J Econ Inequal (2013) 11:195–214
DOI 10.1007/s10888-011-9206-z

Multidimensional poverty in Latin America and the Caribbean: new evidence from the Gallup World Poll

Leonardo Gasparini · Walter Sosa-Escudero · Mariana Marchionni · Sergio Olivieri

Received: 26 July 2010 / Accepted: 15 September 2011 / Published online: 8 October 2011

Abstract This paper studies poverty in Latin America and the Caribbean from a multidimensional perspective, exploiting the Gallup World Poll, a survey that provides a unique opportunity to perform intercountry comparisons. By applying factor analysis we find that welfare can be appropriately summarized by three dimensions: income, subjective welfare and "basic needs". Another finding is that the US$ 1 line appears to be a reasonable cut-off value to measure food deprivation.

Keywords Latin America · Caribbean · Deprivation · Poverty · Welfare · Multidimensional · Gallup

This study is a follow-up of a study commissioned by the IDB's Latin American Research Network on Quality of Life in Latin America and the Caribbean. Gallup has generously provided the microdata of the Gallup World Polls 2006. We are grateful to Eduardo Lora, Ravi Kanbur, Jere Berhman, Carlos Vélez, Marcelo Neri, Carol Graham, Mauricio Cárdenas, Mariano Rojas, and seminar participants at the IDB, LACEA, NIP,WIDER, ISQOLS, and UNLP for helpful comments and suggestions. We thank the editor, Jean-Yves Duclos and two anonymous referees for useful suggestions that helped improve this paper considerably. We are especially grateful to Pablo Glüzmann, Adriana Conconi, Andrés Ham and Germán Caruso for outstanding research assistance. The usual disclaimer applies.

CEDLAS is the Center for Distributional, Labor and Social Studies at Facultad de Ciencias Económicas, Universidad Nacional de La Plata (Argentina). Web page: cedlas.econo.unlp.edu.ar.

L. Gasparini (✉) · M. Marchionni · S. Olivieri
CEDLAS, Departamento de Economía, Facultad de Ciencias Económicas,
Universidad Nacional de La Plata, Calle 6 e/47 y 48, 5to. Piso, Oficina 516,
(1900) La Plata, Argentina
e-mail: leonardo@depeco.econo.unlp.edu.ar

W. Sosa-Escudero
Universidad de San Andrés (UdeSA) and CEDLAS, Calle 6 e/47 y 48,
5to. Piso, Oficina 516, (1900) La Plata, Argentina

1 Introduction

Although intuitively poverty is a simple concept associated to deprivation, in practice its measurement is subject to a host of ambiguities and methodological problems. One central issue in defining poverty is identifying the space in which deprivations are to be assessed. Poverty is deprivation of what? For practical reasons, by large the most extended framework is that of poverty as deprivation in the one-dimensional space of a monetary variable, such as income or consumption. Researchers, international organizations, and most countries in the world monitor poverty by calculating or estimating the extent to which individual incomes or consumption levels fall short of a given poverty line. However, it has long been recognized that deprivation has multiple dimensions that cannot be properly captured by a single monetary variable. With a host of different arguments, researchers have proposed measures that combine the access to a set of goods, services and assets to measure deprivation in a non-monetary fashion. For instance, in Latin America several countries compute multidimensional poverty measures based on attributes such as housing, education and access to water and sanitation [4]. Another approach stresses the several difficulties that arise when trying to measure poverty with an "objective" measure of welfare, and claim that deprivation could be measured based on questions targeted directly at self perceived notions of well being (e.g. [11, 12]).

Although the empirical poverty literature is vast and growing, few studies are able to provide a consistent joint assessment of the three approaches mentioned above—monetary, non-monetary and subjective—for a significant set of countries. The main reason is lack of systematic, reliable and comparable data. Typically, although national household surveys include questions on income and/or consumption, and many also on assets, substantial differences in the questionnaires hinder the international comparisons. In addition, questions on perceptions and self-assessment of living standards are not common in the national household surveys. As a consequence, intercountry studies that explicitly deal with the multidimensional nature of welfare and poverty are almost inexistent.

This paper makes a contribution to this literature by measuring poverty in Latin America and the Caribbean from a multidimensional perspective, exploiting the Gallup Poll, a comprehensive and systematic survey that provides a unique opportunity to perform intercountry comparisons based on an ample information set that includes a wide variety of welfare-related variables that are measured in a comparable and systematic way across 132 countries in the world, 23 of them from Latin America and the Caribbean.

More specifically, this paper deals with the following questions. 1) How do countries in Latin America and the Caribbean perform along alternative dimensions of poverty? 2) Is poverty truly multidimensional and, if so, how many dimensions are involved? 3) How adequate are income-based poverty lines to capture other dimensions of deprivation?

The rest of the paper is organized as follows. Section 2 discusses some basic characteristics of the Gallup Poll and its reliability in capturing welfare. While Section 3 reports results for income poverty, Section 4 deals with non-monetary and subjective deprivation. Section 5 discusses the dimensionality of poverty, using factor analytic methods, while Section 6 analyzes the adequacy of income poverty lines to assess deprivation. Section 7 concludes with some remarks.

2 The Gallup world poll

This paper is based on microdata from the Gallup World Poll 2006, a survey conducted in 132 nations, 23 of them from Latin America and the Caribbean (LAC). The survey has almost exactly the same questionnaire in all countries, so it provides a unique opportunity to perform cross-country comparisons.[1] The Gallup World Poll is particularly rich in self-reported measures of quality of life, opinions, and perceptions. It also includes basic questions on demographics, education, and employment, and a question on household income.

The upper panel in Table 1 shows the number of observations in each LAC country covered by the Poll, while the lower panel presents that information for different regions in the world. The dataset includes the answers of 141,739 persons; 21,200 of them are inhabitants of LAC: 17,144 in Latin America and 4,056 in the Caribbean. The survey covers all the countries in Latin America, and the main nations in the Caribbean according to their population: Cuba, Dominican Republic, Haiti, Jamaica, Puerto Rico and Trinidad & Tobago. The country samples have around 1,000 observations, except in some Caribbean countries, where around 500 observations were collected.

In a companion paper [6] we compare basic demographic statistics drawn from the Gallup Poll with those computed from the national household surveys of the LAC countries for year 2006. To that aim we exploit the *Socioeconomic Database for Latin America and the Caribbean* (SEDLAC), a project carried out by CEDLAS at the Universidad Nacional de La Plata (Argentina) and the World Bank's LAC poverty group (LCSPP).[2] This database contains information on more than 200 official household surveys in 25 LAC countries. All variables in SEDLAC are constructed using consistent criteria across countries and years, and identical programming routines. We compare the share of males, mean age, the number of children, and the share of observations in rural areas in both sources, and conclude that in most countries statistics in the Gallup Poll are roughly consistent with those from national household surveys. In a few countries there are some discrepancies between both sources, a fact that is likely linked to sampling failures in the Gallup Poll (Honduras, Jamaica, and Guatemala).

We are aware of the limitations of the Gallup Poll in terms of small sample sizes, insufficient questions for some purposes, and sampling problems in some countries. Household surveys are clearly better sources of information for studying poverty at the national level. However, at the same time, we highlight the enormous potential of the Gallup World Poll (or other similar surveys) for international comparisons of social statistics, since, unlike national household surveys, questions are identical across a very large set of countries around the world. The next three sections show estimates of income, non-monetary and subjective poverty in all LAC countries, including comparisons with the rest of the world. At the present that task would be impossible using only national household surveys, due to substantial differences in questionnaires across countries, and lack of data for some poverty dimensions.

[1] See [3] for a discussion about the 2006 Gallup Poll.

[2] See <sedlac.econo.unlp.edu.ar>

Table 1 Number of observations

Countries in LAC	Observations
Latin America	17,144
Argentina	1,000
Bolivia	1,000
Brazil	1,029
Chile	1,007
Colombia	1,000
Costa Rica	1,002
Ecuador	1,067
El Salvador	1,000
Guatemala	1,021
Honduras	1,000
Mexico	1,007
Nicaragua	1,001
Panama	1,005
Paraguay	1,001
Peru	1,000
Uruguay	1,004
Venezuela	1,000
The Caribbean	4,056
Cuba	1,000
Dominican Republic	1,000
Haiti	505
Jamaica	543
Puerto Rico	500
Trinidad & Tobago	508
LAC	21,200
Regions in the world	**Observations**
Geographic region	
LAC	21,200
East Asia & Pacific	19,630
Estern Europe & Central Asia	32,757
Middle East & North Africa	15,837
South Asia	7,380
Sub-Saharan Africa	26,506
Western Europe	16,073
North America	2,356

Gallup World Poll 2006

3 Income poverty

As discussed in the Introduction, poverty has many dimensions. The monetary dimension has occupied a central place in both the economic literature and the policy debates. In almost all countries poverty is measured by national agencies over the distribution of monetary income or consumption. In particular, in LAC most poverty assessments are carried out in terms of income, as expenditure data is seldom available in the household surveys of the region.

In this section we compute income poverty with data from the Gallup World Poll. To that aim we take advantage of a question on monthly total household income before taxes. Answers are reported in brackets, leading to just a rough measure of

income.[3] In all LAC countries we compute for each respondent a monthly household income variable in US dollars by (i) randomly assigning a value in the corresponding bracket of the original question in local currency units (LCU), and (ii) translating this value to US$ using country exchange rates adjusted for purchasing power parity (PPP).[4] The assignment in step (i) is carried out by assuming that the shape of the income distribution in a given bracket of the Gallup Poll is similar to that of the 2006 national household survey.[5] Due to data availability we apply this procedure only for LAC countries. When comparing this region with the rest of the world, we use an annual income variable standardized by Gallup, constructed by taking just the midpoints in each bracket. For that reason, our statistics differ when working either with LAC alone, or in comparison with the rest of the world.

Finally, in order to construct a household *per capita* income variable we compute the number of household members by adding the number of children under 15 reported in the Gallup Poll to the average number of adults (above 15) estimated from the national household surveys, since that variable is missing in the Gallup dataset. In particular, we run a model in each national household survey of the number of adults on a set of covariates, and apply the coefficients to predict the number of adults in the Gallup Poll.[6]

As expected, incomes reported in the Gallup Poll are lower than in the national household surveys. While Gallup includes just one general income question, national household surveys typically contain a large set of questions aimed at capturing all sources: labor and capital income, all kind of transfers, and estimates for the implicit rent from own housing. The linear correlation across countries between per capita income in Gallup and the national household surveys is positive, significant, not too high with the whole sample (0.61) but substantially higher (0.95) when deleting the main deviants –Jamaica, Honduras and Venezuela.[7] When taking the medians the correlation coefficient are 0.58 and 0.93, respectively.

We compute income poverty by applying the international poverty line of US$ 2-a-day adjusted for PPP [10] to the distributions of household per capita income estimated both from Gallup and national household survey microdata. The US$ 2-a-day line is a usual standard for international poverty comparisons in the region.

[3]The frequency distributions for each country are available upon request.

[4]Naturally, results change with alternative random draws in step (i). However, all the main results in the paper are highly robust to alternative random assignment of incomes. PPP conversions are taken from the 1993 IPC Program. Results regarding income poverty are robust to the use of 2005 IPC numbers. For instance, the correlation between per capita incomes using both sources for PPP is 0.96, and the correlation of country poverty headcounts is 0.94.

[5]Given larger income under-reporting in Gallup, units belonging to a given bracket in the Gallup Poll may belong to a different bracket in the household survey. To alleviate this problem we first align the brackets in the two sources by multiplying Gallup figures for the ratio of median values of the two data sources. Then, we randomly assign values to each observation in a given Gallup bracket by replicating the *shape* of the distribution in the corresponding household survey bracket. It is important to notice that we assign values based on the original Gallup bracket, and do not adjust them by scale differences.

[6]See [5] for details.

[7]Gasparini and Glüzmann [5] compute for each country non parametric estimates of the density function of the log per capita income in LCU from both sources of information. The distributions are reasonably close in most countries (after adjusting incomes for the difference in means).

Using this line, 39.9% of the population in LAC would be classified as income poor according to Gallup data. We will use this figure as a benchmark in the following sections of the paper.

Table 2 shows the poverty headcount ratios for each country using both sources of information. On average, poverty in the Gallup Poll is 21 points higher than in national household surveys when using the US$ 2 line. This gap is naturally linked to the differences in incomes between the two sources mentioned above. The correlation between poverty estimates using the Gallup survey and those computed with national household survey data is positive and significant. The linear correlation coefficient is 0.62 for LAC, 0.71 for Latin America, and 0.92 without the main income deviants identified above. The Spearman rank correlation coefficient is 0.93. Puerto Rico, Trinidad & Tobago, the Southern Cone and Costa Rica have economies with relatively low income poverty levels, while some Andean and Central American countries are in the other extreme of the ranking. Haiti stands up as the country with the highest incidence of poverty in the region. Despite a much rougher approximation to per capita income, the picture of poverty in Latin America and the Caribbean that arises from Gallup data is not very different from the one obtained from the national household surveys. Poverty levels are highly correlated across both information sources and the poverty rankings are roughly consistent.

Table 2 Poverty in LAC from the Gallup survey and household surveys. Headcount ratio, US$ 2-a-day line

	Gallup	HH surveys	Diff.
Latin America			
Argentina	25.3	10.2	15.1
Bolivia	67.1	39.2	27.9
Brazil	31.2	13.3	17.9
Chile	22.1	3.3	18.7
Costa Rica	27.5	7.0	20.5
Ecuador	51.4	21.0	30.4
El Salvador	67.4	31.1	36.3
Guatemala	55.6	26.4	29.2
Honduras	25.5	32.3	−6.7
Mexico	50.9	14.8	36.1
Nicaragua	64.5	40.6	23.9
Panama	37.1	15.6	21.4
Paraguay	61.9	28.0	33.9
Peru	64.3	25.9	38.4
Uruguay	33.6	5.5	28.0
Venezuela	32.8	28.0	4.8
The Caribbean			
Cuba	24.3		
Dominican Republic	49.6	8.7	40.8
Haiti	84.9	80.2	4.7
Jamaica	22.6	43.8	−21.2
Puerto Rico	5.4		
Trinidad & Tobago	22.0		
LAC	39.9		

Own estimates based on microdata from Gallup World Poll 2006 and national household surveys

4 Non-monetary and subjective deprivation

The poverty literature recognizes the need to assess welfare in a truly multidimensional sense, with income as just one particular relevant dimension. This section explores deprivation associated to the consumption of services and durables that may speak of a still "objective" dimension, not necessarily captured by income, and deprivation as perceived directly by households or individuals, in a "subjective" way.

4.1 Non-monetary, objective deprivation

The Gallup Poll 2006 has information on access to a set of basic services –water and electricity -, and communication and information goods and services -phone (fixed and cellular), computer and Internet.[8] Table 3 shows basic descriptive statistics on those variables by income poverty group based on the US$ 2-a-day line. There are significant differences across income poverty groups in terms of access to services and durable goods. In the case of water, 86.6% of the income poor and 94.4% of the income non-poor report having access to water in their dwellings or lots.[9] The differences between the income poor and non-poor are smaller in the case of electricity (95.3% and 98.4%) and larger for fixed phones (36% and 60%) and computers at home (8.1% and 24.8%).

In order to facilitate regional and country comparisons, we have aggregated the previous information into a single index of non-monetary welfare.[10] The choice of a threshold of this index, that separates the poor from the non-poor, is surely arbitrary, as in the case of setting a poverty line to measure income-based poverty. With the sole purpose of comparing results with those in the previous section we have adopted a *relative* approach, and set a poverty line in the index of non-monetary welfare that implies a share of the LAC population below that threshold equal to the income poverty headcount ratio with the US$ 2 line; *i.e.* 39.9%. Naturally, imposing this threshold implies losing the possibility of comparing aggregate LAC poverty figures across methodologies (which is anyway a debatable goal), but we gain in comparability at the country level.

Following this approach we compute a one-dimensional index based on the access to water, electricity, telephone, cell and regular phone, personal computer and Internet in the 2006 Gallup Poll.[11] The first three columns of Table 4 present mean values of the index –normalized to a [0,1] scale using $z = (x–x_{\min})/(x_{\max} - x_{\min})$, where x is the original variable and z its normalized version- by country and by income poverty group. The fourth column in Table 4 shows the headcount ratios

[8]Unfortunately, other interesting goods and services are excluded from the analysis because of missing information for some countries. For example, data on housing ownership and access to sanitation is only available for Honduras and Nicaragua, while information on access to a television set is not recorded in the surveys of Brazil, Mexico, and Venezuela.

[9]Naturally, propositions like this one are conditional on the methodology adopted to define the income poor.

[10]The index is simply the first principal component of all variables analyzed in this subsection.

[11]The 2007 Gallup Poll has information on additional variables: automobile, cable TV, DVD player, washing machine, and freezer. We computed another one-dimensional index based on these goods plus the set available in the Gallup 2006. Results are available upon request.

Table 3 Some services and durable goods. Basic descriptive statistics. Gallup survey 2006

	Water			Electricity			Fixed phone			Cell phone			Computer			Internet		
	Mean	Poor	Non-poor	Mean	Poor	Non-poor	Mean	Poor	Non-poor	Mean	Poor	Non-poor	Mean	Poor	Non-poor	Mean	Poor	Non-poor
Latin America	92.4	88.7	94.6	97.5	96.2	98.5	52.0	37.0	60.4	41.9	33.1	49.1	19.5	8.2	24.9	10.3	2.2	14.4
Argentina	95.2	95.1	95.0	99.0	97.9	99.4	57.9	28.6	61.8	56.2	41.7	61.6	29.7	7.0	33.4	14.8	0.8	16.5
Bolivia	68.9	63.1	74.4	94.4	91.6	97.6	31.7	20.7	47.7	43.0	37.6	52.9	16.9	8.9	27.9	3.7	1.0	7.8
Brazil	93.7	91.7	94.3	98.6	98.4	98.7	53.0	32.7	58.2	44.2	36.7	47.1	17.3	4.5	20.1	12.6	1.5	15.2
Chile	99.0	97.3	99.2	99.3	98.5	99.3	63.7	29.6	69.1	67.8	54.4	71.3	39.8	8.9	43.8	24.1	1.8	27.7
Colombia	97.9	97.8	98.3	99.5	99.8	99.1	65.3	58.9	81.3	60.1	55.3	73.2	23.0	16.9	37.6	10.4	4.7	20.7
Costa Rica	96.2	95.9	95.4	99.7	99.4	99.8	73.1	53.1	76.0	36.2	20.5	39.4	28.8	10.9	29.1	11.5	0.9	12.4
Ecuador	93.5	90.7	96.2	99.6	99.7	99.6	55.7	42.0	67.0	47.3	36.3	56.3	25.2	10.5	37.4	5.3	1.6	8.4
El salvador	82.6	74.1	93.9	93.7	91.1	98.3	61.9	47.3	81.4	36.4	23.9	54.2	12.7	5.3	25.3	3.2	0.3	8.1
Honduras	83.2	77.2	91.5	72.1	42.8	83.4	24.3	9.8	27.2	23.7	4.5	31.9	8.8	3.1	10.7	1.7	0.0	2.4
Mexico	91.8	85.8	95.2	98.4	96.7	99.3	46.8	38.2	57.6	26.0	19.0	36.1	14.5	8.3	19.5	6.3	2.9	9.3
Nicaragua	77.5	78.9	84.1	76.8	80.4	84.5	32.3	29.7	42.8	23.4	21.0	34.6	4.0	2.5	8.9	0.8	0.7	1.5
Panama	96.0	90.5	98.4	92.3	81.2	97.3	40.0	25.4	46.7	52.4	27.8	63.2	15.5	1.6	21.9	10.4	0.0	15.2
Paraguay	61.1	48.6	75.9	95.6	93.4	98.8	17.8	5.9	32.1	40.1	31.7	49.0	6.7	1.8	11.9	1.5	0.0	3.2
Peru	85.6	81.7	92.6	92.2	88.4	96.4	34.2	17.2	54.1	21.5	12.3	33.3	16.3	5.2	30.7	5.6	0.6	10.3
Uruguay	97.9	92.8	99.4	98.4	95.5	99.3	76.6	45.8	86.1	47.0	38.1	49.6	31.4	10.2	37.3	20.6	4.7	24.9
Venezuela	97.2	95.6	97.6	98.4	98.9	98.4	62.8	44.5	71.8	46.4	24.8	56.8	31.0	9.5	38.2	11.7	1.2	15.6
The Caribbean	79.2	60.1	91.5	92.2	83.3	97.8	41.8	22.2	54.2	38.2	33.0	40.3	17.5	6.7	23.2	9.3	2.4	12.3
Cuba	95.7	96.4	96.0	99.5	99.2	99.5	50.9	40.3	55.9	7.5	6.7	8.3	9.1	3.3	11.0	1.5	0.5	1.9
Dominican Republic	73.9	63.3	79.7	95.7	94.2	96.5	31.3	13.9	43.3	48.1	34.3	59.3	13.7	3.5	20.3	6.2	0.4	9.3
Haiti	45.5	41.2	71.9	72.2	70.5	85.2	22.3	18.8	36.5	43.2	40.7	65.3	12.7	9.4	29.6	5.3	3.9	13.3
Jamaica	98.1	97.5	99.4	99.2	97.4	99.1	45.9	11.8	48.2	75.9	66.2	80.5	36.4	8.8	41.1	34.9	8.8	40.5
Puerto Rico	99.7	100.0	99.7	99.7	100.0	99.7	69.1	43.9	69.3	65.5	39.6	66.3	46.1	12.1	45.5	28.4	5.3	27.8
Trinidad & Tobago	90.2	81.0	88.5	98.0	95.5	97.0	68.0	52.6	71.6	48.1	30.4	49.1	21.9	2.8	24.5	12.0	0.0	15.9
LAC	91.5	86.6	94.4	97.1	95.3	98.4	51.3	36.0	60.0	41.6	33.0	48.6	19.3	8.1	24.8	10.2	2.2	14.2

Own estimates based on microdata from Gallup World Poll 2006

Table 4 Non-monetary and subjective welfare and poverty in LAC. Gallup survey 2006

	Index of non-monetary welfare			Non-monetary	Index of subjective welfare			Subjective
	Mean	Income poor	Income non-poor	deprivation (%)	Mean	Income poor	Income non-poor	deprivation (%)
Latin America	0.35	0.26	0.39	39.6	0.68	0.63	0.71	38.8
Argentina	0.41	0.26	0.44	19.4	0.68	0.59	0.70	39.6
Bolivia	0.28	0.22	0.35	52.6	0.60	0.56	0.65	59.7
Brazil	0.35	0.25	0.38	45.6	0.72	0.68	0.73	28.1
Chile	0.49	0.28	0.53	11.7	0.66	0.49	0.69	44.3
Colombia	0.39	0.34	0.49	17.7	0.67	0.66	0.70	40.8
Costa Rica	0.40	0.28	0.41	19.8	0.73	0.70	0.74	27.7
Ecuador	0.36	0.28	0.42	27.2	0.57	0.53	0.61	64.6
El Salvador	0.29	0.23	0.39	37.6	0.58	0.53	0.63	61.9
Honduras	0.21	0.13	0.25	63.5	0.61	0.51	0.61	54.2
Mexico	0.30	0.25	0.35	45.8	0.68	0.64	0.72	41.0
Nicaragua	0.20	0.20	0.25	67.0	0.51	0.50	0.56	71.9
Panama	0.33	0.20	0.38	31.7	0.67	0.59	0.70	40.9
Paraguay	0.22	0.17	0.27	63.8	0.50	0.43	0.57	79.2
Peru	0.28	0.20	0.38	56.9	0.54	0.49	0.60	67.8
Uruguay	0.45	0.28	0.50	14.6	0.64	0.55	0.66	48.9
Venezuela	0.41	0.28	0.46	32.5	0.74	0.66	0.77	26.9
The Caribbean	0.31	0.21	0.37	43.6	0.56	0.46	0.64	64.8
Cuba	0.27	0.24	0.28	47.5				
Dominican Republic	0.28	0.20	0.34	47.0	0.59	0.53	0.62	58.1
Haiti	0.22	0.19	0.36	64.2	0.42	0.41	0.46	93.5
Jamaica	0.51	0.29	0.55	15.8	0.66	0.53	0.68	43.0
Puerto Rico	0.53	0.31	0.53	8.2	0.71	0.67	0.71	36.8
Trinidad & Tobago	0.38	0.24	0.40	21.9	0.64	0.54	0.62	48.2
LAC	0.35	0.26	0.39	39.9	0.68	0.62	0.71	39.9

Own estimates based on microdata from Gallup World Poll 2006 The index of non-monetary welfare is based on access to water, electricity, telephone, personal computer, Internet and cell phone. The index of subjective welfare is based on questions *wp16, wp17, wp18, wp30,* and *wp40*. Poverty line set to generate a LAC headcount ratio similar to the LAC income poverty ratio with the US$ 2-a-day line (39.9%)

based on the index when setting the threshold to generate an aggregate poverty level of 39.9% (the LAC income poverty rate). Headcount ratios based on this criterion range from 8.2% in Puerto Rico to 67% in Nicaragua. Southern Cone countries, Costa Rica, Jamaica and Colombia have relatively low levels of non-monetary poverty. In the other extreme Nicaragua, Haiti, Paraguay and Honduras rank high in that poverty ladder. When compared to the rest of the world, Latin America looks much better than Sub-Saharan Africa and South Asia (see Table 5), and much worse than North America and Western Europe.

4.2 Subjective deprivation

We now turn to the analysis of self-assessed welfare based on questions available in the 2006 Gallup data set. Questions *wp16*, *wp17* and *wp18* ask individuals to rank themselves ("subjectively") in a 0 to 10 scale, 0 being the worst and 10 the best present (*wp16*), past (*wp17*) and future (*wp18*) level of welfare. Question *wp30* asks whether they are satisfied with their living standard, and question *wp40* asks whether in the last year they felt they lacked enough money to satisfy their food needs.[12] The subjective nature of the answers of these questions is not straightforward, but in all cases questions refer to individuals' perceptions on how they felt or how much they needed.[13]

Table 6 presents basic descriptive statistics on these variables by income poverty group. First, there is a systematic difference in favor of Latin America, as compared to the Caribbean: all measures are higher for the former group of countries. Perceptions regarding present life are usually less optimistic than those concerning the past (questions *wp16* and *wp17*), but the difference is small. The top of the ranking is occupied by Costa Rica, Venezuela and Puerto Rico, and the bottom by Nicaragua, Peru and Haiti. Perceptions regarding the future differ rather dramatically in some countries, as for the case of Brazil, Colombia, Panama, Venezuela, and Jamaica who rank at the top. It is interesting to remark the cases of Argentina and Chile, countries that in spite of performing close to the averages in all other variables, they rank at the top regarding satisfaction with food needs. Venezuela is another case worth highlighting since exactly the opposite occurs: even though it is at the top on most measures, it ranks at the bottom in terms of satisfaction with food access. The case of Haiti deserves to be stressed: it ranks at the very bottom of *all* dimensions, reflecting the deeply rooted problems this country faces in terms of deprivation. Regarding responses by income deprivation status, the non-poor, on average, declare to be more satisfied as compared to the poor. However, an interesting result is that when asked about their pasts, the poor and the non-poor provide similar answers.

As in the previous subsection, we have summarized all variables into a single subjective welfare index based on the first principal component of the variables

[12] Questions *wp30* and *wp40* are binary and are recoded so as "1" means satisfied and "0" not-satisfied.

[13] There are other interesting questions such as *wp43* (whether in the last year they felt they lacked enough money to satisfy their shelter needs), and *wp44* (whether in the last year they felt hungry). Unfortunately, since these questions are missing for some of the countries, we exclude them from the analysis.

Table 5 Non-monetary and subjective welfare and poverty in other regions of the world. Gallup survey 2006

	Index of non-monetary welfare			Non-monetary	Index of subjective welfare			Subjective
	Mean	Income poor	Income non-poor	deprivation (%)	Mean	Income poor	Income non-poor	deprivation (%)
Geographic regions								
Latin America & The Caribbean	0.39	0.28	0.41	18.0	0.67	0.58	0.69	18.0
Eastern Asia & Pacific	0.36	0.20	0.38	52.4	0.60	0.45	0.63	24.2
Eastern Europe & Central Asia	0.44	0.25	0.45	33.8	0.53	0.47	0.54	41.8
Middle East & North Africa	0.55			25.1	0.62			25.0
South Asia	0.16	0.09	0.18	89.4	0.58	0.49	0.60	31.7
Sub-Saharan Africa	0.11			92.3	0.47			55.5
Western Europe	0.81		0.80	1.0	0.73		0.72	7.1
North America	0.88		0.88	0.0	0.74		0.73	8.1
Regions by income								
High Income: OECD	0.87		0.87	0.8	0.72		0.72	8.9
High Income: non OECD	0.78		0.77	2.3	0.71		0.67	9.4
Low Income	0.15	0.13	0.22	87.8	0.55	0.48	0.60	37.6
Lower Middle Income	0.34	0.22	0.37	50.2	0.57	0.50	0.60	32.9
Upper Middle Income	0.43	0.28	0.45	24.4	0.62	0.59	0.64	32.9

Own estimates based on microdata from Gallup World Poll 2006

The index of non-monetary welfare is based on access to water, electricity, telephone, personal computer, Internet and cell phone. The index of subjective welfare is based on questions *wp16, wp17, wp18, wp30,* and *wp40*. Poverty line set to generate a LAC headcount ratio similar to the LAC income poverty ratio with the US$ 2-a-day line (18.0%). For these comparisons we estimate incomes based on midpoints of brackets in PPP US$ provided by Gallup, since we do not have access to incomes in LCU for the rest of the world. For that reason estimates in Tables 4 and 5 differ. Insufficient observations preclude us to compute income poverty in Middle East and North Africa, and in South Saharan Africa. Income poverty is almost inexistent in Western Europe and North America when measured with the US$ 2 line

Table 6 Questions on subjective welfare. Basic descriptive statistics. Gallup survey 2006

	wp16			wp17			wp18			wp30			wp40		
	Mean	Poor	Non-poor	Mean	Poor	Non-poor	Mean	Poor	Non-poor	Mean	Poor	Non-poor	Mean	Poor	Non-poor
Latin America	6.3	5.8	6.6	5.8	5.5	5.9	7.9	7.6	8.2	0.67	0.60	0.72	0.70	0.57	0.79
Argentina	6.3	5.5	6.4	5.8	5.2	5.8	7.7	7.3	7.8	0.66	0.53	0.70	0.77	0.51	0.83
Bolivia	5.4	5.1	5.8	4.9	4.6	5.2	7.0	6.7	7.4	0.70	0.65	0.74	0.59	0.51	0.71
Brazil	6.6	6.3	6.8	5.8	5.8	5.7	8.8	8.7	8.8	0.67	0.56	0.70	0.80	0.67	0.84
Chile	6.1	4.6	6.4	5.7	4.8	5.9	7.4	6.5	7.6	0.67	0.37	0.74	0.73	0.35	0.80
Colombia	6.0	5.9	6.2	5.7	5.5	6.0	8.0	8.0	7.9	0.72	0.71	0.75	0.68	0.64	0.81
Costa Rica	7.1	6.8	7.1	6.7	6.6	6.7	7.8	7.5	7.8	0.79	0.73	0.79	0.74	0.62	0.76
Ecuador	5.0	4.7	5.3	5.2	4.8	5.5	6.2	6.0	6.5	0.66	0.56	0.74	0.63	0.54	0.72
El salvador	5.7	5.3	6.1	5.9	5.6	6.1	5.7	5.1	6.3	0.62	0.56	0.65	0.60	0.51	0.72
Guatemala	5.9	5.7	6.0	5.8	5.8	5.9	6.7	6.5	6.9	0.70	0.65	0.75	0.73	0.67	0.82
Honduras	5.4	4.2	5.6	4.9	3.9	5.0	7.2	6.6	7.1	0.69	0.63	0.69	0.58	0.41	0.63
Mexico	6.6	6.2	6.9	6.3	5.9	6.5	7.6	7.2	7.8	0.69	0.63	0.77	0.64	0.56	0.70
Nicaragua	4.5	4.6	4.8	4.3	4.3	4.6	5.9	5.8	6.4	0.58	0.56	0.68	0.46	0.48	0.49
Panama	6.1	5.0	6.5	5.5	4.9	5.8	8.1	7.2	8.4	0.65	0.62	0.66	0.70	0.60	0.75
Paraguay	4.7	4.3	5.3	5.4	5.1	5.7	5.0	4.3	5.7	0.45	0.35	0.57	0.60	0.47	0.76
Peru	4.8	4.3	5.4	4.6	4.3	4.9	6.7	6.2	7.2	0.52	0.47	0.58	0.50	0.38	0.64
Uruguay	5.8	5.0	6.0	5.8	5.0	6.0	7.1	6.8	7.1	0.61	0.50	0.64	0.75	0.50	0.83
Venezuela	7.2	6.5	7.6	6.2	5.5	6.5	8.5	8.1	8.8	0.79	0.67	0.85	0.58	0.43	0.64
The Caribbean	5.2	4.3	5.6	4.9	4.4	5.3	6.9	6.0	7.3	0.53	0.42	0.63	0.52	0.36	0.64
Cuba	5.4	5.2	5.4	4.8	4.6	4.9	7.0	7.1	6.9	–	–	–	–	–	–
Dominican Republic	5.1	4.6	5.5	4.8	4.7	4.9	7.7	7.3	7.8	0.57	0.49	0.65	0.51	0.40	0.58
Haiti	3.8	3.8	3.9	4.1	4.0	4.2	5.1	4.9	6.0	0.39	0.39	0.41	0.36	0.34	0.48
Jamaica	6.2	5.2	6.3	5.2	4.5	5.3	8.3	7.0	8.5	0.51	0.22	0.54	0.69	0.42	0.75
Puerto Rico	6.6	6.2	6.5	6.9	7.5	6.9	7.7	6.9	7.7	0.78	0.62	0.78	0.73	0.46	0.72
Trinidad & Tobago	5.8	5.2	5.6	5.8	5.9	5.7	7.6	6.2	7.2	0.50	0.56	0.48	0.73	0.60	0.73
LAC	6.2	5.7	6.5	5.7	5.4	5.8	7.9	7.5	8.2	0.67	0.59	0.72	0.70	0.56	0.78

Own estimates based on microdata from Gallup World Poll 2006

wp16, *wp17*, and *wp18* ask individuals to rank themselves in a 0 to 10 scale, 0 being the worst and 10 the best present (*wp16*), past (*wp17*), and future (*wp18*) possible life; *wp30* asks individuals whether they are satisfied with their living standard and question *wp40* asks whether in the last year they felt they lacked enough money to satisfy their food needs. Questions are coded so as "1" means satisfied and "0" non-satisfied

analyzed in this subsection. Once, again, though debatable, this aggregation leads to interesting intercountry comparisons. The second panel in Table 4 presents results of this aggregation. The top of the ranking based on this index of subjective welfare –normalized to a [0,1] scale– is occupied by Brazil, Costa Rica, Venezuela and Puerto Rico, and the bottom by Nicaragua, Paraguay and Haiti.

Again, to compute subjective deprivation we set a poverty line in the space of the index of subjective welfare that implies a share of the LAC population below that threshold equal to 39.9% (the LAC income poverty rate using the US$ 2 line). The last column in Table 4 shows the results. For example, this implies that in a highly ranked country like Brazil, 28.1% of the households are subjectively deprived. On the other extreme, this figure reaches a dramatic 93.5% for the case of Haiti.

The relatively mild, though systematic, differences between the responses of the (income based) poor and the non-poor hint towards the true multidimensional nature of welfare: even though countries differ systematically along subjective welfare, the relationship of this dimension is weak with respect to income, which suggests the inability of income to capture this otherwise relevant welfare dimension. The analysis of these discrepancies is the subject of the next section.

Finally, the second panel in Table 5 compares LAC to the rest of the world. Interestingly, our results suggest that in terms of subjective perceptions the LAC region performs far from developed regions (Western Europe and North America), but much better than all the other regions. In particular, the differences with regions like Sub-Saharan Africa or Eastern Europe and Central Asia are dramatic.

5 The dimensionality of deprivation

The previous sections dealt with deprivation, understood as low levels of a pre-specified quantifiable notion of welfare: income in Section 3 and indices of consumption of durable goods and indicators of subjective welfare in Section 4. The underlying method in those sections follows this sequence: first, a relevant welfare notion is identified; second, variables in the survey are associated to that particular notion; and third, a statistical method is used to produce an index which classifies individuals into the "poor / non-poor" status.

At this point, a natural question which comes up is: which is the dimensionality of welfare and hence of deprivation? Even though there is no clear definition of "dimension" that can be used in the study of welfare, the issue refers to the degree of complexity in characterizing an underlying object, close to the mathematical notion of dimension as the number of coordinates needed to specify a point correctly in a given space. In one extreme case where there is a single underlying notion of welfare, all questions related to welfare are seen as proxies that differ among themselves due the degree of inaccuracy with respect to the unobserved, single-dimensional welfare concept. In the opposite extreme case, welfare is a truly multidimensional concept that cannot be appropriately captured by any single notion. Hence, from this point of view, questions related to welfare may summarize a particular dimension or several of them.

As a first approach, Table 7 presents correlations among the welfare indicators from Sections 3 and 4. That is, we look at household per capita income, and the standardized indices of non-monetary and subjective welfare. Correlations are

Table 7 Correlations among welfare indicators

	Subjective	Non-Monetary	Income
a) All individuals			
Subjective	1		
Non-Monetary	0.298	1	
Income	0.206	0.393	1
b) Low income (below median income)			
Subjective	1		
Non-Monetary	0.231	1	
Income	0.167	0.251	1
c) High income (above median income)			
Subjective	1		
Non-Monetary	0.227	1	
Income	0.130	0.279	1

Own estimates based on microdata from Gallup World Poll 2006

significantly different from zero (standard errors clustered at the country level). The correlation between income and the index of non-monetary welfare is 0.393. The lowest correlation is between subjective welfare and income (0.206).[14] These results are consistent with the previous literature, in the sense that subjective notions of welfare are statistically correlated with income, even though this correlation is low (see, for example [11]). The significant correlation discards the sometimes claimed idea that subjective welfare measures highly idiosyncratic factors that do not obey systematic patterns. Nevertheless, the low correlation suggests that income per se cannot give account of a considerable part of the variation in welfare. Finally, it is interesting to remark that, though weak, this significant positive correlation between subjective welfare and income is consistent with recent results like those reported in [13].

As a robustness check, we compute similar correlations for low and high income individuals. The bottom two panels of Table 7 present correlations for individuals with income below and above the median income. Overall, correlations are smaller when the sample is split, but results remain qualitatively unchanged: correlations, though smaller, are significantly different from zero. The pairwise correlations between subjective welfare and non-monetary measures are virtually identical in both groups. Interestingly, the correlation between non-monetary welfare and income is higher for richer individuals, while the opposite holds for the correlation between income and subjective welfare.

As a second step, we adopt a more "agnostic" approach and explore directly the problem of dimensionality of welfare, looking at all variables considered in Sections 3

[14] In this section we report the results obtained by using the full sample of LAC countries. The main results are robust to the use of alternative samples in which we ignore countries with potential problems in some variables. For instance, if we ignore Honduras, Venezuela and Jamaica (the countries with the larger discrepancies in the income variable between Gallup and the national household surveys) the correlation between income and the index of non-monetary welfare rises to 0.428, and the correlation between subjective welfare and income rises to 0.237.

Table 8 Factor analysis results

a) Unrotated factor analysis

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor1	2.989	1.490	0.249	0.249
Factor2	1.499	0.323	0.125	0.374
Factor3	1.176	0.185	0.098	0.472
Factor4	0.991	0.075	0.083	0.555
Factor5	0.916	0.093	0.076	0.631
Factor6	0.823	0.071	0.069	0.700
Factor7	0.753	0.019	0.063	0.762
Factor8	0.734	0.015	0.061	0.823
Factor9	0.719	0.049	0.060	0.883
Factor10	0.669	0.292	0.056	0.939
Factor11	0.377	0.024	0.031	0.971
Factor12	0.354	.	0.030	1.000

b) Rotated factor analysis (orthogonal varimax rotation)

Factor	Variante	Difference	Proportion	Cumulative
Factor1	2.173	0.142	0.181	0.181
Factor2	2.031	0.572	0.169	0.350
Factor3	1.460	.	0.122	0.472

c) Rotated factor loadings

Variable	Factor1	Factor2	Factor3	Uniqueness
wp16	0.106	0.859	0.075	0.245
wp17	0.079	0.524	0.075	0.713
wp18	0.064	0.778	0.005	0.391
wp30	0.075	0.490	0.147	0.733
wp40	0.219	0.313	0.281	0.775
Incomepc_ppp	0.615	0.112	0.077	0.604
Water	0.055	0.111	0.720	0.466
Electricity	0.002	0.009	0.756	0.429
Telephone	0.417	0.117	0.476	0.586
Computer	0.819	0.083	0.081	0.316
Internet	0.836	0.065	−0.014	0.297
Mobile phone	0.417	0.159	0.136	0.782

Own estimates based on microdata from Gallup World Poll 2006

and 4, but without clustering them into groups, with the goal of asking how many relevant underlying dimensions of welfare they represent.[15]

To this end, we follow a factor analytic approach. We apply a principal component factorization method to all LAC countries. The first panel of Table 8 presents the eigenvalues associated to each factor sorted by size; their incremental differences; the proportion of each factor; and the cumulative proportion of the total variability.

Using the standard rule of retaining factors associated to eigenvlaues greater than one, the method suggests that the 12 variables can be appropriately summarized

[15]The variables included in the analysis are: per capita income (in PPP US$), access to water, electricity, fixed phone, mobile phone, personal computer, and Internet, and questions on self-assessed welfare (*wp16, wp17, wp18, wp30* and *wp40*).

by three orthogonal factors, the three factors accounting for 0.472 of the total variability. A fourth factor may add to the explanation, nevertheless we retain three of them which simplifies the interpretation with a minimal loss in explanatory power. It is well known that factor estimates ("loadings") are unique up to orthogonal transformations, and hence it is standard practice to use particular rotations that help interpret the obtained factors. We have used a standard varimax rotation of the three retained factors; results are shown in the bottom panels of Table 8. Each coefficient represents how each variable is weighted in each factor and hence higher values represent variables relatively more important in the factor.

Factor interpretation is usually idiosyncratic, but the results obtained from the rotated coefficients suggest clear patterns. The first factor relies on income and assets that bear a strong relation with it, like having a computer, access to Internet, or a regular or mobile phone. This is the factor that best represents all the variables. The second factor focuses on the subjective questions, that is, variables weakly correlated with income that still retain relevant information regarding welfare that cannot be accounted by income. Finally, the last factor seems to capture very basic needs, related to having access to water or electricity.

Summing up, the exploratory analysis derived from a simple factor analytic model suggests that welfare can be appropriately summarized by three orthogonal dimensions. Strikingly, the first one is precisely captured by income and variables strongly related to it. This is an interesting result since it speaks about the importance of income-based assessments of welfare status. Nevertheless, the relevance of the two other factors also shows that welfare is a truly multidimensional phenomenon that cannot be fully captured by income solely. The second factor can be labeled as the "subjective factor". The fact that all subjective variables are strongly related among themselves and that they load similarly on the same factor suggests that some average of them may well represent this dimension of welfare. Finally, the third factor can be labeled as "basic needs", suggesting that notions of welfare arising from standard "unsatisfied basic needs" methods, that include the access to basic services like water or electricity, add relevant information not captured by income.

6 The adequacy of income based poverty lines: implicit poverty lines

An important result of the previous section is that even in a markedly multidimensional context, income still plays an important role in the characterization of welfare, and in turn, of poverty. Poverty lines are absolute levels that separate the poor from the non-poor, and are usually constructed by "inverting" expenditure patterns, that is, a consumption basket is exogenously determined, and individuals who cannot afford this basket are rendered as poor. If the relationship between expenditures and income is tight enough, then poverty classifications based on income and expenditures should not differ considerably. On the other hand, self-produced "subjective" classifications arise from individuals perceptions on their welfare and maybe of others in a reference group, and then it is not necessarily an "absolute" notion. In light of the relevance of both income and subjective based dimensions of welfare, a goal of this section is to assess the performance of standard income based poverty lines in capturing other dimensions of welfare and hence poverty, in particular the subjective dimension.

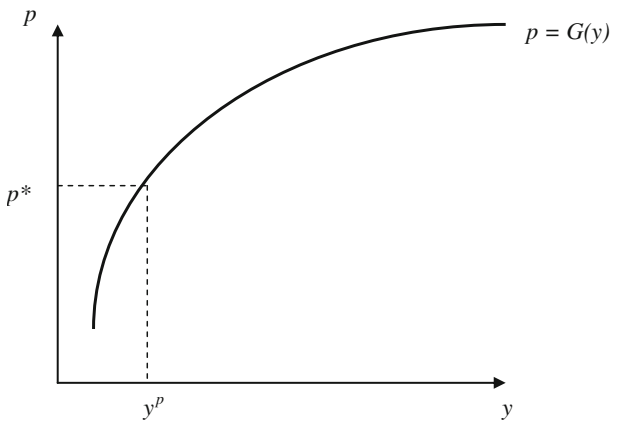

Fig. 1 The subjective poverty line

We implement a simple exercise that "inverts" subjective welfare levels in order to find income thresholds that can be used to separate the poor from the non-poor, in a similar fashion to what is currently implemented with expenditures (see [9] for a related approach). Consider a simple example where individuals are asked whether they are "satisfied or dissatisfied with your standard of living". The goal of the exercise is to find the income level that best separates the "non-satisfied" from the "satisfied": this will be our implicit poverty line.

More concretely, let p be the probability that an individual classifies herself as "satisfied" given her level of income y, and assume that these magnitudes are linked through a simple possibly non-linear relation $p = G(y)$, where $G()$ is an unknown invertible function. The implicit poverty line is the income level that makes an individual indifferent between classifying herself as "satisfied" and "non-satisfied". Suppose that individuals classify themselves as satisfied if given their income, $p > p^*$, where p^* is a probability threshold that distinguishes the "satisfied" from the "non-satisfied". Then, the implicit poverty line y^p is the level of income that solves $y^p = \mathrm{G}^{-1}(p^*)$. Figure 1 illustrates this concept. If the level p^* and the function $G(p)$ are known, then the level of income that separates the poor from the non-poor, y^p can be found as the pre-image of p^*.

In order to implement this exercise we need to specify an observable binary variable s that classifies individuals into "satisfied" and "non-satisfied", and their incomes. Since s is a Bernoulli variable, $E(s) = p = G(y)$. The unknown function $G(y)$ is then found by regressing the binary indicator s on income, using a flexible, non-parametric regression approach that recovers $G(y)$ without the need to specify its functional form. It is tempting at this point to specify a standard parametric form, like a logit or probit, but it seems natural and safer to let the data reveal the form of $G(y)$ instead of adopting a simple, though possibly unrealistic functional form. For the estimation we apply a standard lowess non-parametric estimator.[16]

[16]Lowess (also known as "loess") is a robustified local polynomial regression. Basically, an initial local polynomial non-parametric regression is fit using standard k-nearest neighborhood methods, and then it is iteratively robustified (in the sense of making it resistant to outliers) by reweighing observations. See [2] for an intuitive exposition, or ([7], pp. 192–193) for a description of the algorithm.

Table 9 Implicit poverty lines

	Enough money to buy food	Satisfaction with living standard
$p^* = 0.5$	36.95	
$p^* = 0.659$	163.08	
$p^* = 0.637$		177.38

Own estimates based on microdata from Gallup World Poll 2006

To implement this framework we take questions *wp30* (satisfaction with living standard) and *wp40* (having enough money to buy food), while *y*is household per capita income (in PPP US$). Based on this information, the corresponding $G(y)$ functions are estimated non-parametrically.

The choice of the cutoff point is surely arbitrary. A natural choice is to adopt the standard practice of fixing it to the proportion of cases for which the binary indicator is equal to 1 (proportion of satisfied individuals), labeled in the literature as the "base rate". This is a common practice in probit/logit analysis and has been suggested by several authors as a "fair" choice (see [8]) for a lengthy discussion on prediction and classification in binary choice models). It is also common to use 0.5 as a cutoff point, that is, predict that an individual is "satisfied" if the predicted probability of being satisfied is greater than that of not-being satisfied. A problem with this second choice is that in the case of question *wp30* it implies an out-of-range prediction. More precisely, in the case of food satisfaction (*wp40*) the proportion of satisfied individuals among those with zero income is 0.41, while the proportion corresponding to those satisfied in general terms (*wp30*) among the zero income group is 0.59. These figures can be taken as raw estimates of the intercepts of the probability functions $G()$, and then 0.41 and 0.59 are the minimum values of probabilities of satisfaction where each model implicitly operates.

Results for LAC are detailed in Table 9. The implicit income poverty line for food satisfaction is US$ 36.95 with a cutoff point set at 0.5, and rises up to US$ 163.08 when the threshold is 0.659 (unconditional proportion of satisfied individuals). A comparable figure for overall satisfaction (*wp30*) is US$ 177.38.

It is interesting to notice that the widely-used US$ 1-a-day poverty line is equivalent to a monthly income of US$ 32.7.[17] This figure is very close to our estimate of the implicit poverty line associated to the food satisfaction question with $p^* = 0.5$ (*i.e.* monthly US$ 37). From this analysis the US$ 1-a-day threshold would be a reasonable poverty line to measure and analyze food deprivation in LAC. The other two implicit lines of Table 9 are close to US$ 5–a-day, *i.e.* values closer to the US$ 4 line which is often used to analyze moderate poverty in middle-income countries like most in LAC.

7 Concluding remarks

This paper provides evidence on the multiple dimensions of poverty in Latin America and the Caribbean exploiting the Gallup World Poll 2006. In particular,

[17] 1.0763 a day times 30.42 days. See [1] for details.

we estimate levels and patterns of income, non-monetary, and subjective poverty for all countries in the region based on Gallup microdata. Since the Gallup Poll has the same questionnaire in all the countries in the world, it provides a unique opportunity to carry out a truly international analysis of social issues.

On average, income poverty in the Gallup Poll is higher than in national household surveys. However, the poverty ranking that arises from the two alternative data sources turns out to be similar. We extend the measurement of well being with the Gallup data to other variables beyond income. In particular, we focus the analysis on household consumption of some services and durable goods. To reduce the dimensionality of the problem to a single indicator we apply conventional factor analysis methods. The Gallup survey opens a relevant possibility to explore the issues of subjective welfare and deprivation in detail. We find that the rank correlation between income and subjective poverty is positive and significant, suggesting that subjective-based poverty is significantly related to its objective counterpart. On the other hand, the correlation is far from high, suggesting that income represents only part of a more complex, multidimensional structure behind welfare.

The exploratory analysis derived from a simple factor analytic model suggests that welfare can be appropriately summarized by three dimensions. Strikingly, the first one is precisely captured by income, the second one by an average of the subjective welfare measures, and the third one by variables associated to "basic needs" (water, electricity). This is an interesting result since, on the one hand, it speaks about the importance of income-based assessments of welfare status, and, on the other hand, it shows that welfare is a truly multidimensional phenomenon that cannot be fully captured by income.

In order to assess the adequacy of international income-based poverty lines, we implement a simple exercise by inverting subjective welfare levels in order to find income thresholds that can be used to separate the poor from the non-poor. From this analysis, the US$ 1-a-day international line appears to be a reasonable cut-off value to measure and analyze food deprivation in LAC countries.

References

1. Chen, S., Ravallion, M.: Absolute poverty measures for the developing world, 1981-2004. PNAS **104**(43), 16757–16762 (2007)
2. Cleveland, W.: Visualizing Data. Hobart Press, New Jersey (1993)
3. Deaton, A.: Income, health, and well-being around the world: evidence from the Gallup World Poll. J. Econ. Perspect. **22**(2), 53–72(20) (2008)
4. Feres, J.C., Mancero, X.: Enfoques para la medición de la pobreza. Breve revisión de la literatura. CEPAL, Estudios estadísticos y prospectivos 4 (2001)
5. Gasparini, L., Glüzmann, P.: Estimating income poverty and inequality from the Gallup World Poll: the case of Latin America and the Caribbean. CEDLAS Working Paper N° 83, Universidad Nacional de La Plata (2009)
6. Gasparini, L., Sosa Escudero, W., Marchionni, M., Olivieri, S.: Income, deprivation, and perceptions in Latin America and the Caribbean: new evidence from the Gallup World Poll. CEDLAS Working Paper N° 100. Universidad Nacional de La Plata (2010)
7. Härdle, W.: Applied Non-Parametric Regression. Cambridge University Press, Cambridge (1990)
8. Menard, S.: Coefficients of determination for multiple logistic regression analysis. Am. Stat. **54–1**, 17–24 (2000)
9. Pradhan, M., Ravallion, M.: Measuring poverty using qualitative perceptions of consumption adequacy. Rev. Econ. Stat. **82**(3), 462–471 (2000)

10. Ravallion, M., Datt, G., van de Walle, D.: Quantifying absolute poverty in the developing World. Rev. Income Wealth **37**(4), 345–361 (1991)
11. Ravallion, M., Lokshin, M.: Identifying welfare effects from subjective questions. Economica **68**(271), 335–357 (2001)
12. Ravallion, M., Lokshin, M.: Self-rated economic welfare in Russia. Eur. Econ. Rev. **46**, 1453–1473 (2002)
13. Sacks, D., Stevenson, B., Wolfers, J.: Subjective well-being, income, economic development and growth. NBER Working Paper 16441 (2010)