

The State of Data for Measuring Poverty

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Africa has grown robustly for two decades—performance that lies in stark contrast to the “growth tragedy” of the 1980s (Easterly and Levine 1997). The statistics suggest that Africa’s people are faring better and that poverty has come down. But scrutiny of these statistics has raised doubts about the quality of the underlying data and the exact magnitude of Africa’s progress. The World Bank’s Bulletin Board on Statistical Capacity indicator gave Africa a regional score of 59 in 2014, well below the world average of 66 and low even relative to the average for the low-income category of countries. The lack of good-quality and accessible data to assess socioeconomic changes now regularly features in discussions of the development agenda for Africa (Devarajan 2013; Jerven 2013).

There is no doubt that Africa needs better data to monitor the evolution of both the monetary and nonmonetary dimensions of living conditions. Progress on this front will also be crucial to monitor the post-2015 Sustainable Development Goals (SDGs). To be sure, there have been improvements in data availability in Africa in recent years. The

number of household surveys, particularly surveys that collect data on the nonmonetary dimensions of poverty, has increased, thanks to donor-funded programs such as the Demographic and Health Surveys (DHS) and the Multiple Indicator Cluster Surveys (MICS). The frequency and coverage of data on citizen opinions on a wide range of topics, including governance, political leadership, democracy, and corruption, have increased, and data tracking salient events, such as conflict and weather events, are now widely available. In addition to national statistical offices, the actors in data collection now include non-governmental organizations (NGOs), polling firms, and universities.

These improvements notwithstanding, major concerns remain. Problems with the availability, comparability, and quality of the data, combined with different approaches and methods to correct for these shortcomings, are at the center of the divergent views regarding the direction and magnitude of poverty reduction in Africa over the past two decades (Chen and Ravallion 2010; Harttgen, Klasen, and Vollmer 2013; Pinkovskiy and Sala-i-Martin 2014; Young 2012).

Consider the measurement of monetary poverty, for example. The share of Africa’s population consuming less than \$1.90 a day

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(in 2011 international purchasing power parity [PPP] dollars) declined, according to the World Bank's PovcalNet, falling from 57 percent in 1990 to 43 percent in 2012.¹ However, this estimate is based on surveys in a subsample of countries that cover only one-half to two-thirds of the population. For the remaining population, the poverty rate was imputed from surveys that were often several years old. For five countries (Equatorial Guinea, Eritrea, Somalia, South Sudan and Zimbabwe), which together represent 5 percent of the African population, no data were available with which to measure poverty.

Equally if not even more important are concerns about the comparability and quality of the underlying household survey and price data. Guinea and Mali, for example, each fielded four surveys since the mid-1990s, but no two of these surveys is considered comparable for measuring poverty.

Against this background and as a starting point in revisiting estimates of poverty in Africa, this chapter takes stock of the data available to measure the evolution of monetary poverty in the region. It focuses on household-level consumption and price data but also briefly reviews auxiliary data sources needed to estimate poverty.

The cornerstone of poverty estimates in Africa (and most other developing regions) are consumption data from household surveys that are representative of the population.² By themselves, consumption data are not sufficient to analyze changes in living standards. Monitoring changes in real terms requires data on inflation at the country level—such as a consumer price index (CPI)—to adjust nominal consumption into real values. Estimating global or regional poverty levels requires setting a common poverty line, such as the international poverty line of \$1.90 per capita per day, and converting local currency units to a common reference currency. Auxiliary data sources also have a bearing on Africa's poverty estimates. Population censuses are needed to derive population statistics from sample surveys and, when used jointly with a consumption survey,

estimate poverty for small areas in a country. Gross domestic product (GDP) from national income accounts is used to fill gaps between surveys to provide annual poverty estimates.

This chapter reviews the state of these data in Africa. It reflects on the governance and political incentives that influence data production, in order to help understand why multiple challenges beset the data for poverty measurement, and discusses some approaches for addressing data shortfalls.

Types of Data for Measuring Monetary Poverty

Estimating poverty requires consumption or income data from household surveys, but other data are also needed. This includes price data to adjust nominal consumption values for changes in price levels over time, census data to estimate the population, and national accounts data to impute poverty in years in which no household survey was conducted.

Household Survey Data

Household surveys are essential for obtaining the socioeconomic data necessary to understand the welfare of populations across the world. Some 50 years ago, regular household surveys were virtually nonexistent in developing countries. Although both the number of surveys conducted in Africa and their comparability and quality have improved, substantial gaps remain.

Frequency and scope of data collection

Only a handful of household surveys were collected in Africa in the 1980s. The number grew modestly for almost a decade, expanding rapidly in the mid-1990s, partly as a result of growing interest among governments and the international community in monitoring the Millennium Development Goals (MDGs). The first decade of the 2000s was one of the most productive for household data collection in Africa. By 2010 the number of national household surveys in Africa was the second highest in the developing world,

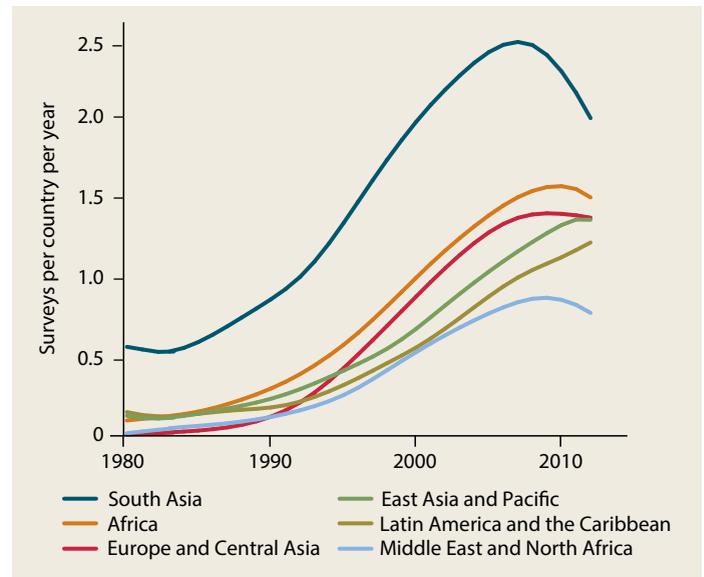
after South Asia (Demombynes and Sandefur 2014; Garcia-Verdu 2013) (figure 1.1).³

The breadth of the socioeconomic data that surveys cover has also increased. A majority of African countries collect data on welfare and key MDG indicators from multiple survey sources, including integrated household surveys, often with a focus on consumption; the DHS, which focus on women's fertility decisions, health, and nutrition; the MICS, which are designed to monitor human development outcomes, particularly among women and children; the Core Welfare Indicators Questionnaire (CWIQ) Surveys, which emphasize poverty-related indicators and service-delivery outcomes; population and housing censuses; and labor force surveys. In addition, specialized surveys conducted outside the national statistical system (Barometer, Gallup, the World Values Surveys) solicit citizens' opinions on governance, leadership, political stability, corruption, and a range of social issues, including crime, social capital, and religious practices (box 1.1).

The impressive improvement in survey data collection depicted in figure 1.1 has arisen almost entirely because of the expansion of surveys that do not collect consumption data.⁴ Figure 1.2 provides a breakdown of the types of surveys conducted in Africa in five-year periods since the 1990s. It shows steady growth in the number of nonconsumption surveys during the 1990s. The number of such surveys peaked in 2000–04 but still numbered 92 in 2010–14.

The increase in the number of nonconsumption surveys has enriched knowledge of nonincome dimensions of poverty, such as child nutrition, women's empowerment, and access to services in many sectors as well as on joint deprivation across dimensions. Many of these indicators are collected at the individual level and hence provide information on differences in the experiences of poverty and deprivation of men and women, insights that cannot be gained from household-level consumption data. Chapter 3 makes extensive use of these datasets to conduct an

FIGURE 1.1 All regions have increased the number of household surveys they conduct



Source: Demombynes and Sandefur 2014.

analysis that would not have been possible even a decade ago.

Consumption surveys, the building blocks for measuring monetary poverty and inequality, have not witnessed similar growth. There are not more surveys available today to measure monetary poverty than there were in the early 1990s. The average number of consumption surveys per five-year period has been just under 40 since 1990, with only small variations around the mean.

An average of 40 consumption surveys every five years for Africa results in less than one survey per country every five years with which to measure poverty. Even more troublesome is the uneven coverage across countries. Between 1990 and 1999, there is not a single survey with consumption data to monitor poverty for 18 of 47 countries in Africa (figure 1.3). Among the remaining 29 countries, 16 each have just a single survey. As a result, for 34 of 47 countries in the region (covering 42 percent of the population), there are no data on changes in poverty or consumption for an entire decade. Coverage has improved since. Data are unavailable for only

BOX 1.1 Sources outside the national statistical system provide valuable information on well-being

Impressive large-scale household survey efforts are being conducted outside the national statistical system. They elicit data on nonconsumption aspects of well-being and perceptions.^a

Afrobarometer

Afrobarometer is a nonpartisan research project that gathers data on social, political, and economic attitudes. It has conducted surveys in more than 30 African countries. A key feature of these surveys is the harmonized set of questions, which allows comparison across countries and within countries over time. Survey questions probe attitudes toward democracy, governance, elections, macroeconomics and markets, poverty, social capital, conflict and crime, participation, and national identity. The latest round introduced modules on corruption, access to justice, the role of China in Africa, pan-Africanism and regional integration, energy supply, tolerance, and citizenship. Data from these surveys are used to construct the lived poverty index (LPI), which is based on experiential measures, such as how often households go without basic necessities (Dulani, Mattes, and Logan 2013). Barometer surveys are also conducted in other regions of the world.

Gallup World Poll

Since 2005 the Gallup World Poll has tracked issues such as economic confidence; life satisfaction; employment; confidence in the leadership, military, and police; religion; access to food; the environment; migration; media freedom; human suffering; and corruption. Surveys are standardized to allow comparisons across countries and within countries over time. Gallup recently added a question about self-reported household income to measure poverty (Phelps and Crabtree 2013).

World Value Surveys

The World Values Survey, established in 1981, is a global research project that explores people's values and beliefs and their social and political impact in almost 100 countries. Topics include support for democracy, tolerance of foreigners and ethnic minorities, support for gender equality, the role of religion and changing levels of religiosity, work, family, politics, national identity, culture, diversity, insecurity, attitudes toward the environment, the impact of globalization, and subjective well-being.

Each wave has covered a wider range of topics, some of which are harmonized across countries. Eleven African countries have been included, some with multiple rounds.

Nonsurvey Methods of Data Collection

Satellites, run mostly by the U.S. National Aeronautics and Space Administration (NASA), collect data on metrics such as night lights, vegetation cover, and precipitation. The unique features of these datasets are their high resolution and geo-referencing. The data are collected from small areas at high frequency.

The use of satellite data is flourishing. They have been used to study urbanization, the accuracy of GDP information, deforestation, and impending drought or crop failure. There have also been attempts to extend their use to understand the evolution of poverty and inequality (Elvidge and others 2009; Mveyange 2015; Noor and others 2008; Pinkovskiy and Sala-i-Martin 2015).

- a. Like household surveys conducted by national statistics offices, these surveys rely on face-to-face interviews with household members. Widespread cell phone ownership in Africa has opened up opportunities for collecting data by phone, obviating the need for face-to-face interviews. If executed well, phone surveys can collect representative data on a wide range of topics more frequently and at lower cost than traditional face-to-face surveys (Hoogeveen and others 2014). This approach generally relies on a baseline survey of face-to-face household interviews. The World Bank's Listening to Africa Initiative, for example, combines a face-to-face baseline household survey with follow-up phone interviews of selected respondents. This approach allows the collection of a rich dataset at baseline and a few selected questions about specific issues (education, health, labor markets, and so on) at higher frequency (monthly, twice a week) and at later points in order to gauge changes in the fundamental dimensions of well-being. In addition to collecting data for policy analysis and research, cell phone surveys have proven to be effective tools for monitoring service delivery failures, corruption, and the breakout of conflict and epidemics. Cell phone surveys have been used to monitor the impacts of Ebola in Guinea, Liberia, and Sierra Leone (World Bank 2015c) and the welfare of refugees in Mali (Etang-Ndip, Hoogeveen, and Lendorfer 2015).

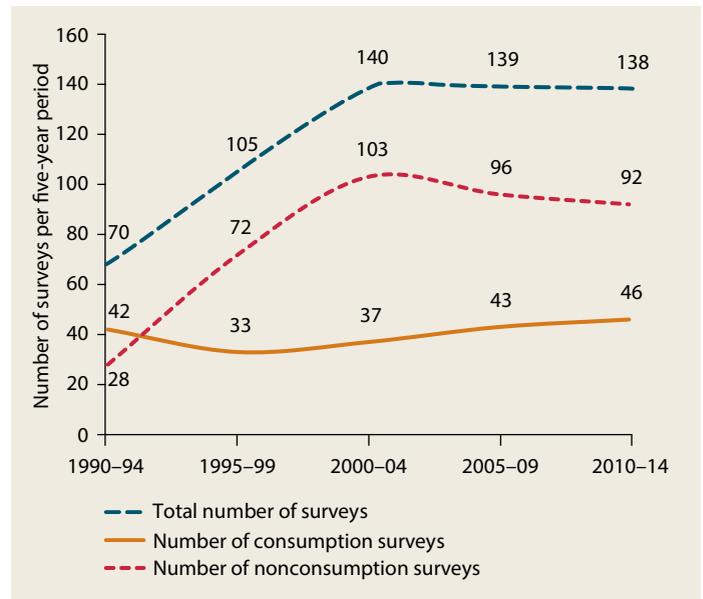
three countries over the period 2000–09, 23 countries conducted one survey and another 21 had at least two surveys.

A wave of consumption surveys was conducted in the region between 2011 and 2015. Many fragile states, including Chad, the Democratic Republic of Congo, Sierra Leone, and Togo, were part of this wave. Twenty seven countries have done a survey since 2011 (map 1.1).

Conducting a survey does not necessarily mean that the data collected are available. If the microdata collected in a survey are not included in the World Bank database, the data are deemed inaccessible in this report. This definition of accessibility is a narrow one, because it does not address access by the general public or whether users have to pay for the data, two important factors that significantly curb the usefulness of household survey data to the public and hence undermine knowledge about poverty trends and drivers in Africa.

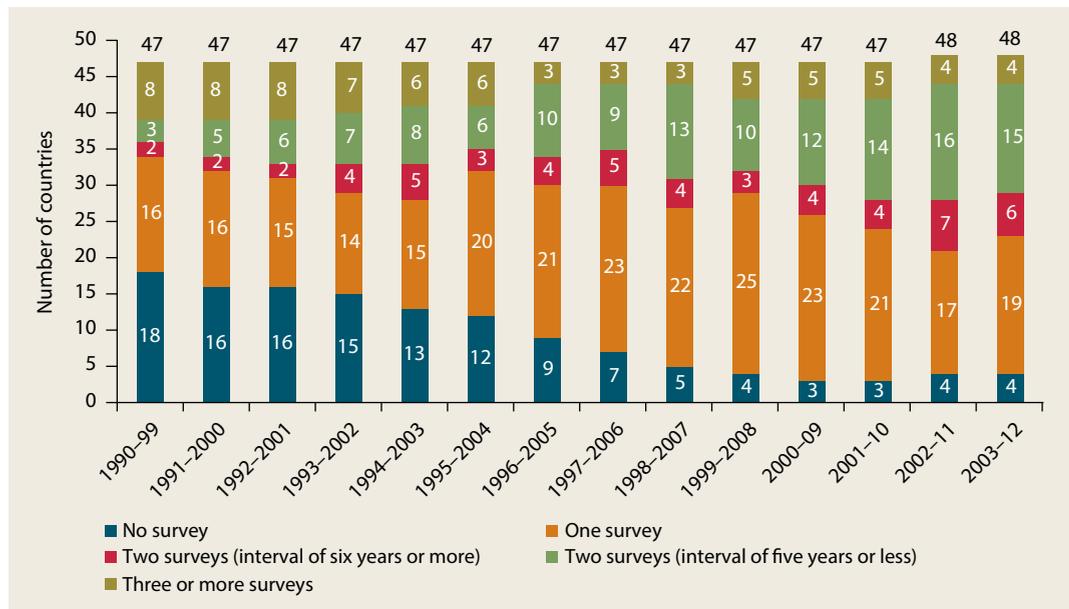
For three countries (Equatorial Guinea, South Sudan, and Zimbabwe), recent data are not available even though surveys were

FIGURE 1.2 Africa conducts more nonconsumption surveys than consumption surveys



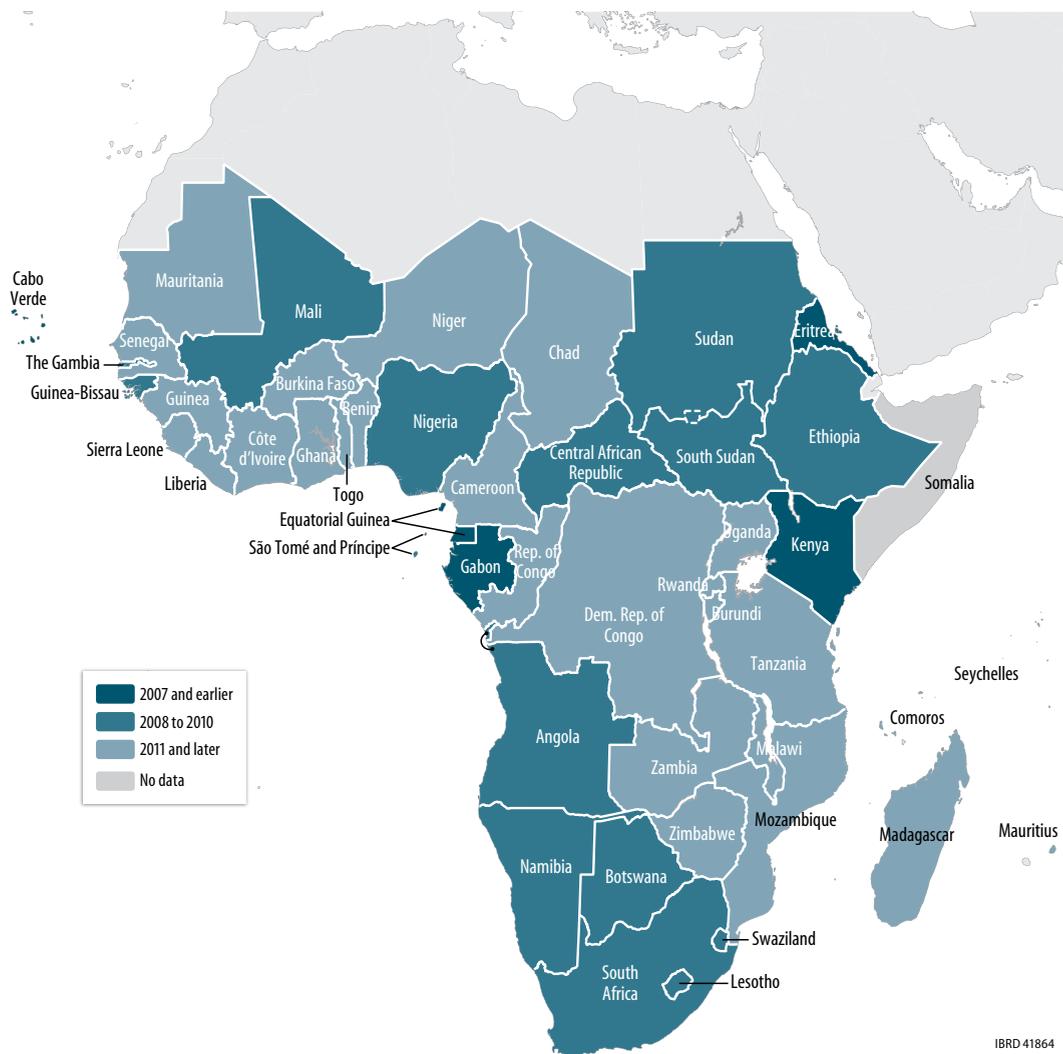
Sources: Data from the World Bank microdata library, PovcalNet, World Development Indicators, and the International Household Survey Network.
 Note: Consumption surveys include surveys that may not be the source of the official poverty estimates. Nonconsumption surveys include Demographic and Health Surveys (DHSs), Multiple Indicator Cluster Surveys (MICSs), labor force surveys, and other ad hoc surveys.

FIGURE 1.3 Many African countries lack surveys with which to gauge changes in poverty



Source: Data from the World Bank microdata library.
 Note: In 2011 the number of countries increased from 47 to 48 with the independence of South Sudan. Surveys for which microdata could not be accessed are counted as not available. Four countries (rather than five) have no data for the period 2003–12. Although the Zimbabwe 2007–08 survey is available, its consumption data cannot be used for monetary measures of poverty because it was conducted at a time of hyperinflation. See also endnote 5.

MAP 1.1 More than half of African countries completed a consumption survey between 2011 and early 2015



Source: Data from the World Bank microdata library.

conducted.⁵ Eritrea and Somalia have not fielded national consumption surveys over the past 20 years. These five countries represent 5 percent of the region's population.

Comparability of consumption data

The lack of consumption surveys is an obvious impediment to monitoring poverty, but problems with consumption data do not end there. Even where multiple surveys are available for a country, they are often not

comparable with one another (or with those of other countries). Tracking poverty trends is difficult when changes in measured consumption partly reflect changes in survey design or implementation.

The survey design literature documents multiple ways in which two surveys can be rendered noncomparable. For this report, household consumption surveys are considered comparable if the following features are consistent across surveys:⁶

- *Nationally representative sample:* A nationally representative sample is necessary to obtain statistics that apply to the whole population, not merely a subgroup. Comparability is obviously impossible if one round covers only urban households and the next covers only rural areas.
- *Seasonality:* Many consumption patterns vary over the year, which has implications for measuring poverty (Kaminski, Christiaensen, and Gilbert 2014; Muller 2008). In Africa, for instance, food and cash income among farmers is plentiful after harvests and dwindles during the lean season. Comparability may be lost if survey rounds are conducted during different months.
- *Reporting instrument and period:* Consumption data can be collected either by asking household members to recall their purchases and consumption from own production (farm harvest) (in the past seven days, past two weeks, the last month, and so on) or to keep a diary of such activities (for two weeks, a month, or longer). A body of evidence shows that the method used matters (see Beegle and others 2012). Both the reporting period and the instrument (recall or diary form) should remain consistent.

Based on these three criteria, 148 consumption surveys conducted in Africa between 1990 and 2012 were reviewed for comparability.⁷ Figure 1.4 displays the results. Blue dots indicate surveys that are comparable within the country; solid black diamonds indicate noncomparable surveys. Dotted lines connect comparable surveys. Hollow black diamonds indicate surveys that are not available. In some instances two or more cross-sections in a country with four or more cross-sections are comparable but the other two or more are not. (South Africa, for example, has two pairs of surveys that are comparable with each other, but it does not have four comparable surveys).

Several observations emerge from the findings presented in figure 1.4. First, many consumption surveys are not comparable.

Between 1990 and 2012, only 27 of 48 countries conducted two or more comparable surveys (map 1.2). As a result, even some countries that have multiple surveys are unable to track poverty reliably over time. Guinea and Mali, for example, each conducted four surveys, but none of them is comparable (box 1.2).

Second, there was a slight improvement in comparability between 2000 and 2014. More surveys were implemented after 2000, and more of them were comparable than before 2000.

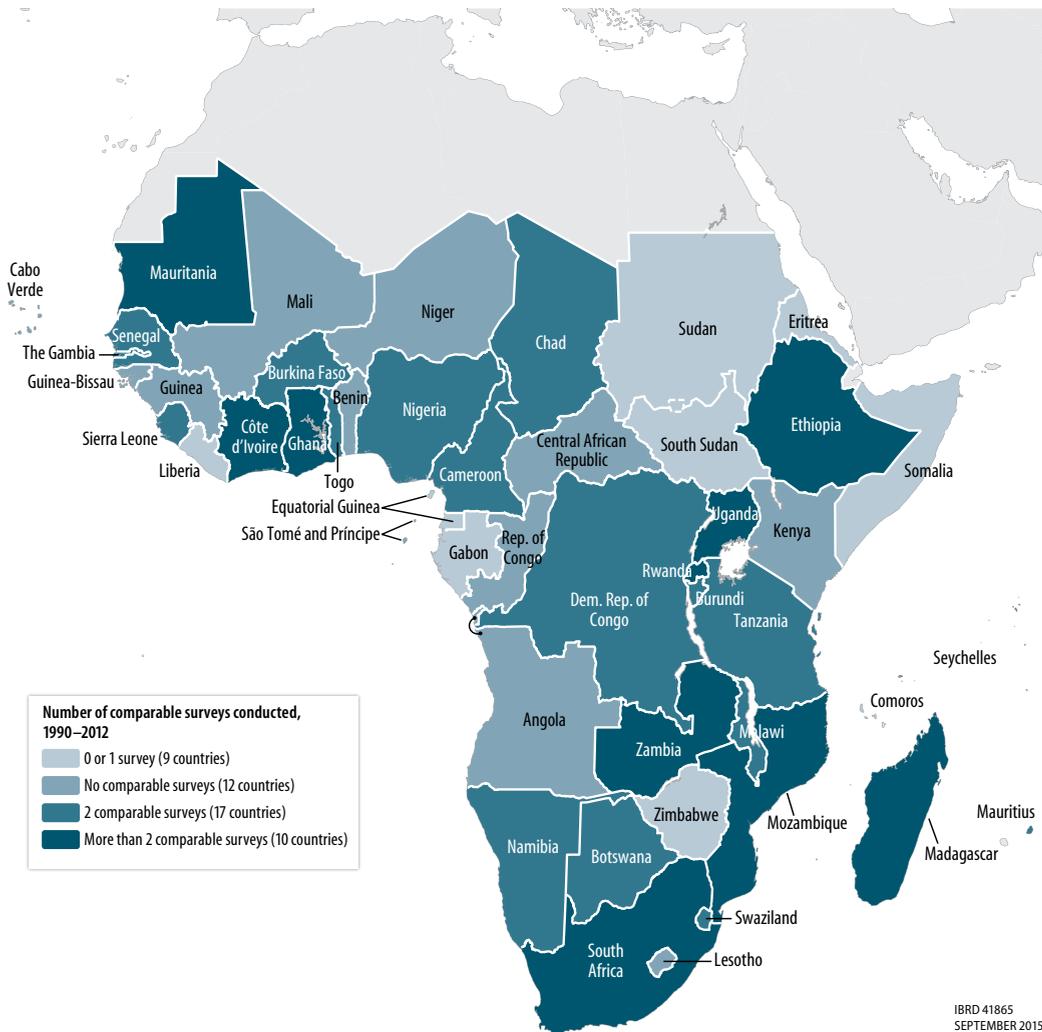
The picture of comparability would appear even bleaker if a more stringent definition of comparability had been adopted. For instance, the list of consumption items on which household members are asked to report can be long (a list of specific foods) or short (if foods are grouped). It is not unusual for surveys in the same country to change these lists dramatically from one round to the next (from well under 100 to well over 100).⁸ In general, respondents recall more when presented with a more disaggregated list, so that reported consumption is generally higher; a condensed list may lead to more reporting errors. Changing the list over time thus compromises consistency. If other factors—such as the quality of fieldwork and supervision—are also taken into consideration, even fewer household surveys in Africa would be considered comparable.

Lack of comparability, combined with the long gap between surveys (often five years or more) hampers the ability to understand changes in welfare over time. Although Africa is doing well in terms of the number of countries on which data are available and compares reasonably well with other poor regions in the number of surveys per country, the region trails most other country groupings in terms of comparable surveys, falling in the bottom half of the World Bank's regional grouping of countries (table 1.1). Since 1990 the average African country conducted only 3.8 consumption surveys (about one survey every six years), 2.2 fewer than the developing world average. The average developing country conducts one survey every four

FIGURE 1.4 Comparability of consumption surveys has improved, but it remains a major problem



Note: Figure is based on all household surveys conducted in Africa between 1990 and 2012. It excludes consumption surveys not used for official poverty monitoring. Not available refers to surveys for which the microdata and/or documentation could not be accessed.

MAP 1.2 Lack of comparable surveys in Africa makes it difficult to measure poverty trends

Source: Data from the World Bank microdata library.

years, and the average Latin American country conducts at least one survey every two years. If comparability is taken into account, the picture is even worse, with African countries producing just 1.6 comparable poverty estimates per country between 1990 and 2012.

Does noncomparability matter? Survey experiments show that changes in questionnaire design can matter a lot. According to Beegle and others (2012), use of diary versus recall, shorter versus longer reporting periods, and changes in the number of consumption items drastically affect poverty and inequality measures. Using methods other

than the benchmark method of personal diary with daily visits yielded poverty rates that were 7–19 percentage points higher. Most instruments, including household-level diaries or recall questionnaires of different granularity, thus underreport consumption compared with the supervision-intensive personal diary. Backiny-Yetna, Steele, and Djima (2014) show that poverty estimates in Niger are sensitive to the reporting period, with estimates of 51 percent, 47 percent, and 43 percent depending on the approach. Results from the 2005/06 survey in Kenya also point to significant differences in poverty calculations depending on whether the recall or

BOX 1.2 How did poverty change in Guinea and Mali? Lack of comparable data makes it difficult to know

Guinea conducted four household surveys between 1994 and 2012. The 1994/95 and the 2002/03 surveys were conducted over 12 months, the 2007 survey was conducted in July–October 2007, the 2012 survey was conducted in February–March 2012. In 1994/95 each household was visited 11 times, one visit every three days for a month. Food consumption data were collected from visit 2 to visit 11, using a three-day recall period. A 12th of the sample was visited each month. In 2002/03 each household was visited three times, or once every four months (the survey is thus a panel of three observations). During each visit, food consumption data were collected using a three-day recall period in urban areas and two-day recall in rural areas. In the 2007 and 2012 surveys, each household was visited once. Food consumption data were collected by asking about typical monthly consumption (not actual consumption, such as consumption the previous week). The 2007 and 2012 surveys were conducted in different seasons. The number of consumption items also differed: the 1994/95 questionnaire included 116 food and 110

nonfood items, the 2002/03 survey included 240 food and 425 nonfood items, and the 2007 and 2012 surveys included 110 food and 130 nonfood items.

Mali implemented four surveys between 1994 and 2012; the surveys vary in a number of ways. The 1994/95 survey included 10 food and 34 nonfood items, the fewest among the surveys, and a 15-day food recall period. In 2001/02 every household was interviewed every quarter. Food consumption data were collected through a seven-day diary; in theory each household was visited 7 times a quarter, for a total of 28 visits during the year. The 2006 and 2010 surveys were Core Welfare Indicators Questionnaire (CWIQ)-type surveys fielded in July–November 2006 and December 2009–August 2010. Food consumption data were collected using the usual-month approach. The number of items on the questionnaires was similar, although some types of expenditures (food eaten away from home, beverages, cigarettes) were reported by each individual household member using an open list.

TABLE 1.1 Africa lags in the number of comparable surveys per country, conducted between 1990 and 2012

Region	Developing countries that conducted at least one consumption survey				Average number of surveys per developing country	Average number of comparable surveys per developing country
	Number of countries	Country coverage (percent)	Population coverage (percent)	Median year of most recent survey		
East Asia and Pacific	15	63	96	2010	3.9	2.8
Europe and Central Asia	21	100	100	2011	10.0	6.4
Latin America and the Caribbean	22	85	98	2011	11.1	6.3
Middle East and North Africa	12	92	98	2007	3.2	1.8
South Asia	8	100	100	2010	4.1	2.8
Africa	47	98	99	2010	3.8	1.6
World	125	89	98	2010	6.0	3.5

Sources: Data from the World Bank microdata library, PovcalNet, and World Development Indicators.

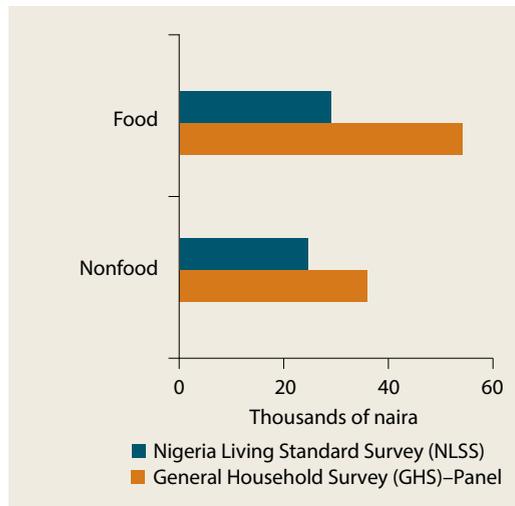
Note: The table includes low-income, lower-middle-income, and upper-middle-income countries, with the exception of Equatorial Guinea, which is a high-income country.

diary approach to consumption was used (Dabalen and others 2015).⁹

In Nigeria two household surveys were conducted the same year. The Nigeria Living Standards Survey (NLSS) was fielded in 2009/10. It overlapped with the first wave of

the General Household Survey-Panel (GHS-Panel), which was launched in the last quarter of 2010. The NLSS, which relied on the diary approach, reported much lower consumption than the GHS-Panel, which used the recall approach (figure 1.5). The surveys

FIGURE 1.5 Different survey designs can result in very different consumption estimates



Sources: Data from the NLSS and GHS-Panel for overlapping months in 2010.

were also different in other salient ways, in particular with respect to field supervision and field team composition, both of which may affect quality.

At the country level, noncomparability between survey rounds is often a concern; country-level poverty reports are replete with discussions of survey comparability (see World Bank 2013 for Burkina Faso; World Bank 2012 for Niger; World Bank 2015b for Tanzania). These differences are often overlooked at the regional level, partly because databases such as PovcalNet do not vet surveys on the basis of comparability.

Lack of survey comparability within countries across time is not unique to consumption measures. It has been reported in the measurement of literacy, for example (see box 3.2 in chapter 3). Although more systematic documentation of these differences in a meta-database would not resolve these issues, it would be helpful to analysts.

Quality of consumption data

The closest approximation of a broad definition of good-quality data involves fitness for use: data should be accurate, rich in detail, relevant, timely, and likely to achieve the purposes for which the survey was intended

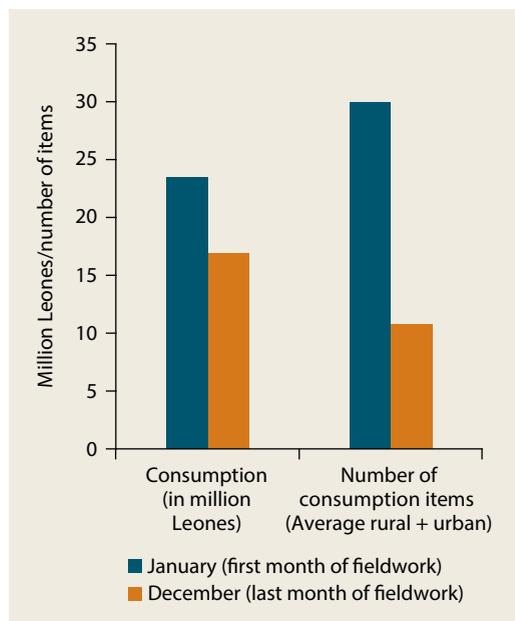
(Biemer and Lyberg 2003; Gryna and Juran 1980). At the core of data quality problems is often a process failure.¹⁰ Interviewers may fail to make contact with respondents and subsequently report fake data, perhaps because supervision was lax or insufficient (as Finn and Ranchhod [forthcoming] document in a survey in South Africa). Enumerators may not have been given sufficient training to probe for the responses intended by the questions. Respondents may refuse to participate, or they may provide false information. Modes of data collection—computers, phones, paper—could also be compromised because the infrastructure needed was not planned appropriately. Errors may be introduced in entering (or keying) data. Poor data quality can undermine comparability over time because process failures that occur one year may not be repeated in another.

Misreported data are clearly the most serious way data quality can be compromised. There is little value in all the other dimensions of data (such as timeliness, richness of detail, relevance, availability, and even comparability), if the data are erroneous and hence cannot be used for the purposes for which they were designed (Biemer and Lyberg 2003).

The systematic detection of poor quality is challenging. Judge and Schechter (2009) apply Benford's law—a statistical method for reviewing the digits in reported statistics for abnormal patterns as a sign of fraudulence—to surveys in Bangladesh, Ghana, Mexico, Pakistan, Paraguay, Peru, South Africa, the United States, and Vietnam. They find widespread evidence of fake crop and livestock production data. Among the surveys reviewed, data quality was far worse in surveys in developing countries. Consumption data for almost 40 percent of households surveyed in the Malawi 1997/98 household survey were incomplete or inaccurate, and the data were unusable in poverty analysis (Benson, Machinjili, and Kachikopa 2004).

One commonly observed manifestation of poor quality is deterioration in reporting over the survey period that cannot be explained by seasonality. In Tanzania average household size fell significantly over the course of surveys

FIGURE 1.6 Data errors may account for some of the reported change in consumption



Source: Data from the 2011 Sierra Leone Integrated Household Survey.

over 12 months, specifically for the Household Budget Surveys 2000/01 and 2007, most likely reflecting enumerator fatigue (NBS 2009). In Sierra Leone, where households were randomly interviewed, both the number of food items and the level of consumption fell steadily during the 12 months of fieldwork (figure 1.6). The number of reported food purchases among urban respondents fell by one-third over the course of the survey, a drop that is explained only partly by seasonality. The reported urban-rural gap also narrowed, possibly because of data quality issues.

Price Data

Price data are indispensable to poverty measurement. Global poverty estimates reported in PovcalNet rely on two types of price indexes: national CPIs to deflate nominal consumption to a common base year and PPP exchange rates to convert local currencies into a common currency.

Because people living in different countries face different prices, comparison of living

standards between countries calls for the use of PPP exchange rates to achieve parity in the purchasing power of people's incomes. The same principle applies within countries, where consumers in rural and urban areas often face different prices, but the evidence for Africa is scant. Empirical studies for developing countries in other regions suggest that within-country price variation can be important, at least in larger countries (Deaton and Dupriez 2011; Majumder, Ray, and Sinha 2012).

Despite the importance of adjusting for differences in the cost of living across regions in a country for capturing true living standards, such adjustments are not widespread. In Africa, PovcalNet, which has the largest collection of consumption data from household surveys across countries of the world, adjusts for spatial price differences only in Angola, Burkina Faso, and South Africa. There is no explanation for why the adjustment is made only in these countries. Outside of Africa, PovcalNet data on consumption are adjusted for within-country spatial price differences in countries in Latin America and the Caribbean, China, India, Indonesia, and, for food only, in countries in Europe and Central Asia. This report uses the consumption measure used in PovcalNet for Africa, meaning that for most countries it has not been adjusted for spatial price differences.¹¹

Adjusting for price changes using the CPI

The CPI is used to track inflation in consumer prices. This core economic indicator is used to index pensions, wages, taxes, and social security benefits and to anchor monetary policy.

The largest consumer price data collection exercise in Africa is conducted by Statistics South Africa, which regularly collects 65,000 price quotations from 27,000 outlets (ILO 2013). In other African countries, the number of CPI price quotations ranges from 1,150 (São Tomé and Príncipe) to 51,170 (Ethiopia).

CPI calculation requires weights to aggregate the price data across items into an index. These weights typically come from budget share estimates from household surveys.

Combining the price data with weights to construct the CPI is a complex process that often differs significantly across countries. Partly because of these variations and partly because the CPI is not designed specifically to apply to the measurement of poverty, CPIs may not always accurately depict changes in the cost of living experienced by the average household or (particularly) the poor.

CPIs suffer from several potential sources of bias. *Commodity substitution bias* relates to the use of an imperfect indexing formula and outdated weights. The most common index for CPIs is the Laspeyres index, which uses weights from a base (reference) period. This index disregards substitution behavior that may stem from inflation itself—that is, it ignores the fact that when the prices of some goods rise more quickly than the prices of others, households shift consumption to similar but cheaper items. It therefore overestimates inflation and underestimates poverty reduction.

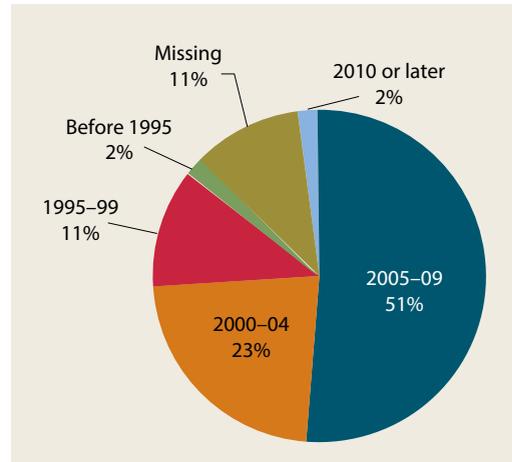
Updating weights can address this problem, but CPI weights are often many years old. As of July 2012, for example, 13 percent of the African population was living in countries in which the CPI basket was based on data from the 1990s (or earlier), and data on 11 percent of the population were missing altogether (figure 1.7).

Outlet substitution bias is related to changes in the retail landscape. Price data for the CPI are often collected from a fixed set of stores or markets. With the advent of discount retail stores in some countries in Africa, failure to adjust where the price data are collected is expected to lead to an overestimation of inflation and underestimation of poverty reduction.

Quality change bias reflects the fact that the quality of a product can change (typically, improve) while the price remains unchanged. Evidence from the developed world suggests that quality change bias generally leads to an overestimation of inflation (Hausman 2003). Overestimating inflation thus understates poverty reduction.

New products bias is similar to quality change bias. The introduction of new products

FIGURE 1.7 The weights used to construct consumer price indexes in Africa are outdated



Source: ILO 2013.

Note: Figures indicate the share of Africa's population in 2013 living in countries in which the weights used to calculate the consumer price index (CPI) in July 2012 came from each time period.

and brands increases living standards. Econometric techniques seek to estimate the gains that occur as a result. Hausman (1996, 1999) measures the consumer gains resulting from the introduction of new breakfast cereals and mobile phone services by estimating virtual (reservation) prices. Whether such techniques should find their way into the estimation of the CPI remains controversial.¹² New product bias is by definition positive. It leads to an overestimation of inflation in the CPI and therefore an underestimation of poverty reduction.

Plutocratic bias arises because CPI weights are computed in a way that implicitly weights households in proportion to their total consumption (so-called plutocratic weights) and are hence more representative of wealthier households (Deaton 1998; Ley 2005; Oosthuizen 2007). Plutocratic weights are the natural choice in the deflation of economic aggregates, such as national accounts, but generally not the first choice for measuring poverty and welfare. The alternative would be weighting all households equally (Prais 1959). If consumption patterns and rates of inflation differ among poor, average, and better-off households, the CPI will not accurately track the changes in prices experienced by the poor.

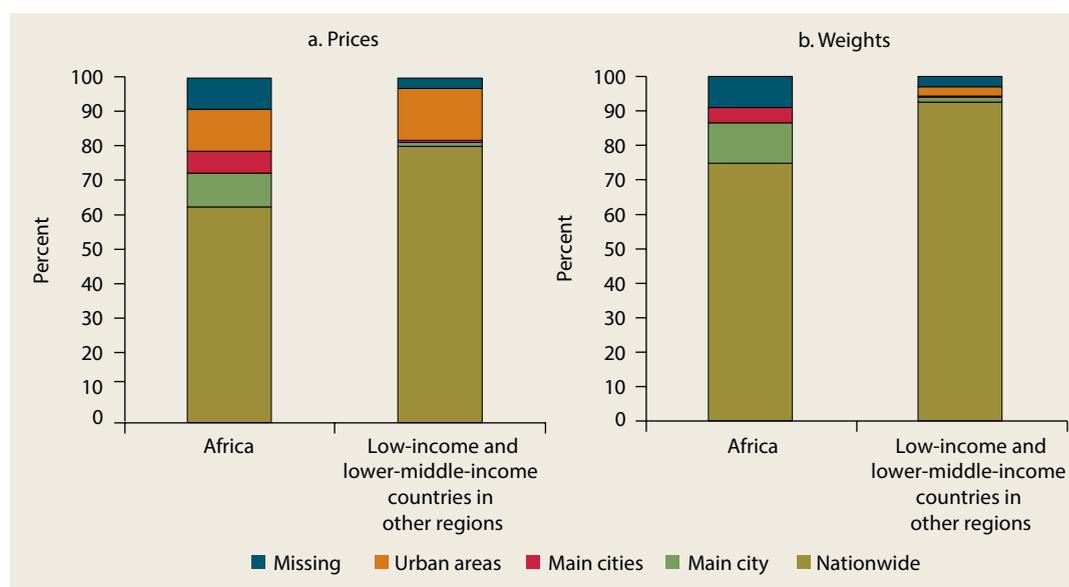
In Africa and other developing regions, there is empirical evidence that inflation inequality can be important—that is, the poor and the nonpoor may experience different inflation rates. Whether these differences result in over- or underestimation of the inflation faced by the poor is less clear. In Burkina Faso in 1994–98, food crop prices increased much more quickly than the prices of other consumer items (Günther and Grimm 2007). Because the poor spend a larger share of their budgets on food, they experienced higher inflation than other consumers. Inflation inequality has also been documented in Brazil, Colombia, Indonesia, Mexico, Peru, South Africa, Tanzania, and Uganda (Goñi, López, and Servén 2006; McCulloch, Weisbrod, and Timmer 2007; Mkenda and Ngasamiaku 2009; Okidi and Nsubuga 2010; Oosthuizen 2007). While some studies find that the inflation poor households experience is higher, in some countries it is better-off households that face higher rates of inflation. Even within the same country, the direction of bias can change. In Burkina Faso, for example, the poor encountered

lower inflation than the better off between 1998 and 2003.

Urban bias arises because many CPIs in Africa are based on prices collected only in urban areas. Some countries also base weights only on urban consumption patterns. Urban-based prices and weights are significantly more prevalent in Africa than elsewhere (figure 1.8). There is reason to believe that the *urban bias* in prices and weights is even more common than suggested by the data of the International Labour Organization (ILO). For instance, Kenya, which is listed as having nationwide coverage in the ILO database, reports, in its CPI publication, that, outside of Nairobi, urban centers were selected to represent each province (KNBS 2010). Whether urban bias matters in measuring poverty depends on whether rural inflation does or does not track urban inflation.

Bias from the treatment of own consumption stems from the practice of including only market purchases in the CPI weights, excluding consumption from food grown by the household. One-quarter of Africa's

FIGURE 1.8 Both the prices and weights used to construct consumer price indexes in Africa reflect a strong urban bias



Source: ILO 2013.

Note: Figures are weighted using the population in 2013.

population lives in countries that exclude home production from weights; for another third, it is not clear whether the weights include home production. The CPI guidelines issued by the United Nations (UN 2009) leave the decision on the inclusion of own production in weights to the discretion of countries, because the decision depends partly on what the index is used for. For the purpose of poverty analysis, where own-consumed goods are typically included in the consumption aggregate and valued at (proximate) market prices, the weights for price indexes should include consumption of own production. As with urban and plutocratic bias, whether this bias matters in measuring poverty depends on whether the inflation associated with these goods differs from the inflation associated with other items.

Biases arising from computational and similar errors also reduce the accuracy of the CPI. In Tanzania, for instance, the CPI underestimated inflation in 2002–05 because of defective protocols for removing outliers and other computational errors. The mistakes were eventually corrected and the CPI series revised, though concerns remained that the series continued to underestimate inflation (Adam and others 2012; World Bank 2007). Similar evidence is reported for Ghana in 1999–2001 (IMF 2003, 2007).

In situations where price changes are politically sensitive, governments may have an incentive to exert pressure on statistical agencies to misreport inflation or strategically time methodological changes to reduce measured inflation. If statistical agencies are not independent, CPI-measured inflation may be biased downward, leading to an overestimation of poverty reduction (Barriónuevo 2011; Berumen and Beker 2011). Although the notion of *political economy bias* is plausible, political influence on the computation of the rate of inflation is difficult to document.

Because of these shortcomings of the CPI, poverty estimates at the national level often use alternative approaches to adjust for spatial or temporal price differences. Some statistical agencies and academic studies reweight CPI

subcomponents to reflect the consumption patterns of the poor or construct survey-based price deflators so that prices and weights are computed directly from household surveys. Since there is little agreement or technical guidance on how to adjust nominal consumption data for price changes, countries often use ad hoc and context-specific methods.

Another approach is the Engel curve method, pioneered by Costa (2001) and Hamilton (2001). It is based on the notion that changes in food budget shares over time reflect changes in real incomes. Chapter 2 takes a closer look at what this method suggests about the magnitude and direction of the CPI bias and the implications for measuring poverty in Africa.

Despite the caveats, national CPIs are applied almost uniformly for across-survey price adjustment in the context of global poverty measurement (although in cases where CPI-measured inflation rates appear highly implausible, alternative inflation estimates are occasionally used).

Using purchasing power parities to measure global poverty

For cross-country analysis, it is necessary to convert local currency values into a common currency. The approach has typically involved using PPP rather than traditional currency exchange rates to compare both poverty and GDP across countries.

The PPP exchange rate is based on a large-scale effort to collect and compare prices for a set of items across all countries (see World Bank 2014 for a detailed discussion of PPPs). The International Comparison Program (ICP), which is in charge of the PPP calculations, is a massive global undertaking that covers thousands of goods and services in 200 countries.¹³ About 199 countries, with 97 percent of the world's population and 90 percent of the world's economy, participated in the latest round (2011). In Africa 45 of 48 countries (all but Eritrea, Somalia, and South Sudan) participated, up from 19 in 1993 and 44 in 2005.

A controversy erupted in 2014 following the release of the 2011 PPPs. The debate

revolved around whether the world has become more or less equal and whether it has become less poor relative to the United States, whose currency is taken as the benchmark when calculating these exchange rates. Such debates have become routine with every round of ICP PPP releases (see the discussion in Almås 2012; Ciccone and Jarociński 2010; Deaton 2010), partly because in each round major revisions have been made to methods, the number of countries participating, and coverage (rural and urban) within countries, so that some reranking becomes inevitable. In the latest release, the consumption and income of the average developing country rose by 25 percent (Inklaar and Rao 2014). The new PPPs project large declines in poverty and a shift in the geography of the poor from Asia to Africa (Dykstra, Kenny, and Sandefur 2014; Jolliffe and Prydz 2015).

Experts are divided over whether the 2005 or the 2011 PPP better describes the world. Supporters of the 2011 round (Deaton and Aten 2014) argue that the methodological changes introduced in 2011, in particular the use of a core global list of goods rather than 18 ring countries in 2005, undid some of the mistakes made in the 2005 PPP, which inflated the price ratios for Africa, Asia (without Japan), and western Asia by 20–30 percent. On the other side of the debate, Ravallion (2014) finds that the 2011 PPP places more weight on strongly internationally traded goods than do past ICP rounds, seen through a convergence of price levels and exchange rates, especially in Asia. He argues that these results are inconsistent with expectations from the methodological changes introduced in the 2011 ICP round.

Lanjouw, Massari, and van der Weide (2015) use a multiple imputations approach that avoids the use of PPPs entirely to rank poverty rates of countries. Their method generates multiple imputed consumption and poverty rates for each country (so for a sample of five countries, there are five estimates per country), each corresponding to the estimate obtained when a particular country is used as the reference in the model. They

then rank countries on the basis of these poverty rates and compare these ranks to ranks obtained using 2005 PPP and 2011 PPP. For a sample of five African countries, the 2011 PPP ranking followed the ranking from this imputation approach more closely than the 2005 PPP did. In contrast, there was no major difference in the rankings of the 2011 and 2005 PPP on the one hand and the ranking based on the imputation approach for a sample of countries in Europe and Central Asia and Latin America and the Caribbean.

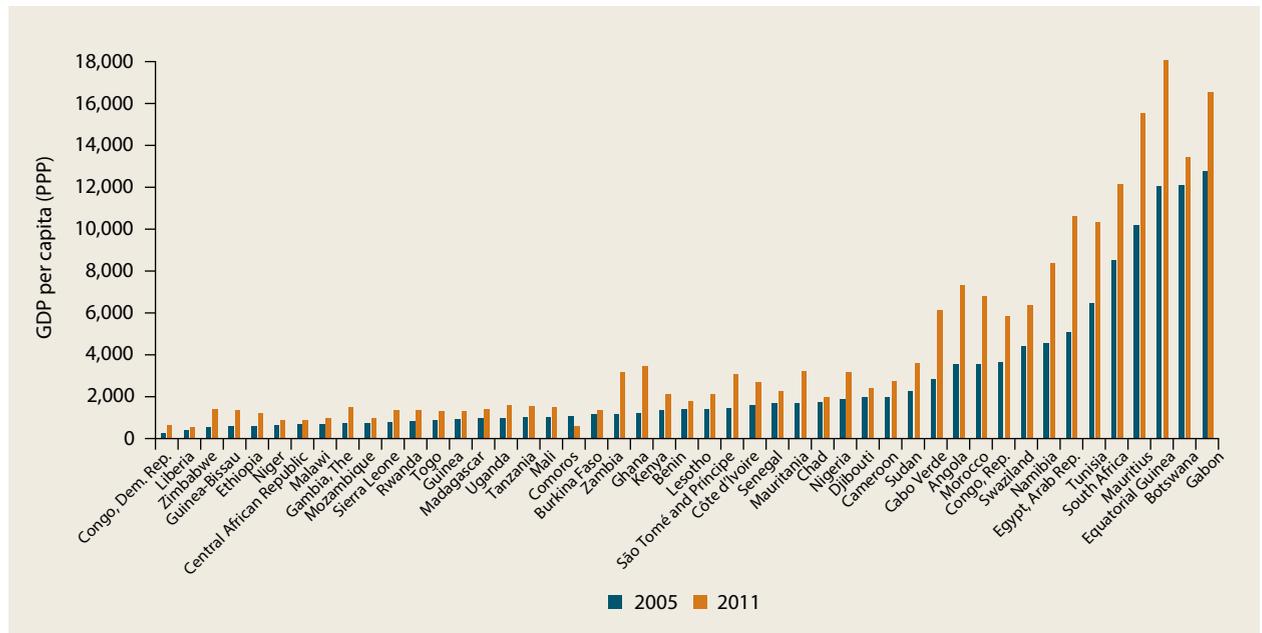
What do the latest PPPs say about the change in national income levels (GDP per capita) in Africa? The region remains the world's poorest, even though its share of global income inched higher, from 3.3 percent in 2005 to 4.5 percent in 2011. All 10 of the world's poorest economies were in Africa. Country rankings within Africa remained fairly stable, but there were some changes in rank, such as Botswana and Gabon at one end and Ghana and Zambia in the middle (figure 1.9).

Population Census and GDP Data

Surveys and price data are not the only data needed for estimating poverty. Census data are needed both to select the sample for a survey and to estimate the size of the population. GDP data from the system of national accounts are used to estimate poverty in years with no survey.

Census data

A census is essential for measuring and monitoring monetary and nonmonetary poverty, for several reasons. First, it is the basis for the sample frame for surveys and the selection of the primary sampling units (communities) from which households are sampled. At the back end of surveys, censuses—specifically the population projections from the past census to the survey year—are needed to obtain the population statistics from the survey estimates. The absence of an up-to-date census introduces significant uncertainty into population-level statistics on living standards

FIGURE 1.9 Adoption of the 2011 purchasing power parity values increased GDP per capita figures across Africa

Source: World Bank 2014.

Note: Countries are ranked by their 2005 PPP estimate of GDP per capita. GDP per capita of Equatorial Guinea using 2011 PPP was \$39,440; in the figure it is capped at \$18,000, so that incomes for the other countries are distinguishable.

(or any measures from household surveys) (World Bank 2015a). Second, census data have been used to estimate poverty rates and poverty counts at the smallest possible jurisdiction, through poverty mapping techniques (Elbers, Lanjouw, and Lanjouw 2003). Third, census data are useful for understanding a number of nonmonetary dimensions of living standards, such as housing conditions and educational attainment.

Because of the enormous financial, personnel, and managerial demands of censuses, they are ideally conducted once every 10 years. The coverage of population censuses in Africa improved significantly in the last two rounds. In the 2000 round (1995–2004), 33 of 47 countries participated; only 8 countries had no census in the 2010 round (2005–14).¹⁴ The eight countries represent about 13 percent of Africa's population. The Democratic Republic of Congo has not conducted a census since 1984. Because it is estimated to be the third most populous country in Africa, obtaining the

correct count of the poor there is critical for regional estimates.

Only a handful of countries make their census data sets available to the public. The Integrated Public Use Microdata Series (IPUMS)—the world's largest collection of public use census microdata files—currently includes 19 African countries.¹⁵

National accounts data

National accounts are the comprehensive economic statistics that measure economic activity in a country. They are also important for estimating poverty in years in which no survey has been conducted. Rather than assume a steady rate of change in poverty between survey rounds, researchers apply per capita growth rates of GDP or private consumption (referred to as household final consumption expenditure in the World Development Indicators) to the household survey means to interpolate the pattern of poverty between two surveys or extrapolate it beyond the survey range (when no other survey is

available).¹⁶ For a country with only one survey, the survey mean is adjusted forward and backward using the real growth rate of GDP per capita to give poverty estimates in other years (see World Bank 2015a). These calculations assume that GDP per capita or private consumption per capita grows at the same rate for everyone.

When used to interpolate, national accounts imputation is preferred over assuming a steady rate of poverty change between survey rounds. This approach helps capture possible downturns and upswings between surveys. The assumption that each household's consumption expands uniformly at the rate of the overall economy becomes more tenuous when extrapolating beyond the surveys, especially farther into the future (or the past).

One reason why the reliability of GDP-imputed poverty estimates declines the farther away the estimate is from the actual survey is that the structure of the economy changes over time. Every year statistical agencies collect proxy information on the level of production in various sectors. They aggregate these values assuming the structure of the economy in the base year. As the structure of the economy changes (for example, the agricultural sector shrinks and the service sector

grows), the base year becomes less and less representative of the economy and therefore requires updating. The international recommendation is to update the base year at least every five years. This process of replacing the base year is known as *rebasings*.

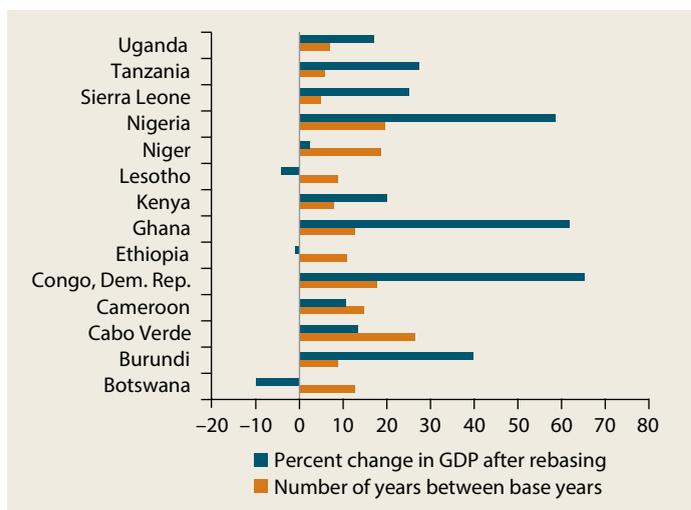
Thanks to rebasing, a national economy can grow statistically overnight (figure 1.10). The GDP rebasing exercise carried out by Ghana in 2010, for example, caused such a large increase in GDP that Ghana jumped from low-income to low-middle-income country status. Rebasings in Nigeria in 2014 propelled it to surpass South Africa as the biggest economy in Africa. The announcement drew much attention from the media, business community, economists, and international organizations (BBC 2014; Economist 2014; Magnowski 2014).

Only 22 countries in Africa (less than half of all countries) use base years that are more recent than 2004. Growing sectors may thus be undercounted, leading to underestimation of GDP, GDP growth, and poverty reduction. Given that rebasing typically gives greater weight to nonagricultural sectors, which are not as powerful at reducing extreme poverty as agricultural growth, underestimation of poverty reduction is likely to be smaller than underestimation of GDP (Christiaensen, Demery, and Kuhl 2011; Loayza and Raddatz 2010).

Of the 14 countries that rebased their GDP in the last 10 years, only 3 reported a decline in GDP. Some of the upward revisions were large, partly because the base year had not been changed in many years.

Interpolation and extrapolation are necessary to estimate poverty in years in which no survey data are available. Should the imputations be based on GDP or private consumption data from national accounts? Private consumption is preferred, because it captures a set of goods and services that more closely mirrors consumption from household surveys (see Deaton 2005 for a critique of private consumption as a proxy for household survey consumption). In practice, however, considerations such as the availability and quality of GDP and private consumption data and the strength of correlations between data from

FIGURE 1.10 Rebasings increased GDP values in many African countries



Source: Data from national statistical agencies for each country.

national accounts and household surveys typically influence the choice. PovcalNet uses private consumption per capita for interpolations, except in Africa, where it uses GDP per capita.

For 1991–2012 the average ratio of average consumption per capita from household surveys to average private consumption per capita from national accounts (based on 83 household surveys in Africa) was 0.86. This figure is similar to the global average but less than the ratio of 1.0 for Africa estimated in Deaton (2005). The ratio of average consumption per capita from household surveys to GDP per capita for the same sample of surveys was 0.61. This figure is two-thirds of the global average (0.9) and 60 percent of the 1.0 ratio reported in Deaton (2005). The lower ratio when using GDP is expected, because GDP includes more than private household consumption.

What about growth rates? For a subset of countries for which two comparable surveys are available, annual per capita growth rates from the household consumption surveys can be compared with the corresponding annual per capita growth of GDP and private consumption from national accounts. Annual growth rates are 0.41 percentage points higher for private consumption per capita and 1.2 percentage points higher for GDP per capita than estimates of consumption per capita growth from household surveys (based on a simple country average for each period for which comparable pairs of survey data are available). For Africa overall, without restricting to years with comparable surveys, GDP and private consumption per capita growth rates from national accounts are very close, with the GDP per capita growth rate higher by only 0.02 percentage points on average. This finding suggests that the performance of GDP in tracking consumption from surveys is worse in the subset of countries for which comparable surveys are available. Overall, using private consumption from national accounts rather than GDP to impute poverty when surveys are lacking does not appear to make a significant difference. Both sources lead to overestimation of the decline in poverty.

In Kenya, for example, where the last household survey was conducted in 2005, the poverty rate associated with the \$1.90 poverty line was 34 percent. Extrapolating from the 2005 survey using a real average GDP per capita growth rate of 2.3 percent yields a poverty estimate of 26 percent for 2012. Reducing the growth rate by 0.5 percentage point a year increases the estimate to 28 percent. The larger the measurement error in GDP growth rates and the older the survey data the projections rely on, the larger the difference between the “true” and the estimated poverty rate using projections.

The Political Economy of Data Production

After years of investment in statistics by African governments and the international development community, a feeling of disappointment is noticeable in recent discussions about the absence of adequate data for poverty measurement, let alone high-quality data. The issues are not unique to consumption data (box 1.3). Explanations for the delays in the availability of data and quality improvements point to inadequate funding, the limited capacity of national statistical offices, the lack of strategic planning, and administrative cultures. The response of some supporters of statistics in the region has been to ask for more money and more capacity building. But there is increasing recognition that the problem may be more deeply seated than lack of money or technical expertise.

Country-Level Factors Associated with the Availability, Comparability, and Openness of Data

Do richer countries in Africa tend to have more surveys and more surveys that are comparable? Are countries that receive more aid doing a better job of collecting data, perhaps because donors have an interest in showing results? Which countries collect more frequent and comparable consumption survey data and make the data available to the public?¹⁷

BOX 1.3 Many kinds of data in Africa are unreliable

Poor quality and lack of comparability affect many kinds of data in Africa, not just consumption data. One telling sign is the wide variance in indicators such as health care use, educational enrollment, adult literacy, child mortality, and access to water and sanitation for the same country from different surveys (box 3.2, in chapter 3, shows the challenge of tracking adult literacy). Another is the divergence between survey and administrative data (see, for

example, Gaddis and Hoogeveen 2015). Although political incentives to show positive results may drive some of the differences between surveys and administrative data (Sandefur and Glassman 2015), data quality problems also play a role. Estimates of maize yields for Malawi for 2006/07, for example, range from 1,700 kilograms per hectare to more than 2,500 (a difference of almost 50 percent) (Carletto, Jolliffe, and Banerjee 2015).

This section groups countries in four ways—by income level, natural resource endowment, geographical location (landlocked versus coastal), and fragility—to identify patterns. Besides these broad groupings, the analysis draws attention to the role of governance and development aid in data production. The upper panel in table 1.2 reports results for Africa, whereas the bottom panel shows results for developing countries in other regions.

Lack of financial resources is generally considered as a major constraint to statistics in Africa. Surprisingly, this is not supported by the results. In Africa, middle-income countries neither collect more consumption surveys than low-income countries, nor are the surveys they collect more likely to be comparable or open to the public. Outside of Africa, middle-income countries collect more consumption surveys than low-income countries, but the relationship turns insignificant after controlling for the share of aid in the budget, political freedoms, and government effectiveness.

African countries that are rich in natural resources conduct fewer consumption surveys than non-resource-rich countries in the region. Both in Africa and in other regions, fragile countries collect fewer consumption surveys than nonfragile countries, although in Africa, the statistical significance disappears after controlling for the share of aid in the budget, political freedoms, and government effectiveness. Unexpectedly, in some specifications, the share of surveys that are

comparable and open to the public is higher in fragile than in nonfragile countries in Africa.

Countries receiving more development aid (as a share of the government budget) might be expected to have more and higher-quality poverty data (defined narrowly as having consumption surveys that are comparable), in part because donors are presumably interested in collecting data with which to assess whether their aid is having an impact. There is no strong evidence that they do. In the non-African sample, there is a negative correlation between aid and the number of consumption surveys. In the African sample, there is no statistically significant relationship between aid and the number of consumption surveys or the share of comparable surveys. In fact, the more aid a country in Africa receives, the less likely it is to open its surveys to the public.

The lack of positive correlation between aid and data production in Africa is puzzling. It may be that donors do not explicitly or implicitly demand more or better data. Alternatively, the incentives of donors and governments could be misaligned. An example of such misaligned interests is the case in which donors ask and are willing to pay for data that are high in quality (small sample, multi-topic surveys) though less frequently collected, whereas governments prefer larger samples that are representative at lower administrative levels (CGD 2014). National statistical agencies can be caught between the preferences of donors and those of their governments.

TABLE 1.2 Only a few country characteristics are correlated with the number and share of comparable and open consumption surveys

Country characteristic	Number of consumption surveys		Share of consumption surveys that are comparable		Share of consumption surveys that are open	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Africa						
Middle-income	-0.781	-0.343	-0.072	-0.141	0.068	0.069
Resource-rich	-0.869*	-1.115*	-0.096	0.075	0.016	-0.079
Landlocked	0.794	1.093	0.047	-0.268*	-0.056	0.015
Fragile	-1.963***	-0.823	-0.084	0.396*	0.169***	-0.010
Log of aid share of government budget		-0.146		0.031		-0.076*
Worldwide Governance Indicators						
— government effectiveness index		0.363		0.581***		-0.280**
Political rights freedom index		-0.165		0.101*		-0.022
Outside Africa						
Middle-income	4.107**	2.360	0.090	0.146	0.094	0.160
Resource-rich	-0.954	-2.755	0.233**	0.166	0.050	-0.067
Landlocked	1.349	3.675**	0.189**	0.122	0.046	-0.001
Fragile	-6.236***	-4.766***	0.025	0.156	0.020	-0.094
Log of aid share of government budget		-1.707***		0.020		-0.003
Worldwide Governance Indicators						
— government effectiveness index		-1.371		-0.018		-0.073
Political rights freedom index		-0.895		0.026		0.009
Number of observations	133	93	133	93	132	93
R-squared	0.251	0.432	0.098	0.390	0.096	0.189

Sources: Survey counts: International Household Survey Network, World Bank microdata library, and PovcalNet. Government effectiveness variable:

Worldwide Governance Indicators. Freedom index: Freedom House. Other control variables: World Development Indicators.

Note: The data set consists of one observation per country. In columns 1a and b, the dependent variable is the total number of consumption surveys conducted between 1990 and 2012. In columns 2a and b, the dependent variable is the share of consumption surveys that are comparable. In columns 3a and b, the dependent variable is the number of surveys that are open (that is, available to the public). The freedom index is Freedom House's freedom of political rights and civil liberties. It ranges from 1 to 7, where 1 is the most free and 7 is the least free. Regressions control for population and land area. Standard errors are clustered at the country level. The constant term is not shown. The R-squared is for a pooled regression (African and non-African countries) with interaction terms.

Significance level: * = 10 percent, ** = 5 percent, *** = 1 percent.

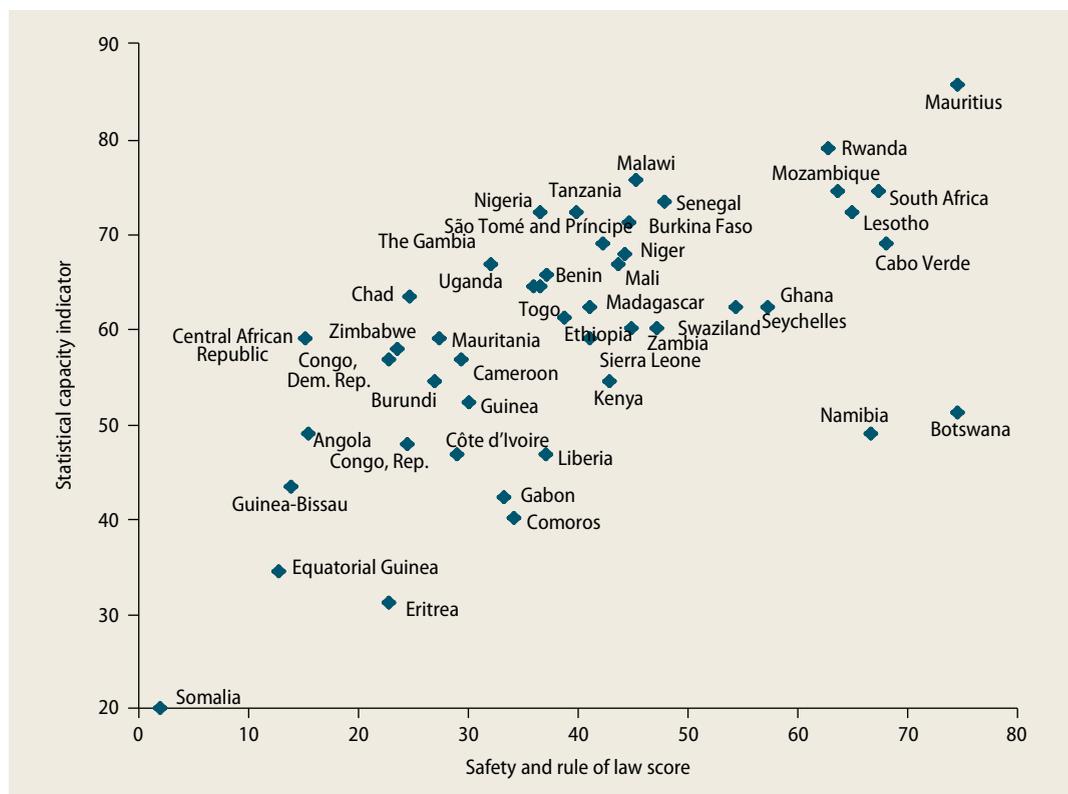
Unlike aid, good governance is positively correlated with higher-quality data in Africa. The government effectiveness indicator—one of six dimensions of governance tracked in the Worldwide Governance Indicators (WGI) database—is highly correlated with greater comparability of surveys. However, the indicator is negatively correlated with the share of household surveys that are open. Political openness is (measured by the freedom index) also positively correlated with a greater share of comparable surveys.

Alternative indicators of statistical capacity and governance yield stronger results. There is a strong positive correlation between

a country's score on the statistical capacity indicator (which measures a country's data collection, data availability, and data practices) and a country's safety and rule of law score (one of the governance indicators tracked in the Ibrahim Index of African governance) (figure 1.11). Countries with better scores on safety and rule of law also have higher statistical capacity scores.

Political Aspects of the Lack of Good-Quality Data

The production of statistics is a technically complex task. It involves mobilizing financial

FIGURE 1.11 Good governance and statistical capacity go together

Source: Hoozeveen and Nguyen 2015.

and human resources on a large scale and establishing robust quality control mechanisms. Pervasive asymmetries of information, which create difficulties if users or buyers seek to verify the quality of the product, render the task even more complicated.

These challenges partly explain the lack of high-quality consumption surveys. But governments in Africa have been able to meet their capacity needs in performing other activities that are more or equally complex technically, such as delivering antiretroviral drugs to people with AIDS and conducting national elections (Hoozeveen 2015). Why have they failed to produce more and better data on living standards?

Several recent reports and papers advance the proposition that data are weak because of the political preferences of elites (Carletto, Jolliffe, and Banerjee 2015; CGD 2014; Devarajan 2013; Krätke and Byiers 2014; Hoozeveen 2015; Jerven 2013). According to

these studies, autonomous statistical agencies fail to emerge even where legislation mandates them because the norms and procedures for making decisions remain informal (personalized), centralized, and even ad hoc (Krätke and Byiers 2014). As a consequence, statistical agencies are unable to produce timely, good-quality data that are free of bias. This failure leaves the agencies vulnerable to pressure from local political and well-organized advocacy groups (CGD 2014). In addition, where outside financiers tie funding to specific indicators (such as school enrollment), both statistical offices and local politicians may have incentives to exaggerate achievements—and produce unreliable data to support them.

The political environment in many African countries is characterized by ethnic divisions, fractious alliances, high degrees of competition for political leadership and economic resources, and vague rules of the

game. Many elites in such contexts may take a hostile attitude toward reliable and timely data collection, which they consider a partisan audit of their performance. This tendency creates strong incentives to establish competing and politicized statistical units, which in turn leads to fragmentation, duplication, wastage, and, ultimately, ineffective agencies.

Political elites may not favor good-quality statistics for other reasons as well. First, where clientelism exists and opportunities to engage politically are limited, as is the case in most African countries, a record of achievement that can be supported by good-quality data is unnecessary, because support from a small group of power brokers suffices

(Hoogeveen 2015). Second, because supporting the patronage network is costly, the opportunity costs of funding high-quality statistics are high in terms of political survival. Third, poor-quality statistics allow elites to escape accountability, because they can contest bad outcomes. This lack of demand by and support from the top of the political hierarchy may be the most important constraint to changing the poverty data landscape in Africa. However, experiences from other regions (notably Latin America and the Caribbean) suggest that regional cooperation and peer learning, together with international standards and technical guidelines, can still go a long way in improving the quality and consistency of existing data (box 1.4).

BOX 1.4 Can donors improve the capacity of national statistics offices? Lessons learned from MECOVI

The Program for the Improvement of Surveys and the Measurement of Living Conditions in Latin America and the Caribbean (known as MECOVI, its acronym in Spanish) was a coordinated effort led by the Inter-American Development Bank, the United Nations Economic Commission for Latin America and the Caribbean, and the World Bank to provide technical assistance to national statistical offices to increase their capacity to produce high-quality household surveys in a sustainable manner. Launched in 1996, the program was active until 2005. The concept and framework it developed still influence household surveys in the region.

The program has been widely recognized as successful in building the capacity of participating countries' statistical agencies, encouraging regional cooperation and peer learning, and establishing the foundations for the sustainability of household survey programs. Several lessons emerge from the program's success:

- Planning for the medium term was crucial. The minimum timeframe for all activities was four years.
- Concentrating on a limited and focused set of activities related specifically to household surveys helped obtain objectives. Clearly allocating local funds to surveys and outside resources to technical assistance rather than data collection led to sustainability.

- Commitment and ownership were key. The national statistical office in each country clearly defined its resources, activities, and work plans.
- Defining the governance structures of the three sponsoring institutions was important.
- Regional training and experience-sharing activities focused on South-South exchanges were critical.

The focused nature of MECOVI's support for household surveys created "islands of efficiency" in some of the least-developed statistical offices. Survey departments became the "favorite child"—with the most funding and the best resources—but the technical nature of the support allowed for significant spillovers to other departments, which benefited from improvements in areas such as data quality control, questionnaire design, sampling, and data entry.

Is MECOVI replicable? Some factors that contributed to its success (such as significant interest in household surveys to measure poverty) cannot be reproduced. Others, however, can be. They include close coordination among donors, cooperation between countries, a long-term view, clearly defined and limited goals, heavy involvement of national statistical offices, well-focused objectives, and secure funding.

Contribution by Jose Antonio Mejia-Guerra.

Reappraising the Information Base on Poverty

The ability to track poverty accurately in Africa hinges on overcoming the many data challenges identified in this chapter. Among these challenges, one set of issues concerns the availability, comparability, and quality of consumption data. A second involves the quality and possible biases in the most commonly used price data (the CPI) used to monitor real standards of living.

Filling in Years with No Consumption Survey

One major data challenge is that consumption surveys are not conducted every year. Global or regional poverty estimates fill in gaps between surveys by relying on GDP or private consumption data as an approximation of consumption growth. Additionally, some consumption surveys may be noncomparable or of dubious quality. If comparability and quality concerns result in excluding some surveys, greater reliance will need to be placed on GDP-based imputations.

The alternative to using GDP imputations to fill in missing data is to use survey-to-survey (S2S) imputations. This approach relies on at least one survey with consumption (the reference survey), which is used to build a model that can be used to estimate consumption in other surveys based on other household traits. The fact that this approach can make use of many types of nonconsumption surveys, such as the DHS and the MICS, is one of its main attractions. The approach can be used to address multiple data problems, including low frequency, lack of comparability, and poor quality. If the model eschews regressors that require adjustments in the cost of living, concerns about the CPI bias can be addressed simultaneously (because the imputation is effectively in real terms). The model's success depends on the stability of the estimated relationship between consumption and the household traits tracked. The evidence mostly suggests

that this method does not pose major issues, at least when there are no dramatic turn-arounds in the economy or the predictions are not too far in the future (Christiaensen and others 2012; Doudich and others 2013; Kijima and Lanjouw 2003).

Using the Engel Curve Approach to Avoid the Biases Inherent in the CPI

Engel's Law is based on the observation that the share of food in households' consumption declines as income increases. The Engel curve method exploits this empirical regularity to estimate changes in real incomes based on changes in food budget shares over time, controlling for other factors that affect the household's allocation of its budget between food and nonfood items (for example, the demographic composition of the household and the relative prices of food and nonfood items) (Costa 2001; Hamilton 2001). Inconsistencies between changes in real incomes estimated by the Engel curve method and measured changes in real incomes (for instance, CPI-deflated nominal incomes) are regarded as evidence of measurement bias in the CPI. A drift of Engel curves to the left, so that over time a given food budget share is associated with a smaller level of real income, is an indication that the CPI overstates increases in the "true" cost of living and that real incomes are increasingly underestimated (Hamilton 2001).

The key identifying assumption of this approach is that no unobserved factors affect the share of the budget spent on food (that is, there are no changes in preferences or price changes beyond the broad factors for which the model controls). This assumption is not trivial and can be violated (because of shifts in preferences toward specific consumer durables, such as mobile phones, for example). For this reason, although the method can provide useful indications of CPI bias, especially when applied to a large number of countries, the results should not be overinterpreted for any specific country.

Recognizing Other Challenges in Measuring Poverty

Several other challenges make measuring poverty difficult.¹⁸ First, it is difficult to monetize the consumption of many goods and services. For example, the market price of food grown and consumed by the household (or given as a gift or wage payment) must be estimated in order to monetize the value of that food. The use value of housing and durable goods, when included in the consumption measure, must also be estimated. Although econometric techniques can be used to estimate the rental price when a home is owned by a household, for example, the estimates are reliable only if a robust rental market exists, which is not the case in many rural areas of Africa. The problem of imputing a use value is complicated by the fact that the typical data collected in surveys do not always reflect the information needed to calculate use values. For instance, many surveys collect information on whether

families own specific consumer durables, but few collect information on the (current or past) value of these items. Many consumption measures include expenditures on education and health, but they understate the “true” consumption value if those services are subsidized or publicly provided.

Second, the global monitoring of poverty uses consumption per capita as the measure of welfare comparisons, dividing total household consumption by the number of household members. Such a practice ignores differences in consumption across household members and economies of scale in household consumption. Failure to address both issues may affect poverty comparisons across groups within and across countries.

Third, having chosen consumption as the welfare measure, a standard needs to be set to determine who is poor and who is not; different approaches exist to determine such a poverty line (box 1.5).

BOX 1.5 What is the threshold for being poor?

Measuring poverty requires setting a level of consumption below which people are defined as poor. Most developing countries define a national poverty line based on the cost of a “basic needs” food basket, with some allowance for fundamental non-food requirements (such as clothing and housing). Although these national lines have the advantage of measuring poverty according to country-specific standards and circumstances, they are not comparable across countries. For instance, Uganda’s national poverty lines are based on a minimum daily calorie intake of 3,000 kcal per adult, which is much higher than the norms used in neighboring Kenya (2,250 kcal) and Tanzania (2,200 kcal). Many other salient differences also undermine cross-country comparisons of national poverty lines.

To measure poverty at the global or regional level and to compare poverty across countries, it is common practice to apply the same absolute standard in each country to estimate the number of poor. The World Bank’s international poverty line has

historically been defined as a line that is representative of national poverty lines in the poorest countries, after conversion into a common currency using PPP exchange rates (World Bank 1990; Ravallion, Datt, and van de Walle 1991; Chen and Ravallion 2010). In 2008 this international line was estimated at \$1.25 per capita per day at 2005 prices. In 2015 the line was updated to \$1.90 at 2011 prices based on results from the 2011 PPP round, the value used in this report.

Several researchers have proposed alternative poverty lines. Ravallion and Chen (2011) and Chen and Ravallion (2013) propose “weakly relative” poverty lines, which combine features of an absolute poverty line for the poorest countries with the notion that once a country has passed a certain income threshold the poverty line should increase with rising per capita income. Klasen and others (forthcoming) propose an international poverty line of about \$1.70 in 2011 prices, derived using a method that is similar to the one used by Jolliffe and Prydz (2015).

Concluding Remarks and Recommendations

The production of social and economic statistics in Africa has been improving over the past 20 years. More household surveys are being conducted. Participation in decennial census rounds is rising. More countries are updating their GDP base years. Participation by African countries in the latest International Comparison Program round reached the highest level ever. Data on governance, political attitudes, and other nonmonetary aspects of poverty are being collected in greater volume, as are gender-disaggregated data on health, violence, and empowerment-related issues. These data have helped researchers examine poverty from a broader perspective.

These improvements are welcome, but there is cause for concern, for three main reasons. First, data production has increased from a very low base. A sustained effort in producing data will continue to be important if the region hopes to catch up with other regions.

Second, many of the data that have been produced, especially consumption data, are of poor quality; in the worst cases, they are unusable. For instance, of the 148 surveys reviewed, only 78 were comparable to another survey in order to track poverty. Only 11 countries rely on GDP base years that are no more than five years old, the recommended frequency of updating.

Third, data problems are more than technical. An important, often underappreciated reason for low investment in statistics in Africa is that frequent and high-quality statistics do not enjoy strong support from politicians and policy makers. Once produced, its use does not preclude another person's use of it. As such they can be used by independent researchers, advocacy groups, and rival politicians to illuminate progress but also to audit performance of incumbents.

Because of these problems, the foundation on which to make policy and demand accountability for results is weak. What can be done?

Rethink the financing model. The most desirable and sustainable arrangement for financing a country's statistical needs is through domestic resources. Doing so requires elites to embrace the benefits of evidence-based decision making and make the collection of statistics the responsibility of an autonomous agency, run by an independent governance board and professionalized staff. The agency should have a clear mandate regarding the types of data it is to collect, dedicated funding from general appropriations, and clear reporting arrangements to institutions that represent the electorate, such as parliament. Current political arrangements often favor limited funding for statistics, perhaps to exercise influence over statistical agencies. The replacement of domestic financing by donor financing has not always been effective because the interests of donors are not always aligned with the interests of governments.

Alternative financing models are therefore needed. One model would require donors, such as the World Bank, to finance statistical production in perpetuity through grant programs in countries that are unwilling to produce good-quality statistics. This model would be akin to the model the U.S. Agency for International Development (USAID) follows with the DHS. Where there is domestic interest in improving the volume and quality of statistics but financing is a constraint, a cofinancing arrangement could be pursued. For instance, donors could finance a larger share of the costs in the early stages of data production. As domestic resources expand and institutional capacity grows, that share would decline. Additional incentives to increase demand through open data access, participation in regional programs for standard setting, and additional capacity support could be built into the compact.

Focus on results and open data access. Too many statistical support programs focus on inputs and outputs rather than results. There is also weak demand for data production. Opening data to public access could address both problems. Public scrutiny by users and policy makers could help improve quality and increase accountability. Knowledge

production externalities would follow, as research using the data expands.

Develop and enforce methodological and operational standards. The ultimate aim of improving the capacity of national statistical offices should be to enable them to collect more frequent and higher-quality data. But better outcomes are possible even without more frequent data collection. The average African country implemented four consumption surveys in the past two decades, but many of them cannot be used because of comparability and quality concerns. Had survey methods been consistent, the data collected could have been useful. Developing consensus on international standards for measuring monetary poverty would help guide countries on international best practices for measuring monetary poverty.

Notes

1. PovcalNet is the World Bank's online analysis tool. It is available at <http://iresearch.worldbank.org/PovcalNet/>.
2. Latin American and some Europe and Central Asian countries traditionally use income instead of consumption to measure poverty. Measuring household income in economies dominated by subsistence agriculture and informal self-employment, which includes most African countries, is complicated. For this reason, consumption is generally the preferred indicator of monetary living standards and poverty.
3. This result is based on reviews of the inventory in the International Household Survey Network, a voluntary association of development partners and member countries that aims to improve the availability, accessibility, and quality of household surveys.
4. Consumption surveys collect data on more than just consumption. If they are carried out as integrated surveys, they provide information on income sources, labor, use of education and health care services, remittances, social assistance, and other socioeconomic dimensions of households.
5. Data from the Zimbabwe 2007–08 Income Consumption Expenditure Survey are available, but that survey was conducted during a period of hyperinflation, making it very challenging to use any monetary measures. The survey has been used to measure other aspects of well-being.
6. Other survey design and implementation features can also render survey-based consumption estimates incomparable. The focus here is on the most common types of comparability problems.
7. Even though 180 surveys were identified, only 148 were available in the World Bank's microdata library and could be included in the review. Not all of these 148 surveys were available for use by the report team, however. Some surveys do not include a consumption aggregate with which to measure poverty. Some include consumption measures but have not gone through a vetting process used by the World Bank. Others (such as South Africa 2000) have consumption aggregates that are available only as grouped data. The team was able to use 113 of the 148 surveys for the analysis of poverty trends.
8. In Kenya, for instance, the number of food items increased from about 80 in the 1997 Welfare Monitoring Survey to more than 150 in the 2005/06 Kenya Integrated Household Budget Survey. In Zambia the number of food items rose from less than 40 to more than 130 between the 2006 and 2010 rounds of the Living Conditions Monitoring Survey.
9. The Kenya and Niger studies do not offer a benchmark for consumption that is taken as true consumption. The Tanzania study proposes that the intensive personal diary is such a benchmark. Both the Kenya and the Niger studies find that diary consumption is lower than recall consumption, but it is not clear whether the finding indicates underreporting in the diary survey or overestimation in the recall survey.
10. Poor questionnaire design (flow and question wording or content) is an important aspect of quality that is not related to process.
11. Using spatially deflated consumption measures does not change the overall story in chapter 2. Some poverty estimates are lower, some are higher, and many show no change when consumption is adjusted for price differences. Likewise, the inequality analysis in chapter 4 is robust to using spatially deflated consumption measures.
12. An influential National Research Council report (Schultze and Mackie 2002) argues against including the virtual price reduc-

- tions associated with the introduction of new goods in the U.S. CPI.
13. Unlike national CPIs, PPPs are not intended for assessing changes in country-level prices over time (Feenstra, Inklaar, and Timmer 2015).
 14. The 14 countries that failed to participate in the 2000 round were Angola, Burundi, Cameroon, Chad, the Democratic Republic of Congo, Eritrea, Ethiopia, Guinea Bissau, Liberia, Madagascar, Nigeria, Somalia, Sudan, and Togo. The 8 countries that did not participate in the 2010 round were the Central African Republic, Comoros, the Democratic Republic of Congo, Equatorial Guinea, Eritrea, Madagascar, Sierra Leone, and Somalia. Sierra Leone conducted a census in late 2015.
 15. See <https://international.ipums.org/international/>.
 16. To calculate the poverty rate for years between two surveys, one can take the first survey and apply the GDP growth rate forward to the interim year, take the second survey and apply the GDP growth backward to the interim year, and take the average of the two poverty estimates, weighted by the number of years to the first and second survey. This weighting gives a survey closer to the interim year more weight.
 17. Openness in this section is defined as access to the public and hence differs from the concept of availability in the previous discussion, which considers only whether data are accessible to the report team.
 18. These challenges feature prominently not only in cross-country poverty measurement but also in poverty measurement for a single country using national poverty lines.

References

- Adam, Christopher, David Kwimbere, Wilfred Mbowe, and Stephen O'Connell. 2012. "Food Prices and Inflation in Tanzania." Working Paper, International Growth Centre, London.
- Almås, Ingvild. 2012. "International Income Inequality: Measuring PPP Bias by Estimating Engel Curves for Food." *American Economic Review* 102 (2): 1093–117.
- Backiny-Yetna, Diane Steele, and Ismael Yacoubou Djima. 2014. "The Impact of Household Food Consumption Data Collection Methods on Poverty and Inequality Measures in Niger." Policy Research Working Paper 7090, World Bank, Washington, DC.
- Barrionuevo, Alexei. 2011. "Inflation, an Old Scourge, Plagues Argentina Again." *New York Times*, February 5.
- BBC. 2014. "How Nigeria Will Become Africa's Biggest Economy." April 4. <http://www.bbc.com/news/world-africa-26873233>.
- Beegle, Kathleen, Joachim De Weerd, Jed Friedman, and John Gibson. 2012. "Methods of Household Consumption Measurement through Surveys: Experimental Results from Tanzania." *Journal of Development Economics* 98 (1): 3–18.
- Benson, Todd, Charles Machinjili, and Lawrence Kachikopa. 2004. "Poverty in Malawi, 1998." *Development Southern Africa* 21 (3): 419–41.
- Berumen, Edmundo, and Victor A. Beker. 2011. "Recent Developments in Price and Related Statistics in Argentina." *Statistical Journal of the IAOS* 27 (1–2): 7–11.
- Biemer, Paul, and Lars E. Lyberg. 2003. *Introduction to Survey Quality*. Wiley Series in Survey Methodology. Hoboken, NJ: John Wiley & Sons.
- Carletto, Calogero, Dean Jolliffe, and Raka Banerjee. 2015. "From Tragedy to Renaissance: Improving Agricultural Data for Better Policies." *Journal of Development Studies* 51 (2):133–48.
- CGD (Center for Global Development). 2014. *Delivering on the Data Revolution in Sub-Saharan Africa*. Final Report of the Data for African Development Working Group, Center for Global Development and African Population and Health Research Center, Washington, DC.
- Chen, Shaohua, and Martin Ravallion. 2010. "The Developing World Is Poorer Than We Thought, but No Less Successful in the Fight Against Poverty." *Quarterly Journal of Economics* 125 (4): 1577–625.
- . 2013. "More Relatively-Poor People in a Less Absolutely-Poor World." *Review of Income and Wealth* 59 (1): 1–28.
- Christiaensen, Luc, Lionel Demery, and Jesper Kuhl. 2011. "The (Evolving) Role of Agriculture in Poverty Reduction: An Empirical Perspective." *Journal of Development Economics* 96 (2): 239–54.
- Christiaensen, Luc, Peter Lanjouw, Jill Luoto, and David Stifel. 2012. "Small Area

- Estimation-Based Prediction Methods to Track Poverty: Validation and Applications.” *Journal of Economic Inequality* 10 (2): 267–97.
- Ciccone, Antonio, and Marek Jarociński. 2010. “Determinants of Economic Growth: Will Data Tell?” *American Economic Journal: Macroeconomics* 2 (4): 222–46.
- Costa, Dora L. 2001. “Estimating Real Income in the United States from 1888 to 1994: Correcting CPI Bias Using Engel Curves.” *Journal of Political Economy* 109 (6): 1288–310.
- Dabalen, Andrew, Paul Gubbins, Johan Mistiaen, and Ayago Wambile. 2015. “Diary versus Recall in Food Consumption: Example from Kenya.” World Bank, Poverty and Equity Global Practice, Washington, DC.
- Deaton, Angus. 1998. Getting Prices Right: What Should Be Done? *Journal of Economic Perspectives* 12 (1): 37–46.
- . 2005. “Measuring Poverty in a Growing World (or Measuring Growth in a Poor World).” *Review of Economics and Statistics* 87 (1): 1–19.
- . 2010. “Price Indexes, Inequality, and the Measurement of World Poverty.” *American Economic Review* 100 (1): 5–34.
- Deaton, Angus, and Bettina Aten. 2014. “Trying to Understand the PPPs in ICP2011: Why Are the Results So Different?” NBER Working Paper 20244, National Bureau of Economic Research, Cambridge, MA.
- Deaton, Angus, and Olivier Dupriez. 2011. “Spatial Price Differences within Large Countries.” Working Paper 1321, Woodrow Wilson School of Public and International Affairs, Research Program in Development Studies, Princeton University, Princeton, NJ, and World Bank, Washington, DC.
- Demombynes, Gabriel, and Justin Sandefur. 2014. “Costing a Data Revolution.” Working Paper 383, Center for Global Development, Washington, DC.
- Devarajan, Shantayanan. 2013. “Africa’s Statistical Tragedy.” *Review of Income and Wealth* 59 (S1): S9–S15.
- Doudich, Mohamed, Abdeljaouad Ezzrari, Roy van der Weide, and Paolo Verme. 2013. “Estimating Quarterly Poverty Rates Using Labor Force Surveys: A Primer.” Policy Research Working Paper 6466, World Bank, Washington, DC.
- Dulani, Boniface, Robert Mattes, and Carolyn Logan. 2013. “After a Decade of Growth in Africa, Little Change in Poverty at the Grassroots.” Afrobarometer Policy Brief 1. <http://www.afrobarometer.org/publications/pp1-after-decade-growth-africa-little-change-poverty-grassroots>.
- Dykstra, Sarah, Charles Kenny, and Justin Sandefur. 2014. “Global Absolute Poverty Fell by Almost Half on Tuesday.” Center for Global Development, Washington, DC. <http://www.cgdev.org/blog/global-absolute-poverty-fell-almost-half-tuesday>.
- Easterly, William, and Ross Levine. 1997. “Africa’s Growth Tragedy: Policies and Ethnic Division.” *Quarterly Journal of Economics* 112 (4): 1203–50.
- The Economist. 2014. “Nigeria’s GDP. Step Change: Revised Figures Show that Nigeria Is Africa’s Largest Economy.” April 12. <http://www.economist.com/news/finance-and-economics/21600734-revised-figures-show-nigeria-africas-largest-economy-step-change>.
- Elbers, Chris, Jean O. Lanjouw, and Peter Lanjouw. 2003. “Micro-Level Estimation of Poverty and Inequality.” *Econometrica* 71 (1): 355–64.
- Elvidge, Christopher D., Paul C. Sutton, Tilotama Ghosh, Benjamin Tuttle, Kimberly E. Baugh, Budhendra Bhaduri, and Edward Bright. 2009. “A Global Poverty Map Derived from Satellite Data.” *Computers & Geosciences* 35 (8): 1652–60.
- Etang-Ndip, Alvin, Johannes Hoogeveen, and Julia Lendorfer. 2015. “Socioeconomic Impact of the Crisis in North Mali on Displaced People.” Policy Research Working Paper 7253, World Bank, Washington, DC.
- Feenstra, Robert, Robert Inklaar, and Marcel Timmer. 2015. “The Next Generation of the Penn World Table.” *American Economic Review* 105 (10): 3150–82.
- Finn, Arden, and Vimal Ranchhod. Forthcoming. “Genuine Fakes: The Prevalence and Implications of Data Fabrication in a Large South African Survey.” *World Bank Economic Review*.
- Gaddis, Isis, and Johannes Hoogeveen. 2015. “Primary Education in Mainland Tanzania: What Do the Data Tell Us?” In *Preparing the Next Generation in Tanzania: Challenges and Opportunities in Education*, edited by Arun Joshi and Isis Gaddis. Washington, DC: World Bank.

- Garcia-Verdu, Rodrigo. 2013. "The Evolution of Poverty and Inequality in Sub-Saharan Africa over the Period 1980–2008: What Do We (and Can We) Know Given the Data Available?" International Monetary Fund, Washington, DC.
- Goñi, Edwin, Humberto López, and Luis Servén. 2006. "Getting Real about Inequality: Evidence from Brazil, Colombia, Mexico, and Peru." Policy Research Working Paper 3815, World Bank, Washington, DC.
- Gryna, Frank, and Joseph Juran. 1980. *Quality Planning and Analysis*, 2nd ed. New York: McGraw-Hill.
- Günther, Isabel, and Michael Grimm. 2007. "Measuring Pro-Poor Growth When Relative Prices Shift." *Journal of Development Economics* 82 (1): 245–56.
- Hamilton, Bruce W. 2001. "Using Engel's Law to Estimate CPI Bias." *American Economic Review* 91 (3): 619–30.
- Harttgen, Kenneth, Stephan Klasen, and Sebastian Vollmer. 2013. "An African Growth Miracle? Or: What Do Asset Indices Tell Us about Trends in Economic Performance?" *Review of Income and Wealth* 59 (S1): S37–S61.
- Hausman, Jerry. 1996. "Valuation of New Goods under Perfect and Imperfect Competition." In *The Economics of New Goods*, edited by Timothy F. Bresnahan and Robert J. Gordon, 209–48. Chicago: University of Chicago Press.
- . 1999. "Cellular Telephone, New Products, and the CPI." *Journal of Business and Economic Statistics* 17 (2): 188–92.
- . 2003. "Sources of Bias and Solutions to Bias in the Consumer Price Index." *Journal of Economic Perspectives* 17 (1): 23–44.
- Hoogeveen, Johannes, and Nga Thi Viet Nguyen. 2015. "Statistics Reform in Africa: Aligning Incentives with Results." Working Paper, World Bank, Poverty and Equity Global Practice, Washington, DC.
- Hoogeveen, Johannes, Kevin Croke, Andrew Dabalén, Gabriel Demombynes, and Marcelo Giugale. 2014. "Collecting High-Frequency Panel Data in Africa Using Mobile Phone Interviews." *Canadian Journal of Development Studies* 35 (1): 186–207.
- ILO (International Labour Organization). 2013. *All Countries CPI Descriptions: Methodologies of Compiling Consumer Price Indices*. 2012 ILO Survey of Country Practices. Geneva: ILO.
- IMF (International Monetary Fund). 2003. *Ghana: First Review under the Three-Year Arrangement under the Poverty Reduction and Growth Facility: Staff Report*. IMF Country Report 03/395. Washington, DC: IMF.
- . 2007. *Ghana: Article IV Consultation: Staff Report*. IMF Country Report 07/210. Washington, DC: IMF.
- Inklaar, Robert, and D. S. Prasada Rao. 2014. "Cross-Country Income Levels over Time: Did the Developing World Suddenly Become Much Richer?" Groningen Growth and Development Centre, University of Groningen, Netherlands.
- Jerven, Morten. 2013. "Comparability of GDP Estimates in Sub-Saharan Africa: The Effect of Revisions in Sources and Methods since Structural Adjustment." *Review of Income and Wealth* 59 (S1): S16–S36.
- Jolliffe, Dean Mitchell, and Espen Beer Prydz. 2015. "Global Poverty Goals and Prices: How Purchasing Power Parity Matters." Policy Research Working Paper 7256, World Bank, Washington, DC.
- Judge, George, and Laura Schechter. 2009. "Detecting Problems in Survey Data Using Benford's Law." *Journal of Human Resources* 44 (1): 1–24.
- Kaminski, Jonathan, Luc Christiaensen, and Christopher L. Gilbert. 2014. "The End of Seasonality? New Insights from Sub-Saharan Africa." Policy Research Working Paper 6907, World Bank, Washington, DC.
- Kijima, Yoko, and Peter Lanjouw. 2003. "Poverty in India during the 1990s: A Regional Perspective." Policy Research Working Paper 3141, World Bank, Washington, DC.
- Klasen, Stephan, Tatyana Krivobokova, Friederike Greb, Rahul Lahoti, Syamsul Pasaribu, and Manuel Wiesenfarth. Forthcoming. "International Income Poverty Measurement: Which Way Now?" *Journal of Economic Inequality*.
- KNBS (Kenya National Bureau of Statistics). 2010. *The New Consumer Price Index (CPI) Users' Guide*.
- Krätke, Florian, and Bruce Byiers. 2014. "The Political Economy of Official Statistics: Implications for the Data Revolution in Sub-Saharan Africa." PARIS21 Discussion Paper 5.
- Lanjouw, Peter, Renzo Massari, and Roy van der Weide. 2015. "International Poverty Comparisons: An Imputation-Based Approach." World Bank, Washington, DC.

- Ley, Eduardo. 2005. "Whose Inflation? A Characterization of the CPI Plutocratic Gap." *Oxford Economic Papers* 57 (4): 634–46.
- Loayza, Norman, and Claudio Raddatz. 2010. "The Composition of Growth Matters for Poverty Alleviation." *Journal of Development Economics* 93 (1): 137–51.
- Magnowski, Daniel. 2014. "Nigerian Economy Overtakes South Africa's on Rebased GDP." April, Bloomberg.
- Majumder, Amita, Ranjan Ray, and Kompal Sinha. 2012. "Calculating Rural-Urban Food Price Differentials from Unit Values in Household Expenditure Surveys: A Comparison with Existing Methods and A New Procedure." *American Journal of Agricultural Economics* 94 (5): 1218–35.
- McCulloch, Neil, Julian Weisbrod, and Peter Timmer. 2007. "Pathways out of Poverty during an Economic Crisis: An Empirical Assessment of Rural Indonesia." Policy Research Working Paper 4173, World Bank, Washington, DC.
- Mkenda, Adolf F., and Wilhelm Ngasamiaku. 2009. "An Analysis of Alternative Weighting System on the National Price Index in Tanzania: The Implication to Poverty Analysis." *Botswana Journal of Economics* 6 (10): 50–70.
- Muller, Christophe. 2008. "The Measurement of Poverty with Geographical and Intertemporal Price Dispersion: Evidence from Rwanda." *Review of Income and Wealth* 54 (1): 27–49.
- Mveyange, Anthony. 2015. "Night Lights and Regional Income Inequality in Africa." Department of Business and Economics, University of Southern Denmark, Odense, Denmark.
- NBS (National Bureau of Statistics). 2009. *Household Budget Survey 2007: Final Report*. Dar es Salaam, Tanzania.
- Noor, Abdusalman M., Victor A. Alegana, Peter W. Gething, Andrew J. Tatem, and Robert W. Snow. 2008. "Using Remotely Sensed Night-Time Light as a Proxy for Poverty in Africa." *Population Health Metrics* 6: 5. <http://www.biomedcentral.com/content/pdf/1478-7954-6-5.pdf>.
- Okidi, John, and Vincent Nsubuga. 2010. *Inflation Differentials among Ugandan Households: 1997–2007*. Research Series 72, Economic Policy Research Centre, Kampala, Uganda.
- Oosthuizen, Morné. 2007. "Consumer Price Inflation across the Income Distribution in South Africa." Development Policy Research Unit Working Paper 07–129, University of Cape Town, Rondebosch, Cape Town, South Africa.
- Phelps, Glenn, and Steve Crabtree. 2013. "More Than One in Five Worldwide Living in Extreme Poverty." Gallup. <http://www.gallup.com/poll/166565/one-five-worldwide-living-extreme-poverty.aspx>.
- Pinkovskiy, Maxim, and Xavier Sala-i-Martin. 2014. "Africa Is on Time." *Journal of Economic Growth* 19 (3): 311–38.
- . 2015. "Lights, Camera..., Income! Estimating Poverty Using National Accounts, Survey Means, and Lights." Staff Report 669, Federal Reserve Bank of New York.
- PovcalNet. Database. <http://iresearch.worldbank.org/PovcalNet/>.
- Prais, Sigbert. 1959. "Whose Cost of Living?" *Review of Economic Studies* 26 (2): 126–34.
- Ravallion, Martin. 2014. "An Exploration of the International Comparison Program's New Global Economic Landscape." NBER Working Paper 20338, National Bureau of Economic Research, Cambridge, MA.
- Ravallion, Martin, and Shaohua Chen. 2011. "Weakly Relative Poverty." *Review of Economics and Statistics* 93 (4): 1251–61.
- Ravallion, Martin, Gaurav Datt, and Dominique van de Walle. 1991. "Quantifying Absolute Poverty in the Developing World." *Review of Income and Wealth* 37 (4): 345–61.
- Sandefur, Justin, and Amanda Glassman. 2015. "The Political Economy of Bad Data: Evidence from African Survey and Administrative Statistics." *Journal of Development Studies* 51 (2): 116–32.
- Schultze, Charles, and Christopher Mackie. 2002. *At What Price? Conceptualizing and Measuring Cost-of-Living and Price Indexes*. Washington, DC: National Academy Press.
- UN (United Nations). 2009. *Practical Guide to Producing Consumer Price Indices*. New York: United Nations. http://www.unece.org/fileadmin/DAM/stats/publications/Practical_Guide_to_Producing_CPI.pdf.
- World Bank. 1990. *World Development Report 1990: Poverty*. Washington, DC: World Bank.
- . 2007. "Underreporting of Consumer Price Inflation in Tanzania 2002–2006." World Bank Policy Note, Washington, DC.
- . 2012. *Niger: Investing for Prosperity, a Poverty Assessment*. Washington, DC: World Bank.

- . 2013. “Burkina Faso: A Policy Note: Poverty Trends and Profile for 2003–2009.” World Bank, Washington, DC.
- . 2014. *Purchasing Power Parities and the Real Size of World Economies: A Comprehensive Report of the 2011 International Comparison Program*. Washington, DC: World Bank.
- . 2015a. *A Measured Approach to Ending Poverty and Boosting Shared Prosperity: Concepts, Data, and the Twin Goals*. Policy Research Report. Washington, DC: World Bank.
- . 2015b. “Tanzania Mainland Poverty Assessment.” World Bank, Washington, DC.
- . 2015c. *The Socio-Economic Impacts of Ebola in Sierra Leone: Results from a High-Frequency Cell Phone Survey: Rounds 1–3*. Washington, DC: World Bank.
- Young, Alwyn. 2012. “The African Growth Miracle.” *Journal of Political Economy* 120 (4): 696–739.