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CHALLENGES IN MEASURING POVERTY AND UNDERSTANDING ITS DYNAMICS: A SOUTH ASIAN PERSPECTIVE

Martin Rama*

World Bank

South Asia's success at reducing poverty does not imply that the topic has become *passé*. Poverty rates are by now low, but this is because poverty lines are low as well. And the assessment of living standards and their dynamics are blurred by measurement and interpretation challenges. This paper relies mostly on South Asian examples to highlight four tensions: poorer versus richer households, rural versus urban locations, monetary versus non-monetary dimensions of wellbeing, and household characteristics versus context. The discussion is conducted against the backdrop of the two analytical approaches with South Asian roots that have shaped the debate for decades. This review leads to three main recommendations: household survey data has to be exploited in a more thorough manner, data that is increasingly available from other sources needs to be incorporated more systematically in the analysis, and the multiple dimensions of wellbeing should be better integrated in a common framework.

JEL Codes: D31, I32, O1

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1. Introduction

Much of the progress in reducing global poverty since the beginning of the century has happened in South Asia. Defining the poverty line as the equivalent of $1.90 per person per day, measured in Purchasing Power Parity (PPP), the number of poor in South Asia declined from half a billion in 1990 to 216 million in 2015. The poverty rate, which is the fraction of the population with consumption expenditures or income below the poverty line, declined from 47.3 to 12.4 percent (World Bank, 2018). This spectacular transformation is not just driven by India, by far the largest country in the region. Rapid declines in poverty are also apparent by now across most South Asian countries. If the global goal is to bring poverty rates below 3 percent by 2030, then South Asia is definitely on track.

Against this backdrop, it may be natural to conclude that the measurement of poverty and the understanding of its dynamics are not among South Asia's top priorities anymore. True, 216 million people is not an insignificant figure: it amounts to more than 40 percent of the EU population, and almost 70 percent of the US population. But South Asia is by now the fastest-growing region in the world and

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*Correspondence to: Martin Rama (mrama@worldbank.org)

it could be argued that rapid growth will soon take care of the remaining poverty (Kharas *et al.*, 2018). If so, attention could now shift to other, more pressing economic issues.

While this viewpoint is understandable, such shift would be not only premature but unwarranted. Poverty rates are not the only metric to assess the wellbeing of a population: they are just one summary statistic for a broader distribution of living standards. And while there is agreement about the decline of extreme deprivation in South Asia, there is still controversy regarding the broader distribution of living standards. One frequent argument is that growth has benefited the rich to a much greater extent than the poor. And even if standard indicators do not show widening inequalities, this could just be due to defective measurement.

The measurement of poverty could be questioned as well. For example, in South Asia poverty rates may well be on their way to single digits, but this result is contingent of the poverty line being set at $1.90 in PPP per day. Poverty is a societal concept and the minimum acceptable wellbeing tends to increase with economic development. The $1.90 poverty line is based on affording the minimum basic needs in the poorest 15 countries in the world (Ferreira *et al.*, 2015). This line is bound to become increasingly irrelevant in South Asian countries as average incomes increase.

Even sticking to a low reference point that is internationally comparable, there are concerns on what is being counted as consumption. Better measurement could lead to reclassifying non-poor households as poor, and the other way around. For example, the poverty estimates for India are based on a recall period of 30 days for all household expenditures. But a mixed recall period, shorter for food and longer for durable goods, allows capturing greater levels of consumption. If India had switched from uniform to multiple recall period in 2011–2012, its poverty rate would have been 12.4 percent, instead of 21.2 percent (World Bank Group, 2016). And in all likelihood the profile of India's poor would have also changed.

The relatively technical points above are part of a broader set of challenges affecting the measurement of poverty, and of living standards more generally. These challenges are discussed here from a South Asian perspective. The paper does not attempt to be a thorough analytical survey of what is by now a vast literature. Instead, specific examples are used to illustrate the key issues. Whenever possible the examples are from South Asia, but the points made often have a broader validity.

The South Asian perspective is emphasized by first retracing the roots of statistical approaches that are by now standard but were at least partially developed in the region. Many of the ongoing debates on the measurement of poverty, living standards and wellbeing can indeed be interpreted as attempts to deepen, and on occasion reconcile, two main approaches that were mainstreamed in parallel almost three decades ago. These two approaches owe much to distinguished South Asians.

The paper then moves on to review four areas where current measurement efforts are found wanting. Each of these areas is discussed as reflecting a tension between two polar extremes: poorer versus richer households, rural versus urban locations, monetary versus non-monetary dimensions of wellbeing, and household characteristics versus context. Admittedly, these antagonisms are somewhat exaggerated in the paper as a device to bring clarity to complex debates. But the tension

does exist when a common statistical approach is applied to two intrinsically different units of observation, or when two different analytical lenses are used to interpret the same reality.

In each of the four areas, the review of the challenges faced is followed by a discussion of ongoing attempts to move forward. By highlighting the promise and pitfalls of these attempts, the paper hopes to encourage researchers interested in South Asia to remain engaged in the measurement of living standards and the understanding of their dynamics.

2. The South Asian Roots

Little known to many data users, some of the most prevalent ways to measure poverty, living standards and wellbeing more generally have strong South Asian roots. Global metrics such as the $1.90 PPP poverty line used by the World Bank, or the Human Development Index (HDI) of the United Nations are nowadays taken for granted. But few are aware that their origins owe much to South Asian thinkers and researchers. Indeed, from the 1960s to the 1980s, distinguished economists and statisticians from the region were at the forefront of statistical development and the adoption of these now ubiquitous global metrics (World Bank, 2017a).

Mahbub ul Haq (1934-1988) was one of them. A Pakistani economist, he studied at Cambridge University—where he developed a lifelong friendship with Indian economist Amartya Sen—and subsequently at Yale and Harvard. In the 1960s, while still in his 20s, he became the Chief Economist of Pakistan. He had a keen interest in the distribution of income and wealth, conducting research on how two dozen family groups had come to dominate Pakistan's economy.

In the 1970s, ul Haq served as the chief economic adviser to Robert McNamara, then President of the World Bank. There he influenced the World Bank's development philosophy for several decades to come. Ul Haq helped convince McNamara that development should focus on raising living standards and that poverty alleviation could be a cause, rather than a consequence, of economic development. This view was embraced by McNamara in his watershed "Nairobi address", in 1973.

In 1988, after having served as Finance Minister of Pakistan, ul Haq worked with the United Nations Development Programme, where he led the establishment of the *Human Development Report*. In the process, he articulated the HDI, a measure of economic and social development that combines monetary and non-monetary dimensions of wellbeing.

Another towering South Asian figure was Prasandra Chandra Mahalanobis (1893-1972). An Indian scientist and statistician born in what is nowadays Bangladesh, he did his undergraduate courses in Calcutta and then studied at the University of London. In 1932, together with two other professors, he created the Indian Statistical Institute (ISI), registered as a non-profit learned society. After India's independence, ISI was declared as an institute of national importance, with the rank of a university.

At ISI, Mahalanobis's best-known contribution was the development of the modern household survey. Mahalanobis was keen to produce a credible snapshot

of living standards at the district level, and this at a time when many Indian districts did not even have a road connecting them to the rest of the country. By doing so, he championed the notion that living standards could be credibly measured even in poor countries with very large informal sectors. This is how India became "the motherland of household surveys" (Deaton, 1997).

In the year 1990, the approaches developed by ul Haq and Mahalanobis were mainstreamed on a global scale. That was when the United Nations launched its first *Human Development Report*, and the World Bank published its "Poverty" *World Development Report*.

The aim of the *Human Development Report* was to place people at the center of the development process in terms of economic debate, policy and advocacy. Building on the human capability approach developed by Amartya Sen in the 1980s, development was characterized in the report as the provision of choices and freedoms resulting in widespread outcomes. The ambition was to go beyond the availability of means for a good life, or even beyond subjective wellbeing, to capture instead individuals' scope to achieve the kind of lives they have reason to value.

"People are the real wealth of a nation," ul Haq wrote in the opening lines of the first *Human Development Report*. "The basic objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives. This may appear to be a simple truth. But it is often forgotten in the immediate concern with the accumulation of commodities and financial wealth" (United Nations Development Programme, 1990).

The approach articulated in the 1990 *Human Development Report* evolved over time into more ambitious global efforts to encourage and monitor development progress along multiple dimensions of wellbeing. The Millennium Development Goals (MDGs), adopted by the United Nations in the year 2000, broke down the health component into three concrete objectives: reducing child mortality, improving maternal health, and combatting HIV/AIDS, malaria, and other diseases. The MDGs also introduced gender equality and environmental sustainability as two new dimensions to focus on. The Sustainable Development Goals (SDGs), endorsed 15 years later, resulted in an even broader scope, now including issues such as reduced inequality, clean water and sanitation, and sustainable cities and communities

Meanwhile, in the 1970s researchers at the World Bank had started estimating poverty rates based on the monetary resources available to households (Ahluwalia, 1976). The poverty rate was set based on the Indian experience using household survey data from 36 developing countries and extrapolating from them to the rest of the world. Building on this work, in the 1980s the World Bank started scaling up the approach developed by Mahalanobis under its Living Standards Measurement (LSMS) project. This was an initiative to support the generation, curation and analysis of household surveys across developing countries.

These methodological and statistical advances laid the foundations for the 1990 *World Development Report*. Poverty was defined there in relation to subsistence needs, as the inability to attain a minimal standard of living. The report aimed to answer in practical terms three questions: 1) How to measure the standard of living? 2) What is meant by a minimal standard of living? And, 3) having

identified the poor, how to express the overall severity of poverty in a single measure or index.

Yet, from the beginning there was awareness that some of the dimensions considered by the capabilities approach mattered as well. In the words of the report: "Household incomes and expenditures *per capita* are adequate yardsticks for the standard of living as long as they include own production, which is very important for most of the world's poor […]. Neither measure, however, captures such dimensions of welfare as health, life expectancy, literacy, and access to public goods or common property resources. Being able to get clean drinking water, for example, matters to one's standard of living, but it is not reflected in consumption or income as usually measured. Households with access to free public services are better off than those without, even though their incomes and expenditures may be the same" (World Bank, 1990).

Over the years, the approach articulated in the 1990 *World Development Report* became the basis of global efforts to monitor the progress in poverty reduction. A very rich research agenda allowed to refine concepts and metrics, with the resulting estimates playing an increasingly prominent role in public policy debates (Ravallion, 2015). More recently, a high-level commission led by Sir Anthony Atkinson made concrete recommendations to further improve the consumption-based methodology the World Bank uses for tracking poverty and to incorporate other dimensions of poverty and deprivation that ought to be measured (World Bank, 2017b).

In sum, and at the risk of simplifying, the *Human Development Report* embraced a multidimensional perspective to assess the support to human capability at the national level, whereas the 1990 *World Development Report* preferred to rigorously measure income or expenditures at the household level. These two approaches have strongly influenced the measurement of living standards in developing countries in general, and in South Asia in particular. But three decades later measurement can be found wanting in several important respects. Four of them are emphasized in what follows. Arguably, they can all be interpreted as dealing with the refinement and reconciliation of the two approaches.

3. Poorer Versus Richer Households

The approach articulated in the 1990 *World Development Report* involves using representative household surveys to compute household expenditures, typically with a breakdown between food and non-food items. Total expenditures are then divided by the number of household members to obtain a measure of consumption *per capita*. Household income can also be estimated, but this is seen as a less reliable metric because assessing the earnings of farmers or the self-employed is difficult, and also because of the strong seasonality characterizing agricultural activities.

There have been several variations of this approach. Some, such as using diaries instead of an interview to collect information on household expenditures, refer to the generation of the data. Others, like, converting young members of the household into "adult equivalents" to compute expenditure *per capita*, focus on data processing. Beyond the refinements, the reliance on representative household

surveys allows applying the same methodology consistently, both within and across countries (World Bank Group, 2015a).

However, households may be heterogeneous in ways that lead to inconsistent results despite the consistent approach. One such heterogeneity is between the richest households and the rest of the population.

The response rate to household surveys tends to be very high in rural areas and among the poorest segments of society. In some countries a small stipend is paid to respondents, to compensate for the time it takes for them to go through the entire questionnaire—typically several hours. But for richer households such stipend is essentially irrelevant, while the time needed to go through the survey is not. Richer households may also prefer to hide their living standards, for fear of being taxed, extorted or stigmatized. And even if they answered, and did so truthfully, the questionnaires of household expenditure surveys usually focus on the relatively basic goods and services consumed by those who live around the poverty line. The more diverse and sophisticated ways in which the better-off spend their income is not captured by them.

Low response rates and under-reporting of expenditures among the richest segments of society implies that their consumption is under-estimated. Aggregate consumption is therefore underestimated too. One way to assess by how much is to compare the total consumption obtained by aggregation across all households—with appropriate sample weights—with private consumption as reported in national accounts. The definition of these two aggregates is not identical, and national accounts are also subject to measurement error, but the gap between them can be expected to be relatively small and stable.

Among South Asian countries, the difference between household expenditures as computed from household surveys and private consumption as captured by national account is relatively small in Bangladesh, Bhutan in Nepal, but it is substantial elsewhere. The difference is particularly striking in India's case where the gap between the two measures widened from about 20 percent of the private consumption measured by national accounts in the 1980s to about half of it in more recent household surveys (Figure 1).

Large gaps of this sort may not affect the measurement of poverty, as response rates are high among poorer segments of the population and survey questionnaires match their spending patterns well. But these gaps do affect the measurement of inequality, as households and their consumption become increasingly "invisible" when moving toward the top of the distribution. Gini indices and other standard inequality indicators are remarkably low in South Asian countries, compared to other developing countries. But this apparently rigorous statistical finding could just be an artifact, at odds with casual observations. For example, India's number of billionaires is unusually high for an economy of its size, and especially given the relatively low income *per capita* of the country (Forbes, 2018).

Simplifying, two approaches have been proposed to improve the measurement of living standards among the highest rungs of the distribution. One of them involves "correcting" the available household survey data through the re-weighting of the sample and the imputation of missing values. The other relies on data sources that are independent from household surveys to either supplement or replace the estimated expenditure *per capita* of selected households.

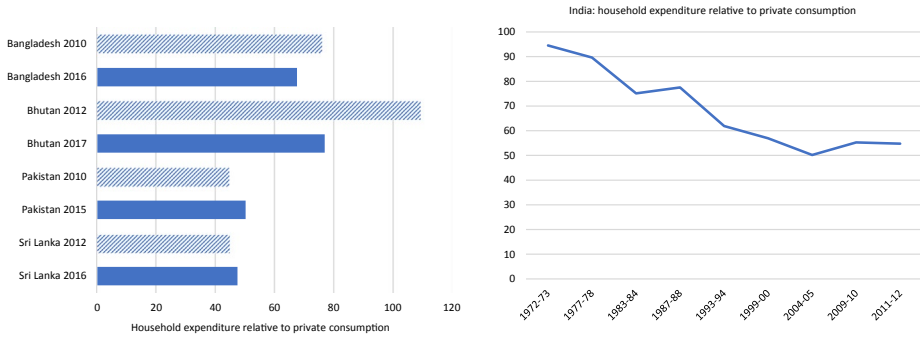

Figure 1. Private Consumption in Household Surveys and National Accounts
Source: World Development Indicators for left panel, and Government of India (2015) for right panel. [Colour figure can be viewed at wileyonlinelibrary.com]

While the first approach has not been applied in South Asia, an illustration of its potential is provided by a recent study for Egypt. This is a country where the aggregate income measured by national accounts grew substantially over the period 2000–2009, while the consumption expenditure measured by household surveys stagnated. In Egypt there is also an important discrepancy between income inequality as measured by household expenditure surveys and the perception of income inequality reported in values surveys. A plausible explanation for these two gaps is that economic growth benefitted mainly the richest households and that these households, or their expenditures, are not well captured by household surveys (Hlasny and Verme, 2016).

To correct for the possible under-representation of richer households in the survey, the Egypt study increased sample weights in locations with abnormally low response rates. These locations were identified by first estimating a probabilistic model linking the observed response rate to household characteristics, and then checking where the actual response rate was significantly lower than the predicted rate. As expected, the locations with abnormally low response rates turned out to be the ones with the highest average incomes. However, increasing the weights of their respondents to the level of the predicted response rate only increased the Gini coefficient for expenditure *per capita* from 0.305 to 0.318. The change was statistically significant, but clearly small.

The same study for Egypt also verified whether the level expenditure *per capita* across households in Egypt followed a Pareto distribution. Studies conducted in several other countries suggest that this particular statistical distribution fits relatively well the incomes *per capita* of the richest households. The fit also turned out to be satisfactory in Egypt's case. This suggests that the under-reporting of expenditures at the top is not a major concern and weakens the case for replacing the expenditures of the richest households with imputed values.

This is only one study, dealing with one developing country, so that caution is needed when trying to draw more general lessons. But the methods chosen to correct for low response and under-reporting are sound and their implementation is thorough. And yet, the adjustments to household survey data explored in this empirical exercise do not seem able to close the gap between national accounts and

household surveys, or between household surveys and values surveys. This may reflect the limits of what can be accomplished with household survey data, even using sophisticated statistical methods.

The second approach goes beyond household surveys, by bringing in data from other, independent sources. Administrative government records are one of such sources. For example, in the US, it has been noted that household surveys miss the receipt of welfare transfers among a large fraction of their samples. Even among households that report receiving transfers, the amount captured by the survey falls short of the real amount by a vast margin. When administrative records can be matched to surveyed households, it is possible to replace the reported receipts by actual welfare transfers and get a more reliable picture of the income distribution (Meyer and Mittag, 2019).

Personal income tax records are another type of administrative data that is increasingly gaining prominence. The use of this other source of information has already led to new and hotly-debated insights into inequality (Atkinson *et al.*, 2011; Piketty 2015). The combination of data from household surveys and tax records, scaled up so as to match national account aggregates, is the foundation of the newly launched *World Inequality Report* (Alvaredo *et al.*, 2018). In South Asia, this second approach was applied to India by Chancel and Piketty (2017, 2019), building on a previous study by Banerjee and Piketty, (2005).

The basic assumption is that surveys provide an accurate description of the distribution of income or expenditure *per capita* for the less well-off, while tax data is more reliable for top earners. A new distribution can thus be generated by combining household survey data up to a point with personal income tax data from there onwards. Sensitivity analyses can be conducted by changing the cutoff point, say from the 80th to the 95th percentiles of the distribution. And multiple additional assumptions are needed to process this merging in practice. But unlike the first approach, this one yields a dramatic increase in the extent of inequality. The study on India concludes that the income share of the top 1 percent of the Indian population is by now even higher than it was during the British Raj.

As individual tax records are not publicly available in many countries, an alternative is to use data on house prices in posh areas to estimate the top tail of the income distribution. Market house price data can often be obtained more easily than income tax data, and incentives for under-declaration are weaker for sale prices than for income. This alternative is again applied to Egypt's case, building on listings of houses and apartments for sale in Cairo and Alexandria from two local real estate firms (van der Weide *et al.*, 2017). The real estate database is used to estimate the distribution of the top 5 percent of the population, and household survey data for the remaining 95 percent. This approach substantially boosts the estimated inequality. While the Gini coefficient for urban areas in 2009 is 36.4 percent according to household survey data, it increases to 47.0 when real estate data are used as well.

These dramatic changes in the estimated inequality show that exploiting other sources of data, such as individual tax records and real estate prices, can provide new insights on living standards. This is in contrast with further refining household survey data, through reweighting and imputation, which so far has not led to a substantially different picture of inequality. The second approach to capture

missing income or expenditure thus seems to bear more promise than the first one. However, the methodological problems associated with this second approach should not be underestimated.

The main challenge concerns the merging of data from household surveys and from extraneous sources of information. These data sources do not measure the same variables: household expenditure is not the same as individual taxable income, or as a property price. In some cases, it may be possible to bring the series closer by making defensible assumptions. For example, adjustments can be made for the actual or presumed number of household members associated with each individual taxpayer. It is also possible to count, or impute, the number of dwellers in a house or an apartment. Another option is to estimate the relationship between consumption expenditures, income tax filings and property prices across households or across space. But the degree of confidence on the resulting estimates diminishes with the number of data transformations needed.

In addition, these other sources of data are not representative of the entire population. In developing countries, only a fraction of households pays personal income tax and only the high end of housing transactions takes place through real estate agents. Among the households that pay tax, avoidance and evasion are common, even in advanced economies. A matching of random audits of taxpayers in Denmark, Norway and Sweden with data on hidden assets leaked through the "Panama Papers" suggests that about 3 percent of personal incomes taxes are evaded even in highly-advanced Scandinavian countries. And the share increases to 25–20 percent for the richest 0.01 percent of the population (Alstadsæter *et al.*, 2017).

The coverage of reliability of the extraneous data may also change substantially over time as a consequence of technological or institutional change. Tax administration agencies may gradually become more effective at countering avoidance and evasion, while internet platforms may bring in more real estate listings into the public domain. These changes may undermine the comparability of the resulting assessments of living standards over time.

4. Rural Versus Urban Locations

Representative household surveys, consistently applied to the population of interest, may not be equally effective at capturing living standards across all locations. For example, if richer households cluster in specific neighborhoods, and if their number and expenditures are not adequately captured by surveys, the living standards of such neighborhoods will be more severely underestimated than those of other locations in the country. But there are other relevant differences across locations, beyond those associated with the incomes or expenditures of their inhabitants. Those other differences may result in an overestimation of the incomes or expenditures of the poorest urban households and have ambiguous effects in the case of other urban dwellers.

Starting with the poorest urban groups, even so-called representative household surveys may not be truly so in urban areas, because in many cases their

sampling frames exclude slum dwellers and households living in illegally occupied land (Carr-Hill, 2013). The living standards and characteristics of slum dwellers may be quite different from those of the rest of the urban population. Not including them when computing household incomes or expenditures may therefore lead to a distorted picture of the distribution of living standards in a country. This is an important concern in the case of South Asian countries, where it has been claimed that up to one fourth of the urban population lives in slums (Ellis and Roberts, 2016).

A recent study for Bangladesh processed two household surveys covering informal settlements and compared the living standards of their residents to those of the rest of the population (Arias-Granda *et al.*, 2017). Poverty rates were slightly lower in slums than in rural areas, which is consistent with continuing rural-urban migration. But slum dwellers were poorer than other urban households, and especially much poorer than other urban households living in areas covered by the City Corporations of Dhaka, which are the core of the city (Figure 2). Combining this finding with the potential underestimation of income or expenditure in richer neighborhoods, it is safe to conclude that the extent of urban inequality is more substantial than current household survey data suggests.

Another frequently-mentioned reason why household surveys may be spatially biased is their uneven coverage of meals outside the house. Such meals tend to be more common in cities, and especially in large ones, than in rural areas. Not counting the value of these meals as part of household expenditures thus leads to an underestimation of urban living standards. In South Asia, the household surveys of Bangladesh, Pakistan and Sri Lanka do not include food purchased outside the house in the consumption aggregate, while other countries do (Islam *et al.*, 2018).

However, an arguably more important shortcoming is the uneven measurement of housing services. Most household surveys include the rent paid by households who lease their housing, but rental markets are often incipient in developing countries. Many households are homeowners or occupants, and not all household

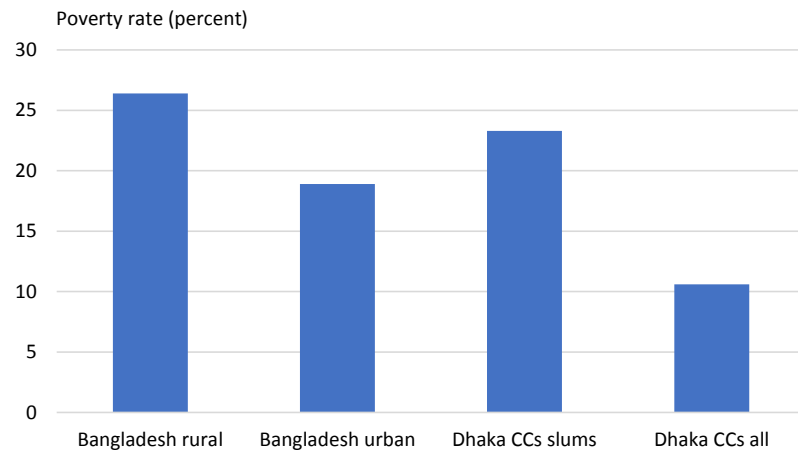

Figure 2. Poverty Rates in slums, the Rest of Urban Areas, and Rural Areas
Note: CCs = City Corporations. *Source*: Arias-Granda *et al.* (2017). [Colour figure can be viewed at wileyonlinelibrary.com]

surveys include questions allowing to estimate how much they would have to pay in rent, had they been tenants. This hypothetical rent may not be substantial in rural areas, but it can be sizeable in urban centers and especially in metropolitan areas.

India is one of the countries where the estimated household expenditures do not include imputed rent. Given that a third of its population already lives in cities, and the urbanization process is proceeding rapidly, this omission may be leading to an underestimation of household expenditures among urban households, at least in nominal terms. It has even been argued that the omission of imputed rent in the calculation of household expenditures *per capita* is the main reason why the estimated poverty rate is higher in India than in Bangladesh (Islam *et al.*, 2018).

In real terms, other biases may operate in the opposite direction and result in an overestimation of living standards in urban areas. An important heterogeneity across locations concerns the prices households need to pay to purchase otherwise similar goods and services. These prices tend to be low in rural areas, higher in secondary cities and even higher in large metropolises. The differences may be substantial even for highly comparable products, because the retail price includes storage and commercialization costs, and these are higher in urban areas.

Onions, the main staple of the Indian diet, are a case in point. In August 2015 the price of onions across the biggest urban centers of every Indian state varied from 18 rupees per kilogram to 80, and on average the price was higher in more urbanized states (World Bank, 2015b). Such spatial variation implies that the same nominal level of household expenditures translates into different living standards depending on where the household lives.

Spatial deflation is therefore needed to obtain consistent estimates of living standards, but this is not always done. It may come as a surprise that in South Asia's case the internationally comparable poverty rates regularly estimated by the World Bank only include spatial deflation in the cases of Bhutan, India and Nepal (Islam *et al.*, 2018). This practice is bound to lead to an overestimation of poverty in rural areas, and to an underestimation in urban areas.

National poverty estimates across the region do include a correction for spatial differences in the prices of goods and services, but their variation across locations may be understated due to the limited granularity of the price deflators. For instance, in India state-level rural and urban poverty lines are used to correct for cost-of-living differences. However, the population of urban areas in India ranges from 5,000 inhabitants to 17 million, so that assuming the same price deflator for all urban locations in a state is potentially misleading.

Some of the solutions to these measurement challenges are relatively straightforward. Sampling frames should be revised to include slums and other irregular settlements. Survey questionnaires should ask about the hypothetical rent or sale price of the premises where households live and assemble data on the characteristics of those premises, to allow estimating imputed rent rigorously. Spatial deflators should be refined to capture the variation of prices across locations with greater granularity. All of this is relatively straightforward and none of it involves a departure from the household survey approach to the measurement of living standards.

Poverty maps are another way to address heterogeneity across locations. This tool combines data on household characteristics from population censuses with data on the same characteristics plus data on household consumption expenditures

from household surveys (Elbers *et al.*, 2003). The household survey data allows to estimate the relationship between consumption *per capita* and the household characteristics which are captured by both the population census and the household survey. The estimated relationship is then used to predict household expenditure *per capita* for every household covered by the population census.

In the process, the methodology exploits the residuals of the relationship estimated using household survey data to get better predictions in each location. Positive residuals in a location mean that households living there do better there than could be anticipated based only on the household characteristics that are captured by both the population census and the household survey. For example, the location may host households that are better endowed in some other way, or it may be conducive to higher labor earnings or higher returns on assets than other locations. The interpretation is similar, but with opposite sign, if the average residual in a location is negative. These residuals can therefore be taken into account when predicting household expenditures using population census data. The prediction is shifted up in locations with positive average residuals, and down in locations where the average residual is negative.

A range of poverty maps have been built across countries using this methodology, and valuable insights have been gained out of them. The resulting dispersion in household expenditures depicted by these maps is higher, sometimes much higher, than in analyses relying only on household survey data. But this does not mean that standard poverty maps fully address the sources of heterogeneity across locations discussed above. On the positive side, population censuses supposedly include all the country's inhabitants and therefore poverty maps should cover slum dwellers and households living in irregular settlements. But on the negative side, the price deflators remain the same as in standard poverty analysis, implying that disparities in the local cost of living, hence in expenditure *per capita* measured in real terms are underestimated.

The increasing availability of geo-referenced data is encouraging researchers to address heterogeneity across locations in different ways. As in the case of heterogeneity across households, the key is to bring in data that is extraneous to household surveys. Three main types of data have been used to this effect: anonymized metadata on mobile phone calls and messages, nighttime light intensity from satellite imagery, and land classification and features that are also constructed out of satellite imagery.

Data on mobile phone traffic could be informative about living standards because mobile phones have become ubiquitous in developing countries, even among the poorest segments of the population. The basic assumption here is that poorer users tend to limit their calls and rely on texting whereas richer users can be expected to speak longer and download more data. Therefore, the higher is the mobile phone traffic *per capita*, the higher are the predicted living standards.

To implement this approach, local mobile phone traffic is first quantified by mapping call records to the antennas to the regions in which they fall and summing the volume and duration of the calls made. More traditional poverty assessments based on household surveys are then used to estimate the relationship between living standards and mobile phone use at relatively aggregate levels, such as provinces

or regions. Finally, the estimated relationship is applied to local mobile phone traffic data to predict local living standards.

This approach has been successfully applied to Ivory Coast and Rwanda (Smith *et al.*, 2013 and Blumenstock *et al.*, 2015, respectively). And it is becoming increasingly more viable as large mobile phone operators have started to make available anonymized detail records of phone and text exchanges between their customers, including antenna-to-antenna traffic. However, as in the case of personal income tax records, mobile phone traffic data is not available for all countries. And in those countries where it is, the available data tend to be from a single mobile phone operator. Therefore, the extraneous information used to build these poverty maps may not be representative.

Satellite imagery, on the other hand, is widely available from both public and private sources. Not surprisingly, there is a rapidly-growing literature on the relationship between granular indicators built out of satellite imagery and more traditional measures of living standards from either household surveys or national accounts. For example, the estimated relationship between nighttime light intensity and poverty rates at the national level has been used to construct a global poverty map (Elvidge *et al.*, 2009). Similarly, the relationship between nighttime lights and Gross Domestic Product (GDP) *per capita* has been used to assess the extent to which the national accounts of developing countries underestimate local living standards (Henderson *et al.*, 2012).

In the South Asian context, this approach has been used to generate a map of living standards at the district level for the entire region (Beyer *et al.*, 2018; World Bank, 2017a). In practice this was done by combining data on nighttime light intensity with information from national accounts and population censuses. The procedure involved several steps. First, because the correlation between nighttime light data and economic activity in agriculture is low, agricultural GDP at the state or province level was disaggregated across districts based exclusively on the distribution of the rural population in the state according to the population census. Non-agricultural GDP, on the other hand, was distributed across districts based on nighttime light data. The predicted levels of agricultural and non-agricultural GDP in each district were then added up, and the total was divided by the corresponding population to obtain the predicted income *per capita* of the district (Figure 3).

Another alternative is to rely on information extracted from daytime imageries by Earth-observing satellites. A recent study compiles a range of indicators for each of 1,291 villages in Sri Lanka, including the number of cars, the number and size of buildings, the type of farmland, the type of roofs, a proxy for the height of the buildings based on their shade, the length of roads and the road material. These village features are then matched to household estimates of *per capita* consumption derived from a more traditional poverty map. A simple linear model that includes as its explanatory variables the area of the location, whether it is administratively urban, and the local features extracted from satellite imagery explains a significant share of the variation in poverty rates estimated using a conventional poverty map (Engstrom *et al.*, 2017).

These methods to address heterogeneity across locations bear much promise, but they also face limitations that are similar in spirit to those faced when

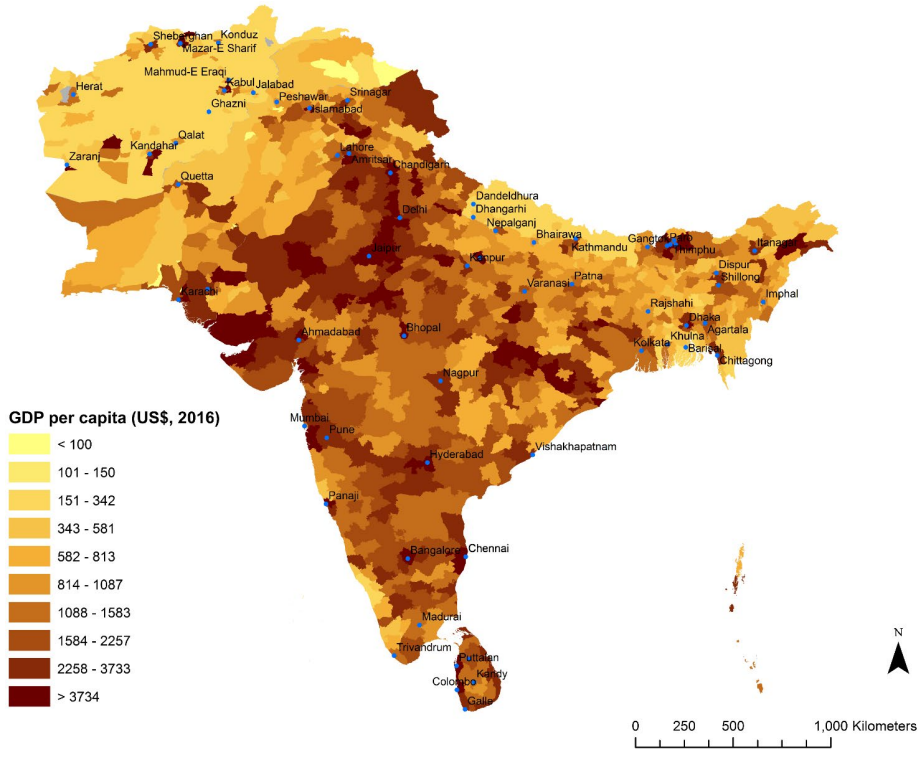

Figure 3. Income *per capita* in South Asia Based on Nighttime Light Data
Source: World Bank (2017a). [Colour figure can be viewed at wileyonlinelibrary.com]

using individual tax records or property prices to address heterogeneity across households.

The promise stems from the fact that the data distributions for these extraneous sources of information tend to have greater coverage, and hence be more representative than individual tax filings or real estate data. Satellite imagery on nighttime lights or daytime imageries from Earth-observing satellites has global coverage and increasing spatial granularity. The coverage of data on mobile phone traffic is not as broad yet, because access to it depends on the goodwill of for-profit mobile phone operators. But in principle at least, telecommunications regulators could have access to traffic volume by antenna.

The limitation comes from the indirect relationship between these distributions and living standards. The correlations between nighttime light and GDP *per capita*, or between land features and poverty rates, are certainly high. But to fulfill their promise, these new methods require a better understanding of the relationship between the granular indicators used in the analysis and the chosen living standards metric. Assumptions and modeling are somewhat unavoidable and, once again, the degree of confidence on the resulting estimates diminishes with the number of data transformations needed.

5. Monetary Versus Non-Monetary Dimensions of Wellbeing

The goal stated in the introduction to the first *Human Development Report*, in 1990, was to assess people's ability "to enjoy long, healthy and creative lives." The proposed measurement tool, the HDI, attempted to do this in practice by giving life expectancy at birth and educational attainment the same weight as income *per capita*. Subsequent developments of this approach, including the MDGs and SDGs have broadened the list of dimensions to consider even further.

The 1990 *World Development Report* had also emphasized "such dimensions of welfare as health, life expectancy, literacy, and access to public goods or common property resources." In principle, information on access to education, health care, drinking water and similar services was to be included in the household surveys used to measure household consumption. However, the valuation of these services and resources by standard poverty metrics has been quite rudimentary.

The standard practice has been to keep track of what households actually spend on basic services. Actual spending includes items such as tuition fees and private lessons in relation to education, or out-of-pocket expenditures and medicines in relation to health. Not all household surveys inquire systematically about these expenditures though. In the South Asian context, for example, the household surveys used to measure poverty in Afghanistan and Nepal do not report out-of-pocket spending on health (Islam *et al.*, 2018). Across countries, assessing the value of services received free of charge is the exception rather than the norm.

The partial valuation of the services consumed by households can make poverty lines less meaningful at the country level, and less comparable at the international level. The poverty line is the minimum amount of resources needed to ensure the nutritional intake required for a healthy life in each country. The more substantial non-food consumption is among people of modest means, the higher the overall level of expenditure needed to reach the minimum nutritional intake. Therefore, the consumption of education, health services and the like is measured unevenly across households if the value of services received for free is not taken into account.

A practical solution to this problem is to exclude education and health from the consumption bundle used to set the poverty line. Non-food expenditures are then restricted to items such as transportation and clothing. This practice is justified on the grounds that poorer households do not have the means to pay for private schools or doctor visits anyway. However, this is a questionable assumption, and especially so when public services are unavailable or dysfunctional, as is often the case in South Asia. Reliance on private education is indeed prevalent in countries such as Pakistan, even in rural areas (Andrabi *et al*., 2006). And a cross-country review shows that catastrophic health expenditures are more common among the poor (Wagstaff *et al.*, 2019).

Including actual spending on services in the consumption aggregate is not necessarily a better solution. When doing so, a household sending a child to a private school appears to have a higher consumption than a household whose child attends a public school. Similarly, a household paying a private doctor for medical services is seen as having a higher consumption than a household relying on a government-run health clinic. But other things equal, households relying on free

public services have more disposable income left for food and can therefore ensure a higher nutritional intake for their members. This is consistent with the idea that providing public services free of charge helps the poor.

A better alternative is to make a more systematic effort to attach value to the services received for free. One possibility in this respect is to rely on the market prices for equivalent services. For example, the average tuition fee paid by parents who send their children to private schools in a location would provide a measure of the value of the education services provided free of charge by public schools in that location. Another possibility is to consider the cost at which public services are being delivered. For instance, the budget allocation for health services in a location divided by the covered population could serve as a measure of the implicit health insurance being provided (Lustig, 2018).

Needless to say, there may also be differences in quality and other adjustments could be considered. But it is still intriguing that three decades after the launch of the 1990 *World Development Report*, free public services received by households are often ignored when measuring household consumption.

An altogether different way to address this challenge, closer in spirit to the approach of the *Human Development Report*, is to treat monetary and non-monetary dimensions of wellbeing separately. The HDI uses different metrics for income *per capita*, life expectancy and educational attainment. Modern versions of this approach consider other possible deprivations as well, in addition to insufficient access to health and education services. Examples include lack of access to water and sanitation, exposure to crime, and lack of voice in community matters. Even the insufficiency of household income to support a minimum nutritional intake could be treated as a deprivation. This generalization of the approach proposed by the 1990 *Human Development Report* lies behind the Multidimensional Poverty Index (MPI), mainstreamed through the 2010 edition of the report.

An important step in the development of this other solution was the articulation of a coherent methodology to aggregate the deprivations faced by a household (Alkire and Foster, 2011). The methodology requires setting a minimum threshold for each of the dimensions of wellbeing considered. For example, a household may be deprived of monetary income if its resources do not allow it to sustain consumption expenditures $1.90 in PPP per person per day. Or it may be deprived of education if the maximum educational attainment in the household is below complete primary education. Then the deprivations faced by each household in the survey are counted, and the resulting number is treated as indicator of how poor the household is.

An MPI built along these lines satisfies several desirable statistical properties. It subsumes the standard poverty rate as a particular case of the MPI in which the only deprivation considered is the insufficiency of monetary income. It is decomposable, in the sense that for any breakdown of the total population the aggregate poverty rate can be expressed as a function of the poverty rates of all population subgroups. And it is monotonic, meaning that if the acceptable number of deprivations for a household to be counted as non-poor decreases, the aggregate poverty rate increases.

Standard poverty rates and MPIs can lead to widely different assessments of living standards in a country. In South Asia's case, the potential gaps are illustrated

by a study of 25 Indian states over time (Alkire and Seth, 2013). Based on the MPI approach, between 1999 and 2006 poverty rates fell more rapidly in states where they were initially low. But based on standard poverty rates the improvement between 1993–94 and 2004–2005 was faster in states with higher initial poverty rates (Figure 4). In one case there is poverty convergence across states, while in the other case there is divergence.

In principle, convergence in standard poverty rates is not incompatible with divergence in MPIs. Both trends can coexist if progress along all the dimensions of wellbeing considered is not strongly correlated. For example, monetary incomes may have increased fastest, in relative terms, in states that were initially poorer, whereas access to health and education might have increased more in initially richer states. While this is certainly plausible, it is legitimate to ask whether the gap between apparent convergence and apparent divergence is not driven by methodology.

The MPI approach has been criticized, from a conceptual point of view, for the arbitrariness of the thresholds used to define what a deprivation is (Ravallion, 2011). In the case of the traditional poverty line, now at $1.90 PPP per day, the threshold had been derived from the nutritional intake needed to sustain a healthy life. This minimum nutritional intake comes from medical studies and varies depending on climate conditions. Identifying the types of foods generally consumed by households of modest means in a particular country, as well as the nutritional value of those foods, allows converting the minimum nutritional intake into a monetary figure. By comparison, the thresholds related to non-monetary dimensions of wellbeing are somewhat more whimsical. For instance, it could be argued that basic literacy and numeracy is a more meaningful threshold than completed primary education.

It should be noted, however, that this criticism can be turned into a methodological questioning of standard poverty metrics. Exclusively considering expenditure or income *per capita* to assess household wellbeing is defensible only under relatively stringent hypotheses. One of them is that monetary and non-monetary dimensions of wellbeing are highly correlated. However, the diversity of deprivations across households uncovered by the MPI approach suggests that this is not a realistic assumption. Another possibility is to assume that households attach a very low weight to non-monetary dimensions of wellbeing. Or, equivalently, the

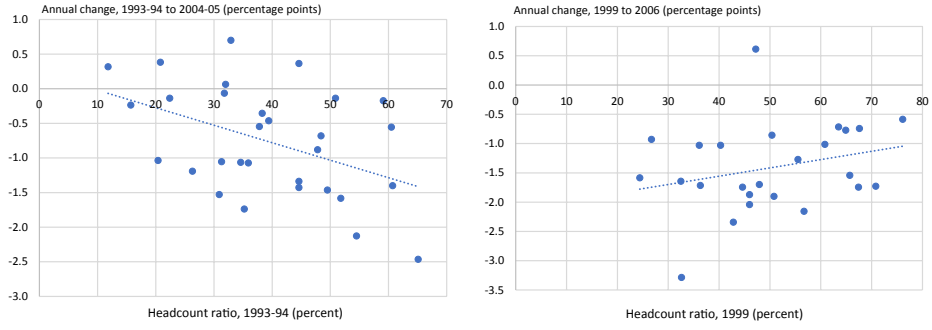

Figure 4. Consumption-Based Poverty Versus MPI Across Indian States
Source: Alkire and Seth (2015). [Colour figure can be viewed at wileyonlinelibrary.com]

deprivation thresholds for non-monetary dimensions of wellbeing can be set so low that every household can be considered non-deprived. But it is difficult to see in which way these rather arbitrary assumptions are superior to those made under the MPI approach.

A more practical criticism of MPIs is that they are disturbingly sensitive to the number of dimensions of wellbeing considered. There is general agreement that multiple dimensions matter for wellbeing. The choice of which ones to include in a particular MPI is often constrained by data availability, but in principle the list could be quite long. Potentially important deprivations include not being able to access basic services, but also being exposed to negative social and environmental externalities, or lacking voice in collective decision making. But which ones to consider remains for now an open question.

In recent years there has been a proliferation of living standards metrics that are multidimensional in nature, and the number of dimensions of wellbeing they consider is generally large. A prominent new metric is based on report led by Stiglitz *et al.*, (2009). The authors had been tasked with identifying the limits of GDP as an indicator of economic performance and social progress and discussing what additional information might be required to generate a better assessment. The report recommended shifting emphasis from measuring economic production to measuring people's wellbeing. And it identified eight key dimensions to take into account: 1) material living standards, 2) health, 3) education, 4) leisure and work, 5) voice and governance, 6) social connections and relationships, 7) the environment (present and future conditions), and 8) insecurity.

In line with the recommendations of this report, in 2011 the Organisation for Economic Cooperation and Development (OECD) introduced the Better Life Index. In practice, this is an interactive tool that allows users to compare country performances according to the weights they personally attach to different dimensions of wellbeing. The Better Life Index includes 11 such dimensions: 1) housing conditions, 2) household income; 3) jobs, earnings and employment security, 4) quality of the social support network, 5) education and learning, 6) environmental quality, 7) involvement in democracy, 8) health, 9) the level of happiness, 10) murder and crime, and 11) the work-life balance.

Another well-known metric, the Gross National Happiness (GNH) Index, has South Asian roots. Indeed, the concept of GNH was developed by Bhutan's fourth king, Jigme Singye Wangchuck, and his advisor Karma Ura, who has been the director of the Center for Bhutan Studies (CBS) since its founding in 1999 (Ura *et al.*, 2012). GNH is inspired in Buddhist philosophy and was enshrined in the country's first Constitution, enacted in July 2008. GNH includes nine domains of wellbeing: 1) living standards, 2) education, 3) health, 4) work-life balance, 5) cultural diversity and resilience, 6) community vitality, 7) ecological diversity and resilience, 8) good governance, and 9) psychological wellbeing.

Two other related metrics, the MDGs and their successor the SDGs, have been officially endorsed by governments around the world. Developed through a consultative process by the United Nations, these metrics build on the HDI concept. But they result in a substantial expansion of the number of dimensions considered. Only three were included in the original HDI: income, health and education. But the MDGs considered seven dimensions (without counting the goal related to

global partnership for development) and the SDGs increased their number further to 15. In practice, the SDGs translate into 169 target indicators. Consistent with the global endorsement of the SDGs, it could be argued that all 169 indicators need to be taken into account when measuring poverty and inequality.

This multiplication of potentially important dimensions of wellbeing points in the direction of a "dashboard approach" (Aaberge and Brandolini, 2015). Such approach would entail assessing how individuals or households do along each of the dimensions considered and making the information available to policy makers. They in turn could decide on both the level of the thresholds and on the relative importance of the various dimensions of wellbeing. To the extent that policy makers respond to collective choices, the dashboard approach would put them fully in charge.

Another option is to attach explicit weights to each of the dimensions of wellbeing and to still construct a single indicator out of them. If this could be done in a credible way, the weights would provide information on the tradeoffs faced when trying to improve the wellbeing of the population. For instance, it would be possible to tell whether ensuring access to education is worth more, from the households' perspective, than providing improved sanitation. Credible weights would also be crucial in informing which dimensions of wellbeing to focus on, as dimensions with an attached value close to zero could be confidently be left out of the living standards metric.

Several approaches have been proposed to construct credible weights for non-monetary dimensions of wellbeing. Among them, the principal components method has intuitive appeal (Decancq and Lugo, 2013). This statistical method brings together highly correlated dimensions that seem to be reflecting the same latent variable, in this case the level of wellbeing.

Another proposal to shift from a large and eclectic dashboard to a single summary metric is the Human Capital Index (HCI), recently introduced by the World Bank (Kraay, 2018). The acronym is reminiscent of HDI, and the key components are relatively similar, as they include survival rates, quality-adjusted years of education, and health indicators. But these components refer to what a child born today can expect, not to population averages. And unlike the HDI, which gives equal weight to its components, the HCI is measured in units of productivity. The survival rate enters the proposed index in a multiplicative way, consistent with the idea that children who die will never become productive. School attainment is multiplied by estimated returns to education across countries, and health measures by microeconomic estimates of their impact on earnings in adulthood.

A promising alternative is to rely on the knowledge individuals have about their own wellbeing. The burgeoning "happiness" literature has led to the accumulation of an enormous amount of data on satisfaction with life and subjective wellbeing. This literature has also uncovered a few regularities across countries, suggesting that the data is informative (Helliwell, 2003). For instance, levels of overall satisfaction with life display a U-shaped pattern in relation to age and are lower for men and for singles. Some of these patterns, such as the so-called Easterlin Paradox, are especially relevant for the assessment of weights in MPIs. The Easterlin Paradox states that happiness varies directly with income both among and within nations, but after some point it stops increasing ever as income continues to grow (Di Tella and MacCulloch, 2008).

Weighting the indicators for the various dimensions of wellbeing based on households' own knowledge is similar in spirit to hedonic pricing. This is a method that helps reveal preferences by breaking down an aggregate value (in this case the subjective level of wellbeing) into its constituent components or dimensions. In the process, hedonic pricing estimates the contributory value of each characteristic.

Credible weights of this sort would allow converting non-monetary dimensions of wellbeing into a monetary equivalent. For example, using such weights it would be possible to tell by how much the overall wellbeing changes when a household gains access to clean water. It is then possible to quantify by how much would household monetary expenditures would have to increase to attain the same change in overall wellbeing. This hypothetical increase in monetary expenditures gives an indication of the monetary value of access to clean water. More generally, it would be possible to tell from the data how much households in a particular country value access to healthcare, security from crime, or community vitality.

In South Asia, a variant of the hedonic pricing approach is being tried in Bhutan's case, using the Gross National Happiness Survey (GNHS). This is a household survey whose sampling frame is the same as for the household expenditure survey used for standard poverty measurement. Instead of asking about household expenditures the GNHS only reports household income. However, it does contain a large number of questions related to subjective happiness, both overall and in connection with each of the nine dimensions of wellbeing considered by GNH. Preliminary results suggest that overall subjective wellbeing is strongly correlated with financial security and, to a lesser extent, with health, education, the work-life balance and the strength of social networks. The correlation with other dimensions of wellbeing, on the other hand, is low and generally insignificant (Rama and Zangmo, 2019).

The challenges in shifting from a dashboard approach to a weighting approach should not be underestimated, however. While weighting the various dimension of wellbeing is institutionally appealing, estimating the right weighs could be challenging in practice. Data on reported satisfaction with life and overall wellbeing are noisy by nature. As a result, estimates of the contribution of specific non-monetary dimensions of wellbeing to overall wellbeing may be too unstable to be reliable.

6. Household Characteristics Versus Context

The accumulation of data on poverty and human development has led to a burgeoning literature aimed at understanding the determinants of living standards and their dynamics. It could be argued that data on expenditures *per capita* has been more seminal, from an academic point of view, than its multi-dimensional counterpart. A Google Scholar search based on the words "poverty rate World Bank" yields five times more books and articles than one relying on the words "HDI United Nations". The imbalance remains even if books and articles identified using the words "MDG United Nations" and "SDG United Nations" are added to the multidimensional list. But regardless, the combination of all these searches gets close to half a million Google Scholar entries, showing how prolific the field has become.

Some of the studies in this literature deal with the relationship between economic growth, inequality and poverty reduction at the aggregate level. Others with the role of health, education and access to services in boosting the living standards of individual households. Many assess the impact of shocks, as well as of targeted policy interventions, on the wellbeing of the poor.

Confronted with a body of knowledge this vast, it would be difficult to produce a comprehensive analytical survey of the main findings and debates, no matter how succinct. Several authoritative volumes provide compelling "readings" of the field from different perspectives (Dollar and Kraay, 2002; Sachs, 2005; Banerjee and Duflo, 2011; Ravallion, 2015). Here the focus is rather on the lenses through which the data are analyzed. And the main point made is that the reliance on household surveys for measurement has led to a strong focus on household characteristics as the main determinant of living standards, somehow downplaying the context these households live in.

A consequence of this strong focus is that the discussion of poverty alleviation policies often ends up being about boosting the human capital of the poor, supporting them through targeted transfers of resources, and leveraging their voice. All of this is perfectly sensible but, once again, the literature on migration shows how much better individuals can do in contexts that are more conducive, despite their limited endowments. A stronger focus on the context would call for poverty alleviation policies putting greater emphasis on, say urbanization (Datt *et al.*, 2016).

Rigorously proving the existence of a bias toward household characteristics, away from context, would be difficult given the vastness of the literature. But such bias is at least plausible, given the massive amount of information accumulated through household surveys over the decades. These surveys provide researchers with detailed information on the educational attainment and health status of each member of the surveyed households. But they say less about the market returns to more education and better health in the area these households live in. Similarly, the community questionnaire of these surveys is often informative on whether the location has a rural road, or how far is the closest market. But it is more difficult to tell what kind of transport network the rural road connects to, or how significant the market closest to the community is.

Beyond plausibility but short of proof, what is proposed here is a cursory review of three possible manifestations of this bias. These manifestations occur through poverty analyses which have by now become quite standard: poverty profiles, equality-of-opportunity assessments, and poverty alleviation strategies. This cursory review also allows identifying ways in which the bias could be redressed in each of the three areas going forward.

In its simplest form, a poverty profile is a thorough set of pairwise correlations between the poverty status of households and their characteristics. Information on poverty status and household characteristics is obtained from household surveys. Poverty profiles often confirm that the poor are less educated, live in more precarious housing, and have more limited access to basic services than the non-poor. Often, it also appears that the poor tend to work in agriculture, that poverty is more prevalent in rural areas, and that female-headed households tend to be poorer than their male-headed counterparts. Poverty profiles thus uncover a set of regularities that are informative and can be used to counter stereotypes. They also

provide a foundation for targeted interventions based on observable household characteristics.

In more refined analyses, the variation in household expenditures *per capita* is decomposed into differences in assets and differences in returns to assets (Bussolo and López-Calva, 2014). While assets are captured through household characteristics as reported in household surveys, returns to assets can be interpreted as capturing the context households work and live in. The context is essentially seen as linked to economic policies and shocks at the aggregate level, including commodity prices, external conditions, the importance of trade in the economy, the sectoral composition of growth, and fiscal structure and capacity. But the framework remains assets-based.

A recent study on India confirms that the characteristics usually considered in a poverty profile can account for more than half of the variation in expenditure *per capita* across households (Li and Rama, 2015). This goodness of fit compares favorably with that of standard labor earnings equations. However, the explanatory power of household characteristics diminishes when the regression explaining household expenditures *per capita* includes dummy variables for the location where the household lives. And as locations become more granular, the variance in expenditure *per capita* accounted for the dummy variables increases. When locations are defined at district level or below, household characteristics explain less than 40 percent of the variance, while the location dummies and their associated interactive terms account for 20 percent.

This study on India suggests that important correlates of living standards are missed out in standard poverty analyses, and that the observed correlations are most possibly overstated by the omission of location characteristics. Moreover, the extent of the bias may vary across household characteristics, so that a naïve poverty profile could yield a distorted picture of the poor. If so, a potentially important improvement would be to bring in extraneous information on what else there is around the place a household lives. This extraneous information could for example refer to topography, climate, infrastructure, enterprise development, security and the like.

A promising South Asian example in this respect is the recent development of a highly granular spatial database anchoring information from dozens of data sources around well-defined locations (Li *et al.*, 2015). This database relies on a relatively comparable spatial hierarchy across countries, including four administrative levels plus gridded cells or tiles. The four levels correspond to states or provinces, districts, sub-districts, and towns or villages. Both traditional sources of data (such as administrative records, census data, and surveys) and more modern forms of data (including remote sensing data and crowd-sourcing). Whenever possible, the local indicators are curated out of primary data to increase their consistency across countries, years and sources.

Data of this sort, combined with detailed data on household characteristics, would support the construction of more thorough poverty profiles. Several recent studies illustrate the potential of this approach. The one mentioned above, for India, shows that some locations are associated with a "premium" in expenditures *per capita*, above what a naïve regression using household characteristics only would allow to predict. The study also shows that some of these better-performing

locations spread their prosperity more than others. For example, the city of Bengaluru displays a larger location premium than Delhi, the capital. But Delhi's premium spreads over close to 200 km, whereas that of Bengaluru almost entirely vanishes 50 km away from the city center. The study then goes on into identifying the characteristics of these better-performing locations.

Another ongoing research effort in this spirit focuses on the role of secondary cities in reducing poverty in South Asia and Sub-Saharan Africa (Christiaensen and Kanbur, 2017). This research develops the concept of "action space" as the range of possible destinations to which a migrant can realistically move at a given point in time and, intimately linked to this, the set of possible livelihoods at destination. It posits that secondary towns occupy a unique middle ground between semi-subsistence agriculture and the capitalistic city, between what is close by and familiar and what is much further away and unknown. Recent findings on the relative roles of towns and cities in reducing poverty in India are consistent with this hypothesis (Gibson *et al*., 2017).

A second manifestation of a bias toward households more than context can be found in the by-now standard literature on equality of opportunity (Roemer, 1998; Ferreira and Peragine, 2016). Equality of opportunity is considered a key condition for a society to ensure distributional justice. Important individual outcomes are seen as determined by two main factors: efforts and circumstances. Equality of opportunity would require compensating individuals for disadvantages related to their circumstances, so that the distribution of outcomes can be entirely attributed to their efforts.

While disentangling efforts from circumstances is difficult in practice, there is consensus that making access to basic services universal is at the core of equality of opportunity. General agreement exists that the set of goods and services that every individual under 16 years of age should have access to includes nutrition, health care, basic education, clean water, and improved sanitation (Paes de Barros *et al.*, 2009). The dispersion in access to services can then be linked to household characteristics beyond the control of the individual, such as the educational attainment, gender and ethnicity of the household head. And again, the detailed data provided by household surveys is ideally suited for this empirical exercise.

However, high inequality of opportunity should be less of a concern in a society that enjoys high upward mobility, where people from disadvantaged backgrounds and their offspring can prosper. Therefore, much the same as the recommendation regarding poverty profiles was to look beyond households into the context, in the case of inequality of opportunity the recommendation would be to look beyond access to basic services during childhood into mobility throughout life. Doing this rigorously requires having panel data on households and their members over time. But such panels are scarce in developing countries. A potentially promising alternative is to build "synthetic panels" through statistical imputation methods connecting multiple rounds of cross-section surveys (Dang *et al.*, 2014).

A recent assessment of inequality in South Asia finds that despite this being a region characterized by serious shortcomings in human development, its economic growth has been quite inclusive. Occupational mobility is increasing steadily from one generation to the next. And within the same generation, mobility in earnings—measured through synthetic panels as the ability to move out of poverty and into

the middle class—is comparable to that of the United States or Vietnam (Rama *et al.*, 2015).

Mobility can also be explored from a geographic perspective. Another recent study for India analyzed the growth of the "premium" in household expenditures *per capita* across more than 1,200 locations over a decade (Li *et al.*, 2018). The conventional wisdom is that India suffers from absolute divergence in living standards, especially between the more prosperous south and the more traditional northern hinterland. But this study finds strong convergence across cities and narrowly defined locations. A thorough machine-learning exercise also allows to identify the correlates of rapid growth in the following decade. Access to electricity, closeness to markets, the tribal share of the population, the quality of local governance and the share of large firms are among the most robust predictors. There is also a positive relationship between educational attainment and subsequent growth, but it is weaker.

Finally, poverty reduction strategies are the third standard analytical tool suggesting a possible bias toward household characteristics, instead of context, as the main drivers of living standards. These strategies are integrating pieces that take stock of a vast array of data and research to identify the priority investments, budget allocations and economic policies with the highest potential to bring down the extent and severity of poverty in a country. Often structured in the spirit of a think piece, documents of this sort can be quite telling about the way poverty is interpreted.

A thorough meta-analysis of poverty reduction strategies would be needed to rigorously document the alleged bias, and such meta-analysis is beyond the scope of this paper. However, a word-counting exercise involving two recent World Bank documents reveals wide differences in perspectives (Figure 5). One of those documents is an attempt to identify pathways to reducing poverty in India building on lessons from the last two decades (Chatterjee *et al.*, 2016). The other offers a game plan to end extreme poverty in the world by 2030 (Gill *et al.*, 2016). While the latter document has a global focus, India plays a prominent role in the reasoning, given the large number of poor people it still hosted earlier this century.

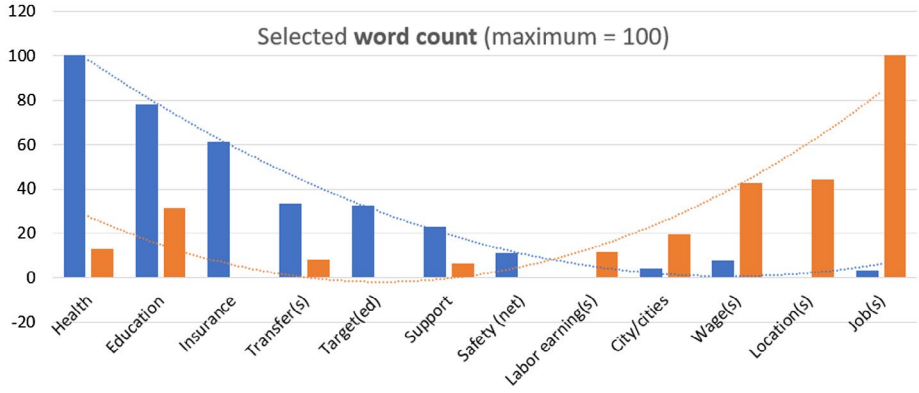

Figure 5. Two Complementary Views on What Drives Poverty Reduction

Source: Based on Gill *et al.* (2016) for the blue bars and Chatterjee *et al.* (2016) for the orange bars. [Colour figure can be viewed at wileyonlinelibrary.com]

Based on the word count, the global game plan is very much in the spirit of standard poverty assessments and equality of opportunity analyses. The words that come up more frequently in this document refer to human capital, social transfers and insurance, reflecting a focus on adequately equipping and protecting households. The most recurrent words in the India document, on the other hand, refer to jobs, labor earnings, locations and cities. This focus on the context surrounding households is not surprising in a document whose subtitles include "Cities, more than specific sectors, drove poverty reduction" and "Jobs, more than transfers, mattered for households."

7. Conclusion

Much progress has been made in the measurement of living standards and the understanding of their dynamics in the three decades since the launch of the *Human Development Report* series and the publication of the 1990 *World Development Report*. The analytical agenda laid out back then with the participation of influential South Asian economists has proved seminal. Metrics such as the poverty rate or the SDGs are by now at the center of policy debates in developing countries, helping to hold governments accountable and to identify the most conducive approaches to improve the living standards of the population. The vast academic literature relying on these metrics shows that the concepts and approaches mainstreamed by those two important reports have greatly contributed to global knowledge.

At the same time, the four tensions reviewed in this paper—between richer and poorer households, between urban and rural locations, between monetary and non-monetary dimensions of wellbeing, and between household characteristics and context—reveal that important gaps remain in measurement and interpretation. There is by now an entire industry generating poverty estimates and churning out SDG indicators across countries. But the discussion above suggests that the time has come to take a fresh look at the tools and methodologies currently used to measure living standards and to identify policy interventions aimed at their improvement.

The review in this paper points out to three main areas for improvement. First, the rich amount of household survey data available, the legacy of Mahalanobis, could be exploited in ways that are more consistent with consumption theory and with development theory. Second, there is a need to more systematically incorporate the burgeoning data from other sources, beyond household surveys. And third, an effort is needed to move beyond dashboards, better integrating the multiple dimensions of wellbeing and human capabilities emphasized by Sen and ul Haq.

Regarding the use of household survey data, there should be a more systematic effort to incorporate slum dwellers and other irregular occupants in the sampling framework of the surveys. Downplaying these groups could be understandable three decades ago, when most developing countries were still agrarian societies and most poverty was rural. But the neglect is increasingly difficult to justify in a world that is rapidly urbanizing and where the urbanization process is often messy.

There should also be a greater emphasis on spatially granular measures of the cost of living. Distinguishing between consumer prices in urban and rural areas,

or between states and provinces, is not enough. Living in metropolitan areas is considerably more expensive than living in secondary cities, or in the urban fringe. Ignoring these differences leads to an underestimation of urban poverty and of the extent of inequality in urban areas. Efforts to produce more and better household expenditure surveys should go hand in hand with a push to develop richer consumer price indicators.

Importantly, there should be a more consistent valuation of services that account for a significant share of consumption but for which no formal payment is made. Housing and public services make a major difference in the living standards of a population. Focusing on food items and bunching the rest in a non-food bundle was defensible when a large fraction of the global population was close to subsistence levels, less so in a more affluent world. Not imputing a value for services received for free leads to a distorted picture of living standards, and also results in potentially misleading poverty lines.

Household survey questionnaires can be designed in a way that allows estimating the rent that could be charged for the dwellings where households live. But the uneven treatment of imputed rent in the measurement of poverty across countries suggests that this has not been a priority. The valuation of public services received for free, or with a heavy subsidization, also varies substantially from one country to the next. Again, there has been no systematic effort to assess the market value of alternatives such as private schools or private health, or the budgetary cost of delivering these services.

A greater emphasis on panel data is also warranted. The availability of multiple cross-sectional sources of data has supported a burgeoning literature on inequality of opportunity before reaching adulthood. But it can be argued that the paucity of panel data has resulted in insufficient attention to mobility throughout life. And this in turn has biased policy attention toward the provision of basic services, away from job creation and the dynamics of labor earnings.

While household surveys have been the backbone of poverty measurement, relevant data is becoming increasingly available from other sources. New digital technologies and advances in access to information are leading to a data revolution. Administrative records, including tax filings, are gradually been disclosed. A rapidly growing number of transactions is taking place through internet-based platforms, making prices more visible than they were before. Mobile phones have become ubiquitous, even among the poor, allowing to trace multiple forms of consumption. And satellite imagery, both at nighttime and daytime, provides massive amounts of information on the places where households live.

It is encouraging to see novel analyses making use of these alternative sources of data to measure living standards and interpret their dynamics. But there has not been a consistent stock-taking on which data sources bear more potential and should be boosted as part of the statistical development agenda. Or on the most fruitful ways to exploit these new sources of data to improve the measurement of living standards.

A better integration of extraneous data could be pursued along two main axes. One of them concerns individual- or household-level indicators. There have been promising attempts to "complete" the distribution of household expenditures captured through household surveys with the distribution of tax records,

housing prices, mobile phone traffic, nighttime light intensity or land features. These attempts involve either a truncation point—after which the distribution of some extraneous data is seen as more informative than that of household expenditures *per capita*—or a transformation function—some other indicator is converted into household expenditures *per capita*.

It may be more conducive to interpret all these distributions, including that of household expenditures *per capita*, as manifestations of a latent but intrinsically unobservable level of consumption. Seen this way, all sources of data would be informative about all households, but to varying degrees. The relevant latent variable could then be inferred from these multiple distributions, with varying margins of error depending on the characteristics of the households.

The second axes for data integration is spatial. Reliance on household surveys has arguably led to a disproportionate emphasis on household characteristics, as opposed to context, when assessing the determinants of living standards and their dynamics. Despite the growing availability of data about the places where households live and work, analyses continue to capture the context based on information from the community questionnaire attached to the household survey. But by now much more is known about communities than whether they have a school or are connected by a rural road.

Together with the generation and analysis of household surveys there should be a more systematic effort to integrate and geo-reference multiple other sources of data readily available, so as to better characterize the context where households live. These other sources include population and economic censuses, administrative data, satellite imagery and crowd-sourced information. Systematically compiling data on the context should help identify the most important sources of deprivation as well as the drivers of improvements in living standards, beyond the households' own assets.

Finally, the welcome recognition that non-monetary dimensions of wellbeing matter is also leading to a confusing multiplication of metrics. These non-monetary dimensions had been downplayed in practice by standard poverty analyses. Despite the clear understanding that development is plagued by missing markets, the attempts to value social and environmental externalities were limited. Again, this was an understandable practice when a large share of the global population was still struggling to meet subsistence levels. But now the pendulum seems to have swung in the opposite direction, as shown by the 169 target indicators introduced by the SDGs.

More information on non-monetary dimensions of wellbeing is of course welcome, but the proliferation of somewhat disconnected metrics may blur the understanding of what matters the most and create confusion on where action should be focused. One-dollar-a-day had a refreshing clarity that complex dashboards may not match. Just telling the user to weight the indicators as he or she pleases runs the risk of fragmenting policy debates. It can even be argued that single aggregate metrics such as GDP *per capita* or the poverty rate encourage integrative thinking, whereas the proliferation of targets indicators boosts narrower sectoral agendas.

The question that arises then is: what would the equivalent of one-dollar-a-day be nowadays? This is not a question about setting poverty lines at levels that are higher than in the 15 poorest countries on earth. The issue is not whether $1.90

or $3.30 or some other daily threshold should be considered, depending on a country's development level. The question refers to the conversion of non-monetary dimensions of wellbeing into a monetary equivalent, with the "weight" of these other dimensions revealing how much they matter, and possibly varying across households depending on their characteristics.

In practice, a greater effort may be warranted to integrate the proliferation of wellbeing metrics with the growing literature on subjective wellbeing. So far the measurement of living standards and the analysis of happiness seem to have progressed on parallel tracks. However, the happiness literature offers the opportunity to apply hedonic pricing tools to the non-monetary dimensions of wellbeing. And this could be a first step toward generating defensible weights for each of them.

The three areas for improvement suggested by this review—better exploiting household survey data, more systematically incorporating other sources of data, and better integrating non-monetary dimensions of wellbeing—may sound trivial. It could be argued that the challenges are well-known to experts in the field. However, it is not clear that the massive analytical machinery put in place over the last three decades is moving in the three proposed directions on its own.

The report by the high-level commission led by Sir Anthony Atkinson provides a good gauge of what the current priorities are from the point of view of prominent thinkers and experts in the measurement of poverty and living standards. Indeed, the leading author of the report was a distinguished economist who had produced seminal research on poverty and inequality, and the advisory board for the report included 23 renowned economists from around the world.

The Atkinson report makes 21 concrete recommendations to improve the measurement of global poverty. Eight of them refer to the terminology to be used and the processes to be followed. Out of the remaining 13, three refer to making a better use of household surveys, five to incorporating other data sources, and six to incorporating non-monetary dimensions of wellbeing in the measurement of living standards. But despite this apparent similarity of priorities, when looking in more detail into each of the three clusters, substantial differences in perspective emerge.

On making better use of household surveys, the strongest agreement with the Atkinson report refers to the need to investigate the extent to which people are "missing" from poverty counts, and to propose adjustments for survey underrepresentation and noncoverage (Recommendation 3). The Atkinson report also states that the quality of domestic prices indexes has to be improved (Recommendation 9). But this is mainly in relation to the relevant consumption bundle for the poor, not to address spatial disparities in the cost of living. Also, the Atkinson report does not include explicit recommendations on valuing imputed rent or services provided for free, or on fostering the development of household panels. However, these may be subsumed in the call for an assessment of the availability and quality of the required household survey data (Recommendation 6).

On better incorporating other data sources, the Atkinson report includes a welcome push for a major investment in statistical sources and analysis (Recommendation 20). It also includes a call to review possible alternative sources of data when household surveys are not available, and to propose methods of ex post harmonization (Recommendation 6). In these cases, scaled-down household surveys and modeling approaches could be used (Recommendation 8). There is also

reference to the need to reconclle household survey data with national accounts (Recommendation 7). However, no concrete suggestion is made on the use of administrative records and big data, or on the geo-referencing of other relevant data sources. There is a proposal to report measurement errors (Recommendation 5). But this is mainly in connection with non-sampling error and the use of PPPs.

Finally, the Atkinson report devotes considerable attention to non-monetary dimensions of wellbeing. However, rather than discussing their integration in the measurement of household consumption, the report embraces a proliferation of metrics. In addition to the national and international poverty headcounts, it proposes to introduce a basic-needs estimate of extreme poverty, a "societal" headcount measure that takes into account the development level of the country, and a multidimensional poverty indicator (Recommendations 15, 16 and 19). There is also a call to adopt a multidimensional dashboard of outcome indicators, although it warns that their number should be small and their inclusion should be based on an explicit set of principles (Recommendations 11 and 18). The use of subjective assessments of personal poverty status is encouraged (Recommendation 14). But this is seen as a tool to produce "quick" surveys of poverty, rather than as a way to explore the weights of non-monetary dimensions of wellbeing.

In sum, there is much in common between the suggestions made in this paper and the prevailing consensus among experts and practitioners. But the South Asian perspective embraced here also offers different insights and calls for different emphases.

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