2000). *A Universalização de Direitos Sociais no Brazil: a Prêvidencia Rural nos anos 90*. Brasilia: IPEA.

Doyel, L., & Gough, I. (1991). *A Theory of Human Need*. London: Macmillan.

Dreze, J., & Sen, A. (1989). *Hunger and Public Action*. Oxford: Oxford University Press.

Duclos, J.-Y., Sahn, D., & Younger, S. D. (2003). 'Robust multidimensional poverty comparisons'. Mimeo. Québec: CIRPÉE, Université Laval.

Duflo, E. (2003). 'Grandmothers and granddaughters: old age pensions and intrahousehold allocation in South Africa'. *World Bank Economic Review, 17*(1), 1-25.

Easterlin, R. A. (2003). 'Building a better theory of well-being'. Discussion Paper 742. Bonn: IZA.

Edmonds, E., Mammen, K., & Miller, D. (2001). 'Rearranging the family? Household composition responses to large pension receipts'. *Journal of Human Resources, 40*(1), 186-207.

Ferreira, M. (2006). 'The differential impact of social-pension income on household poverty alleviation in three South African ethnic groups'. *Ageing and Society, 26,*337-354.

Heslop, A., & Gorman, M. (2000). 'Chronic poverty and older people in the developing world'. Mimeo. Manchester: IDPM.

Jensen, R. (2004). 'Do private transfers "displace" the benefits of public transfers? Evidence from South Africa'. *Journal of Public Economics, 88*(1-2), 89-112.

Kakwani, N., & Silber, J. (Eds.) (2007). *The many dimensions of poverty* Basingstoke: Palgrave Macmillan.

Kinsella, K., & He, W. (2009). *An Ageing World: 2008*. Report. Washington, DC: US Census Bureau.

Klasen, S. (2000). 'Measuring poverty and deprivation in South Africa'. *Review of Income and Wealth, 46*(1), 33-58.

Lasso de la Vega, C. (2010). 'Counting poverty orderings and deprivation curves'. *Research on Economic Inequality, 18*.

Leibbrandt, M., Woolard, I., Finn, A., & Argent, J. (2010). 'Trends in South African income distribution and poverty since the fall of apartheid'. OECD Social, Employment and Migration Working Papers 101. Paris: OECD.

Lloyd-Sherlock, P. (2002). 'Nussbaum, capabilities and older people'. *Journal of International Development, 14*(8), 1163-1174.

Moller, V. (2010). *South Africa Country Report*. Grahamstown: Rhodes University.

Møller, V., & Sotshangaye. (1996). '"My family eats this money too": pension sharing and self-respect among Zulu grandmothers'. *Southern African Journal of Gerontology, 5*(2), 9-19.

Nussbaum, M. (1999). 'Women and equality: the capabilities approach'. *International Labour Review, 138*(3), 227-245.

Pattanaik, P. K., Reddy, S. G., & Xu, Y. (2007). 'On procedures for measuring deprivation and living standards of societies in a multi-attribute framework'. Working Paper 08-02. Atlanta, GA: Andrew Young School of Policy Studies, Georgia State University.

Ravallion, M. (1996). 'Issues in measuring and modelling poverty'. *Economic Journal, 106*(438), 1328-1343.

Saboia, J. (2010). *Beneficios não contributivos e combate à pobreza dos idiosos no Brasil – 2008*. Report. Rio de Janeiro: Universidade Federal do Rio de Janeiro, Instituto de Economìa.

Sagner, A., & Mtati, R. (1999). 'Politics of pension sharing in urban South Africa'. *Ageing and Society, 19*(4), 393-416.

Schwarzer, H. (2000). 'Impactos socioeconômicos do sistema de aposentadorias rurais no Brazil – Evidências empíricas de un estudio de caso no estado de Pará'. Discussion Paper 729. Rio de Janeiro: IPEA.

Schwarzer, H., & Querino, A. C. (2002). 'Non-contributory pensions in Brazil: the impact on poverty reduction'. ESS Paper 11. Geneva: Social Security Policy and Development Branch, ILO.

Sen, A. (1985). *Commodities and Capabilities*. Amsterdam: North-Holland.

Sen, A. (1993). 'Capability and well-being'. In M. Nussbaum & A. Sen (Eds.), *The Quality of Life* (pp. 30-53). Oxford: Oxford University Press.

Sen, A. (1999). *Development as Freedom*. Oxford: Oxford University Press.

Smith, W. J., & Subbarao, K. (2003). 'What role for safety net transfers in very low income countries?' Social Protection Discussion Paper 0301. Washington, DC: The World Bank.

Townsend, P. (1979). *Poverty in the United Kingdom*. Harmondsworth, UK: Allen Lane.

van der Berg, S., Siebrits, K., & Lekezwa, B. (2010). 'Efficiency and equity effects of social grants in South Africa'. Stellenbosch Economic Working Papers 15/10. Stellenbosch: University of Stellenbosch Department of Economics.

The University of Manchester
Brooks World Poverty Institute

MANCHESTER 1824

Executive Director
Professor David Hulme

Research Directors
Professor Armando Barrientos
Professor Rorden Wilkinson

Contact:

Brooks World Poverty Institute
The University of Manchester
Humanities Bridgeford Street Building
Oxford Road
Manchester
M13 9PL
United Kingdom

Email: bwpi@manchester.ac.uk

www.manchester.ac.uk/bwpi

The Brooks World Poverty Institute (BWPI) creates and shares knowledge to help end global poverty.

BWPI is multidisciplinary, researching poverty in both the rich and poor worlds.

Our aim is to better understand why people are poor, what keeps them trapped in poverty and how they can be helped - drawing upon the very best international practice in research and policy making.

The Brooks World Poverty Institute is chaired by Nobel Laureate, Professor Joseph E. Stiglitz.

www.manchester.ac.uk/bwpi