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Towards better measurement of household food security: Harmonizing indicators and the role of household surveys

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ABSTRACT

A variety of indicators are currently used for food security analysis, monitoring, and programming, and most agencies have their preferred variant on methods of data collection, aggregation, and analysis. This lack of consensus is reflected in an inefficient multiplicity of survey instruments collecting information on various dimensions of food and nutrition security, with tremendous variation in the content, quality, and quantity of the information collected. No single existing survey instrument will ever be able to collect all needed indicators at the desired periodicity, and no single institution has either the mandate or the ability to measure and monitor food security in its many dimensions on a global scale. However, with better coordination across institutions and survey efforts, the state of food security measurement worldwide can be greatly improved. This paper attempts to identify the elements of a strategy, built around a combination of short-term fixes and long-term methodological advancements, to reverse the existing trends of poor coordination and slow methodological innovation in food security measurement and monitoring. International focus on a small dashboard of indicators, collected on a regular basis by different stakeholders through a number of available data collection options, is feasible and can be partially achieved by repurposing existing surveys to better suit food security monitoring goals.

1. Introduction

As global food prices have spiked in recent years, the international community has paid increasing attention to prospects for the world food situation, particularly in light of global climate change, population and income growth, and the evolution of dietary habits. Despite the importance of the topic, however, the international community currently lacks any form of a consensus on the core household food security indicators that are needed in order to properly measure and monitor food security around the world, partly due to a lack of global coordination and consensus on methodology across institutions and various survey efforts. As a result, the degree to which household food security has been affected by these trends remains as yet unclear, nor can we easily identify in a consistent manner the areas where food security has been most seriously affected.

The Food and Agriculture Organization of the United Nations (FAO) estimate for global undernourishment is the officially recognized indicator for monitoring progress towards achieving one of the targets of the first Millennium Development Goal (MDG), which commits to halving poverty and hunger by 2015. The annual release of this estimate routinely attracts worldwide media and expert attention, but also serves to expose the FAO to criticism from a variety of sources for its methodological choices in the calculation of this data.

While the existing literature has established that the FAO numbers present much scope for improvement, it is far from clear what approaches would work best as complementary or alternative international household food security indicators, particularly if the objective is to produce updates on an annual basis with the data that are currently available. Complicating things further is the fact that food security is a multidimensional concept, and data on all of its dimensions are seldom available and often unreliable.

In practice, a variety of indicators are currently used for food security analysis and monitoring, and most agencies have their preferred variant on methods of data collection, aggregation, and analysis. Sifting through this cloud of indicators, several could reasonably serve as candidates for household food security analysis and monitoring on a global scale. However, the variation among indicators is significant: some focus on specific dimensions of food security while others are multi-dimensional, some are quantitative while others are qualitatively based on perception and self-assessment. The indicators also vary on level of analysis, ranging from the regional or national level to the household or individual level, depending on the survey. While some indicators are clearly comparable over time

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and space, others are not well-suited for such comparisons. Furthermore, the quality also varies tremendously across indicators: there are indicators that fail to reliably capture their intended object of measurement, those that have been tested and validated in the field for years, and emerging indicators that may still require further validation.

Most importantly, the intended purpose of the available indicators varies widely. Some are used in the context of targeting emergency projects, whereas others were developed for monitoring and/or evaluation purposes; some play a role in the advocacy of certain key issues, and others contribute to the global monitoring of progress towards international policy objectives. While this heterogeneity in purpose necessarily leads to variation in methodological choices, for the specific purpose of global monitoring, the various stakeholders involved should recognize that a small set of indicators that satisfactorily capture each requisite dimension of food security and that are relatively easy to collect with different types of household surveys can be identified and adopted at little detriment to a broader agenda.

The aim of this paper is therefore to propose some concrete steps for moving towards a widely shared strategy to reform the international approach to multidimensional household food security monitoring and measurement by focusing on the potential for enhancing and harmonizing the use of household survey-based food security indicators. Towards this end, we first review the most common definitions and indicators used to measure food security. We then examine the major international data collection initiatives and survey instruments currently available as possible platforms for enhancing our ability to monitor food security, after which we offer practical suggestions on the way forward. The focus of the paper is limited to the potential for household survey data to contribute to monitoring food security on a global scale, so we will not consider here other methods of food security monitoring, such as sentinel systems and early warning systems (for instance, the Integrated Phase Classification (IPC) methodology and its applications).[1]

The remainder of the paper is organized as follows: Section 2 reviews issues with definitions, concepts and indicators; Section 3 reviews the potential, challenges and opportunities of various data collection instruments; Section 4 proposes a strategy that separates potential quick wins from medium- and long-term plans, and Section 5 concludes.

2. Definitions, conceptual framework, and indicators

An initial step in creating any strategy is to define its intended scope. With this in mind, we clarify here a few definitions, concepts, and indicators that will be useful in the discussion of food security measurement that follows.

2.1. Definitions

"Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life." This widely accepted definition agreed upon at the 1996 World Food Summit (FAO, 1996) points to the four key dimensions of food security:

1. Food **availability**: The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid).
2. Food **access**: The access to adequate resources (entitlements) to acquire appropriate foods for a nutritious diet. Entitlements are defined here as the set of all commodity bundles over which a person can establish command, given the legal, political, economic and social arrangements of the community in which he or she lives (including traditional rights such as access to common resources).
3. Food **utilization**: The utilization of food through adequate diet, clean water, sanitation, and health care, to reach a state of nutritional well-being in which all physiological needs are met. This highlights the importance of non-food inputs in food security. For example, it is insufficient for an individual to receive an adequate quantity of food, if he or she is unable to make use of the food due to illnesses resulting from inadequate sanitation or poor sanitary practices.
4. Food **stability**: The stability of access to adequate food at all times, independent of shocks (such as economic or climate-related crises) or cyclical patterns. This includes issues of seasonal food insecurity, such as the agricultural period before harvest known as 'the hunger season'.

This definition stresses food availability and access at the individual level, as well as food quality and cultural preferences. It highlights the fact that food security is a multidimensional concept, the assessment of which requires the measurement of several indicators that can together capture the various dimensions of food security. A clear hierarchy is evident across these dimensions; availability is necessary for food security, but is not sufficient to ensure access, whereas food access is similarly necessary but insufficient to ensure proper utilization of food (Barrett, 2010). Meanwhile, the concept of stability cuts across the first two dimensions, and can refer to variability and uncertainty in both availability and access. As recognized by the international community of practice (FIVIMS, 2002; Hoddinott, 1999), no single indicator has the capacity to capture all four dimensions of food security. Therefore, a combination of measures and indicators is needed to fully reflect the complex reality of food insecurity in any given context.

2.2. Conceptual framework

In many ways, this consensus on the need for a suite of indicators reflecting an agreed list of dimensions raises the problem to a new level. In fact, dozens of indicators are currently used by analysts and practitioners in the attempt to capture the various dimensions of food security. A useful way to organize the thinking about the variety of indicators is to relate them to the specific dimension(s) of food security they capture and the level of analysis to which they refer (i.e., global, national, household, and/or individual). Fig. 1 depicts this conceptualization; the figure is borrowed from Smith et al. (2000), on which the discussion below also draws.

At the global level, the crucial issue is global food availability, which depends on food production and stocks in any given year. Meanwhile, national food security depends on a country's food production and stocks, and on its food imports. Schematically, a country's capacity to produce food depends on its resource endowments, climate, capital of all types, policies, and on the productivity with which the available resources are employed. The ability to import food depends on a country's national income, the availability of foreign exchange, and the conditions and prices on international markets. Food aid may also be an external addition to national food supply.

National food availability, together with household incomes, determine household and individual access to food. Such access may be obtained either through direct production of foodstuffs,

[1] For details on the IPC background, methodology and country applications, see www.ipcinfo.org.

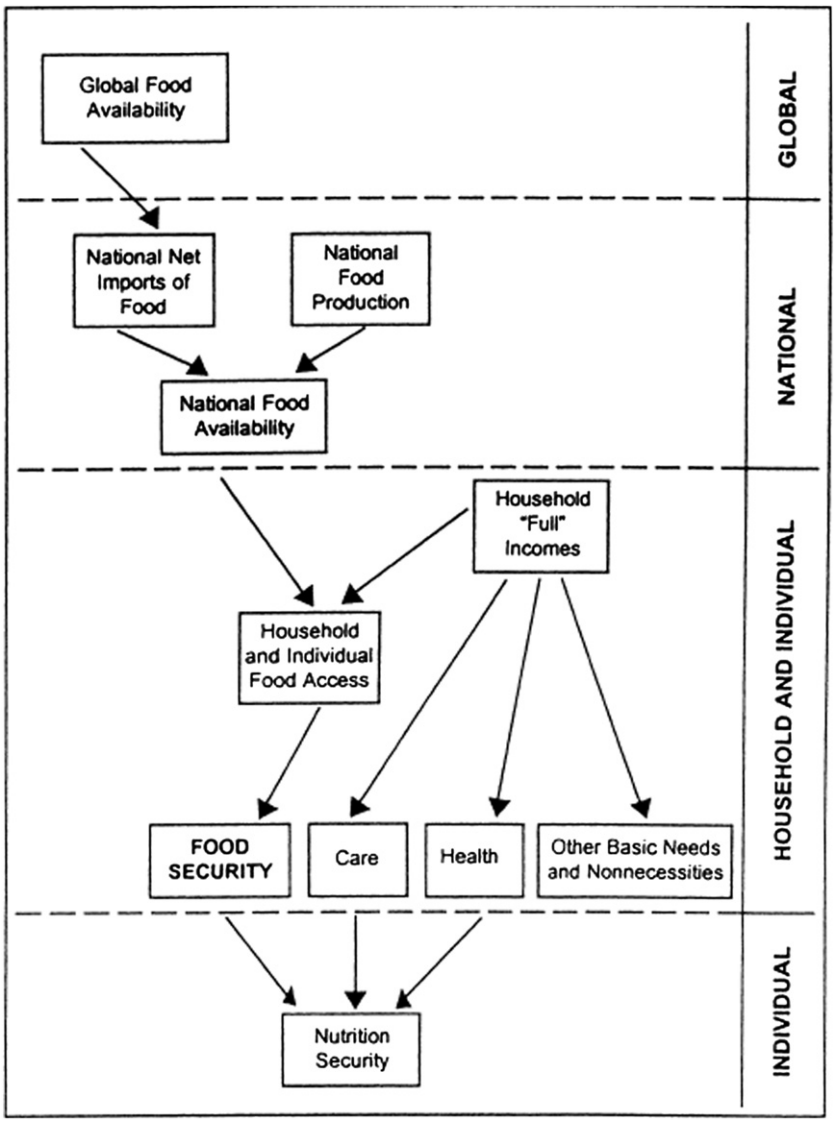

Fig. 1. Conceptual Framework of Food and Nutrition Security.
Source: Smith et al., 2000

market purchases of food, or through in-kind food transfers. Intra-household allocation of food determines the quantity and quality of food to which each individual ultimately has access.

In this framework, a distinction is made between food security and nutrition security. Food security is seen as a basic need that the household aims at satisfying alongside other needs when allocating its budget and resources. Food security, together with some of these other basic needs, then determines individual nutrition security. Aside from access to food, other key factors for individual nutrition security include care, health, and sanitation. For example, an unhealthy individual may not be able to absorb the nutrients and energy contained in the food she consumes. Similarly, care behaviors can affect an individual's nutritional status, for which the classic example is the effect of breast-feeding on children.

That said, for the purposes of this paper, we do not address nutrition security directly, instead confining our discussion to the harmonization of indicators on food security. Thus, traditional nutrition-focused indicators and surveys such as anthropometric measures and 24-hour recall Nutrition Surveys (24 HNS) are not extensively considered here, as these issues are already covered in Fiedler (2012).

2.3. Indicators

Moving now from concepts to indicators, in this section we explore some of the most commonly used indicators of food security in order to provide a brief comparative assessment of their relative strengths and weaknesses in relation to their informational requirements and specific use.

2.3.1. Undernourishment

A commonly used measure identified with the FAO is undernourishment, which is used to quantify food security at the national level by capturing the average availability of food against requirements at the national level. The first step in measuring food availability through the FAO methodology is the estimation of the per capita dietary food energy supply derived from aggregate food supply data. Based on income or consumption

distribution data, a number of assumptions are made on the distribution of the food supply across households. The proportion of undernourished in the total population is then defined as the part of the distribution lying below a minimum energy requirement level (Naiken, 2003).[2]

The advantage of the FAO measure is that it allows for frequent updated comparisons of energy deficiencies across countries and over time. The main disadvantages relate to the fact that it relies on often poor quality data for the calculation of total food/calorie availability (i.e., the Food Balance Sheets), and on parametric assumptions and often outdated survey data for the analysis of the distribution. An additional drawback is that the official FAO method is not amenable to the analysis of determinants of profiles of food insecurity below the national level (Smith et al., 2006).

The FAO's Statistics Division has recently begun applying a methodology similar to the one they use to produce the global undernourishment numbers to the analysis of survey data. This method, which is still based on parametric techniques, addresses some of the criticism of the 'traditional' FAO method, in that it no longer relies on dubious Food Balance Sheet data, while also allowing for some analysis of food security below the national level (Sibrian, 2008). However, the experimentation conducted by Smith et al. (2006) on the use of dietary energy deficiency measures based on non-parametric techniques highlighted large discrepancies between their measures and those obtained via the FAO methods, raising questions about the possible reasons for such discrepancies. Their work makes a strong case for the international community to conduct further research comparing parametric and non-parametric estimates, particularly as the availability and frequency of non-parametric survey data continues to increase.[3]

2.3.2. Household survey food consumption data

While the move to the exclusive use of household surveys to derive global undernourishment figures may not itself be fully practical, more and better food consumption data from household surveys is likely to be a game-changer in improving the FAO undernourishment estimates. That said, it is important to recognize that the issue of frequency of data is unlikely to be fully addressed on a global scale by household surveys alone, as the likelihood of generating comparable household survey data on a frequent basis from every country is extremely low.[4]

When household surveys collect information on quantities of food consumed (or purchased), these can then be converted into kilocalories with the use of appropriate conversion factors, for the purpose of comparison against household/individual energy requirements. This step in the analysis has several points in common with the aggregate macro-analyses, requiring decisions on and information for translating household-level information on consumption of food items into individual-level intake of kilocalories. Decisions must be made regarding (1) the use of per capita or adult equivalent calculations, (2) the use of calorie conversion tables for countries that currently lack them (or for any food items missing), and (3) the conversion into kilocalories of items such as prepared foods or food eaten away from home.

When a satisfactory measure of energy intake or acquisition is obtained, the final objective is often to use it to derive an indicator of food energy deficiency. This derivation is conducted by relating the measured consumption to a shortfall from a given norm or reference point, or from the energy requirements of the household/individual, the calculation of which requires information on household composition (e.g., the age and sex of all members), as well as data on individual height, weight, and activity levels. While the above demographic information is typically available, the anthropometric information is often not available, particularly for adults. Attempts to collect information on activity levels and/or intra-household food distribution are rarely made, with this information usually being replaced by standard assumptions (e.g., equitable distribution; light or moderate activity levels). These aggregates are therefore both difficult to collect and costly; as such, they are not always feasible to collect on a regular basis. Furthermore, collecting detailed food consumption data requires lengthy lists of food items, an approach that may be unattractive when the objective is to keep interview (and analysis) time to a reasonable length. Nonetheless, detailed food consumption expenditure information is the backbone of poverty measurement in most countries, thus making the collection of this type of data essential for all countries, irrespective of the difficulties and costs entailed. Ensuring that food quantities are collected alongside expenditure information renders possible the applicability and use of this information for food security monitoring and analysis.

2.3.3. Dietary diversity

One of a number of faster measures that have been proposed over the years as an alternative means of capturing food access is dietary diversity, which is of particular importance in developing countries where diets are composed mostly of starchy staples, include few or no animal products, and may be high in fats and sugars. In some developing countries, it has been established that many nutritional problems are not the result of a lack of calories, but rather a lack of diet quality (Ruel, 2003). Thus, the measurement of dietary diversity indicators has gained increasing prominence, particularly as the close relationship of dietary diversity with household per capita consumption and daily caloric availability as well as with anthropometric indicators of nutritional outcomes has been confirmed by several empirical studies (see, for example, Hoddinott and Yohannes, 2002). The use of dietary diversity as an indicator of dietary quality both at the individual and household level has been advocated as well, but the empirical evidence remains scant (Ruel, 2012).

The indicator is usually measured by summing the total number of foods or food groups consumed over a given reference period, typically ranging from one to three days. One common dietary diversity indicator is the Household Dietary Diversity Score (HDDS), developed by the Food and Nutrition Technical Assistance (FANTA) project, which denotes the number of a total of 12 food groups consumed during the past 24 h. The HDDS separates main staples into two groups, disaggregates meat, fish, and eggs, and also includes a group for miscellaneous food items.

A primary problem associated with dietary diversity indicators concerns the difficulty involved in interpreting comparisons across studies, since the food groupings as well as the reference periods often vary between approaches. In an effort to explore this issue further, validation exercises have been conducted involving dietary diversity indicators that group food in different ways or that prompt respondents about minimum quantities of each food group consumed. The results of these exercises generally appear to be robust to such changes, suggesting that it

[2] USDA also produces international food security measures (the average nutrition gap and the distribution gap) based largely on food availability data (including food aid) and modeling. See Shapouri et al. (2011) for details. IFPRI produces a composite Global Hunger Index that combines the FAO indicator with indicators of under-five mortality and underweight prevalence.

[3] See Sibrian et al. (2007) for a response by FAO to some of the criticism of the parametric approach and for a discussion of the possible issues with moving to a non-parametric one. A detailed account of this controversy is beyond the scope of this paper.

[4] See Fiedler et al. (2012) for a detailed discussion of the opportunities and possible constraints in improving the quality of consumption data in household consumption and expenditure surveys.

may not be worthwhile to add unnecessary complexity. Different recall periods and data collection tools have also been tested in the context of dietary diversity (1-day vs. 3-day recall; quantitative vs. qualitative lists); however, no recall period has yet been established as optimal, and existing research offers conflicting results. For example, a study by Drewnowski et al. (1997) suggested that a one-day recall period may result in the significant underestimation of food intake variability (Drewnowski et al., 1997, cited in Ruel, 2002). However, a more recent study measuring dietary diversity in rural Burkina Faso specifically comparing one-day and three-day recall periods found that the dietary diversity score calculated from a one-day dietary recall was sufficient to predict nutritional status for women, in addition to being a more rapid, reliable and inexpensive option (Savy et al., 2007, cited in Ruel, 2012). Ultimately, more work is needed in order to inform assessments of optimal recall periods as well as of the performance of qualitative approaches.

To date, dietary diversity indicators have been used for various measurements, including the measurement of nutrient adequacy at the individual level, as well as of food security at the household level. On the individual level, a study conducted in Mali by Hatløy et al. (1998) validated two types of dietary diversity indicators against nutrient adequacy: one indicator was calculated by a simple count of the number of foods consumed and the other was based on eight food groups. The study found a significant association between the two indicators and nutrient adequacy, with the food group-based indicator faring better than the alternative. A similar study using the same methodology for the two dietary diversity indicators was conducted in Vietnam (Ogle, Hung and Tuyet, 2001), which also confirmed the positive association.

With regards to household food security, a 10-country analysis conducted by Hoddinott and Yohannes (2002) demonstrated strong associations between household-level dietary diversity and per capita consumption and energy availability. They found that for every 1 percent increase in dietary diversity, there was an associated 1 percent increase in per capita consumption, and a 0.7 percent increase in per capita energy availability. The study also found that a set of questions on dietary diversity generally took under 10 min per respondent to complete, and that respondents found such questions straightforward and non-intrusive, both desirable features for large-scale survey implementation.

In terms of future validation, remaining points of contention to address include issues of item selection and grouping, portion size and intake frequency, and the selection of scoring, cutoff points, and reference periods. More research is also needed to validate indicators of dietary diversity for individual nutrient adequacy, as well as for household-level dietary diversity indicators that accurately reflect household food security.

2.3.4. Food consumption score

A widely utilized variation on the dietary diversity theme is WFP's Food Consumption Score (FCS), which is a frequency-weighted dietary diversity score, calculated using the frequency with which a household consumed eight food groups (i.e., staples, pulses, vegetables, fruits, meat/fish/egg, milk, sugar, and oil) with a 7-day recall from the date of the survey. Within each food group, the consumption frequencies are summed to yield a food group score, truncated to be no higher than seven. Each food group score is multiplied by its weight (based on the nutrient density of a given food group), and the results are then summed to create the FCS.

Wiesmann et al. (2009) found that food frequency scores were superior to simpler measures of dietary diversity based on food group count. Their validation of the score supported the use of the FCS for food security assessments, with the caveats that its definition cutoff points for certain food consumption groups (i.e., 'poor', 'borderline' and 'adequate') should be revised upwards, and that further gains in validity could be achieved with small-scale technical adjustments, such as increasing the number of food groups from eight to twelve. They also highlight that as dietary patterns differ greatly across regions – for example, as shown by Smith and Wiesmann (2007), dietary diversity is much lower in sub-Saharan Africa than in South Asia – the FCS method may need to be adapted to accord with region-specific idiosyncrasies.

A study by IFPRI found positive associations between the FCS and caloric consumption per capita in Burundi and Haiti, but not in tsunami-affected Sri Lanka. However, the unweighted indicator based on 12 truncated food groups that they used following the FANTA Household Dietary Diversity Score was found to fare better than an unweighted non-truncated FCS based on more food groups (IFPRI, 2008).

The focus of the validation work on the FCS is currently on the identification of appropriate thresholds to define different levels of food insecurity, as well as the possibility of establishing cutoff points with universal applicability.[5] There are also a number of other issues requiring validation with regards to this indicator; for example, there continues to be a lack of consensus as to the choice of food groups included within the FCS. Aside from the food groups contained, the FCS also lacks the ability to differentiate between processed and unprocessed foods, which has implications for food security, particularly in terms of food utilization. Finally, as mentioned previously, questions persist with regards to the validity of the score for suiting the varied local contexts in which it may be deployed. A review and validation of food security indicators by IFPRI in 2006 concluded that the weighting system for the food frequency scores might not be able to accommodate variation across space and time. Furthermore, due to the high survey data requirements for creating appropriate weighting factors for a given location and time, the indicator is also unsuitable for emergency assessments, given that the pattern of significant food groups has been found to vary by country and even from one survey round to the next (in the case of Mali) (IFPRI, 2006).

2.3.5. Household food insecurity access scale

As in other domains of welfare analysis, approaches to food security measurements based on subjective responses have recently received considerable attention. The Household Food Insecurity Access Scale (HFIAS) is based on the idea that there is a set of predictable reactions to the experience of food insecurity that can be summarized and quantified, allowing for measurement through household surveys. The HFIAS was adapted from the current United States methodology for estimating national prevalence of food insecurity, and measures (1) household access to food and (2) the degree of anxiety involved in its acquisition. Its classification system uses a set of nine questions used in surveys around the world that have been proven to be effective in distinguishing the food secure from the food insecure at the household level (Coates et al., 2007). The HFIAS questions thus represent universal aspects of the experience of food insecurity, capturing information on food shortage, food quantity and quality of diet to determine the status of a given household's access to food. Households and populations can be classified according to the severity of their food security status along a spectrum, by using data on the severity and frequency of their experiences over the previous 30 days. The information generated by the HFIAS can be used for geographic targeting as well as for

[5] See, for instance, the ongoing work by Astrid Mathiassen presented at the 2012 International Scientific Symposium on Food & Nutrition Security Information in Rome, Italy Mathiassen (2012).

monitoring and evaluation, by assessing the prevalence of household food security and detecting changes over time in household food security status (Coates et al., 2003). A variant based on a subset of the HFIAS questions is the Hunger Scale (HS), developed with the intent of improving the cross-context and cultural comparability of the index in highly food-insecure situations (Deitchler et al., 2010).

Numerous validations around the world have offered encouraging results as to the reliability of the HFIAS. For example, validations conducted in Latin America and sub-Saharan Africa (Melgar-Quinonez et al., 2006; Knueppel et al., 2010) have found that the instrument demonstrated reliability and validity in the local contexts in which it was deployed. A study published in 2009 by Maes et al. (2009) determined that the HFIAS (translated into Amharic) was a valid tool for ascertaining food security among community health volunteers in Addis Ababa, Ethiopia, with high internal consistency. Other validations have also established, however, that cross-cultural and language barriers to comparability may be hard to resolve on a global scale. It is possible that while the HFIAS instrument itself may be deployable in all settings, the interpretation of the results will necessarily need to conform to the specific region or country context (Swindale and Bilinsky, 2006). For example, in the HFIAS conducted by Knueppel et al. in Tanzania, the authors suggest that more cognitive testing should be conducted in order to capture the experience of uncertainty and anxiety over food supply as it exists in Tanzania. They also suggest that more testing of the progression of the scale items within the local context could serve to explain minor inconsistencies in their results.

2.3.6. Coping Strategy Index

The Coping Strategy Index (CSI) is similarly built around a 'behavioral' approach to food security analysis. The motivation for this indicator arises from the recognition that there are several common behavioral responses to food insecurity that are often used for the management of household food shortages. These responses, referred to as coping strategies, are easily observable, making them a simple, cost-effective, and relatively rapid alternative to the collection of data on household food consumption (CARE/WFP, 2003). The CSI is based on the weighted aggregation of information on the severity and frequency of a certain menu of possible coping strategies, developed and assessed based on location-specific assessments and appraisal methods such as focus group discussions. The tool is intended for application (1) in emergency situations to assess the food security situation, (2) for targeting purposes, (3) to serve as an early warning indicator, as well as (4) to monitor the impact of interventions and long-term changes in food security status.

Christiaensen et al. (2000) in their comparative validation of operational food security indicators in Mali in 2000, found that not only did the CSI perform as a reliable indicator of dietary inadequacy, but unlike the dietary diversity index, a weighted CSI was also a good predictor of food vulnerability. Work by Maxwell et al. (1999) compared coping strategy indicators to more conventional measures, including consumption, poverty and nutrition benchmarks, and found that the coping strategy indicators performed most effectively in minimizing the risk of classifying a food-insecure household incorrectly. These indicators were also found to be useful in identifying vulnerabilities and trade-offs made for the acquisition of food, suggesting their use as key complementary measures to the more traditional benchmarks of food security. On the other hand, their penchant for generating false positives creates potential problems, particularly in the context of targeting individuals for food aid in emergency situations.

2.3.7. Food adequacy question

Other, coarser, subjective methods to assess food security such as the food adequacy question (FAQ) have been proposed and implemented in large-scale household surveys. The FAQ is typically worded as follows: "Concerning your food consumption, which of the following is true?" Answers are generally coded as: (1) "more than adequate"; (2) "just adequate"; and, (3) "less than adequate". The advantages of this method lie in its simplicity as well as its ease and rapidity of deployment. Nonetheless, this indicator shares with other subjective indicators the unfortunate characteristic of being particularly likely to capture a series of the respondent's latent characteristics, which renders problematic the comparability of this type of indicator across households/individuals. Carletto and Zezza's exploration of the potential for enriching poverty profiles by combining subjective and objective welfare measures demonstrates this point via their finding that subjective measures of food consumption adequacy and self-assessed health status had the highest impact in predicting the subjective welfare rung in which a respondent placed himself, as a large part of what these variables capture are unobserved personality traits (Carletto and Zezza, 2006).

In terms of validation, the sole study of which we are aware that systematically attempted to validate the use of this question involved four multi-topic household surveys (in Albania, Madagascar, Nepal and Indonesia), and concluded that this indicator is at best poorly correlated with standard quantitative indicators (Migotto et al., 2005). However, a study incorporating simple qualitative questions on food adequacy into integrated household surveys in Jamaica and Nepal found that the implied aggregate poverty measures suggested by their data were in close accordance with the existing measures based on traditional methods, suggesting that further validation efforts in the realm of food security may be warranted (Pradhan and Ravallion, 2000).

2.3.8. Non-food factors

A final set of information that is required in order to obtain a more complete picture of the factors that ultimately result in individual-level food security outcomes concerns the various non-food factors that contribute to determining those outcomes: health and care inputs, feeding practices, and access to basic services such as clean water and sanitation. Most large-scale living standard and health surveys – such as Demographic and Health Surveys (DHS), Multiple Indicators Cluster Survey (MICS), and Living Standard Measurement Study (LSMS) surveys – collect information on these topics with fairly similar approaches. The questionnaires for DHS and MICS have already been standardized to a substantial extent, and comparability would be enhanced if others were to follow their lead in questionnaire design. Some concerted effort may be needed to achieve consensus on a minimum set of questions and indicators that surveys should include, but this task is well within reach, given the existing degree of harmonization and comparability across some of these surveys in this particular domain. An alternative would be to enhance the linkages between DHS and MICS-type surveys, with their extensive and standardized information in these domains, and consumption and other types of integrated surveys. While tried in a few countries with some success, the experience to date has not been particularly encouraging.

3. Survey instruments

There are currently a wide variety of survey instruments that collect information on the various dimensions of food security, with tremendous variation across surveys in the content, quality, and quantity of information collected. To differentiate among these instruments, it is of key importance to consider their varied

suitability for collecting food consumption data. For example, while some surveys routinely collect food consumption data for an extended list of products at the household level, other instruments often limit themselves to the collection of food expenditure data (excluding information on food quantities), while others only collect very limited or no information on food acquisition. As a result of the innate difficulty of collecting full food consumption data in most surveys due to high requirements in terms of time, cost and capacity, household surveys often include abridged consumption modules that focus on the frequency of the consumption of a restricted list of items or items in specific food groups. Thus, while it would be desirable from a food security perspective to have most of these surveys collect food consumption data in a coherent manner, it is unrealistic and likely counterproductive.

That said, for some of these surveys, the collection of food consumption data in a more standardized manner is an important step forward. In fact, supporting improved standards and a more frequent periodicity across consumption surveys would likely revolutionize the measurement and monitoring of worldwide food security, both through types of indicators like the FAO undernourishment figures as well as other estimates such as food consumption, dietary energy and micro-nutrient intakes, and food expenditure shares. Even if collecting consumption data is not an option, survey instruments could still be potential vehicles for measuring a common set of non-consumption measures as part of an agreed suite of indicators to capture the dimensions of food security. Assuming that some agreement could be reached on a common minimum set of indicators, this would require improved coordination among the international actors supporting the various types of data collection initiatives.

To varying degrees and with similarly varying levels of success, countries currently measure food security (or its proxies) using a number of different types of surveys, including, inter alia:

(i) Household Budget Surveys (HBS) and Income and Expenditure Surveys (IES).
(ii) Living Standards Measurement Study (LSMS) and other Multi-Purpose and Integrated Household Surveys (IHS).
(iii) Demographic and Health Surveys (DHS).
(iv) Multiple Indicators Cluster Surveys (MICS).
(v) Comprehensive Food Security and Vulnerability Analysis surveys (CFSVA).
(vi) Welfare Monitoring Surveys (WMS).
(vii) Core Welfare Indicators Surveys (CWIQ).
(viii) 24-Hour Nutrition Surveys (24HNS).

These surveys originated at different points in time, and were conceived with diverse objectives in mind. As such, any modification to better serve the needs of the food security community must take into account the need to maintain the integrity of these original objectives. Nonetheless, it remains worth asking whether the current use of these surveys is synonymous with the best possible use, particularly with regards to food security. While each instrument was created with its own specific agenda, all of the instruments are potentially capable of serving as vehicles for collecting a simple suite of indicators on food security, if these can be agreed upon by the international community. Given this, what is the scope for repurposing these instruments towards the objective of reaching global convergence in food security measurement, while allowing each survey to remain effective with regards to its initial aims? To answer this question, we will explore the incorporation of the various possible indicators described in the previous section into these different surveys, by describing some of the main features of the abovementioned survey instruments within the context of the measurement and monitoring of food security.

For instance, **Household Budget Surveys** and **Income and Expenditure Surveys** are designed and implemented at varying periodicity by national statistical offices in most countries around the world with the primary purpose of collecting expenditure shares information to update the weights of the basket for calculating the Consumer Price Index (CPI). In light of this focus, many HBS, and especially IES, only collect information on the values of food purchased, often exclusively in urban areas. Although initially designed for this purpose, HBS have often been expanded to include additional modules to capture other aspects of the household socioeconomic environment, particularly in less developed countries where budgetary issues are a concern and the need to minimize the fielding of multiple surveys is greater. Large heterogeneity in methodologies also exists; for instance, recording periods vary from country to country, with 7 or 14 days being the most common. A purported advantage of HBS is the high level of disaggregation and standardization of the list of items by following the universal Classification of Individual Consumption by Purpose (COICOP) nomenclature for National Account purposes. The length of the list can surpass 500 separate consumption expenditure items. However, information on food frequency, anthropometrics, and any qualitative components of food security are seldom captured with these instruments, as it goes beyond the original objectives of these surveys, thus limiting their usefulness in capturing a broader set of information on food security beyond food consumption expenditures.

Living Standards Measurement Study surveys were created in the early 1980s with the purpose of measuring poverty and studying household behavior, welfare, and their interaction with government policies. The key objective of LSMS surveys is to capture the determinants of outcomes and linkages among assets, characteristics of households, livelihood sources, and government interventions. Given the multi-purpose nature of the instruments, in addition to full consumption data, information on several other dimensions of food and nutrition security is collected as part of LSMS-type surveys, and further extensions have been considered in many countries. Since its inception over three decades ago, the LSMS team has implemented more than 85 LSMS surveys around the world, and many more have been implemented with technical assistance from the LSMS team or using LSMS methodologies. However, being mostly demand-driven, multi-purpose consumption surveys *à la* LSMS are not collected on a regular basis in most countries, despite the general recommendation for countries to carry out an LSMS survey every 3–5 years. For instance, while 43 of 49 Sub-Saharan African countries have now conducted at least one household consumption expenditure survey, for half of those, the latest survey was carried out more than six years ago.[6] Thus, availability of these consumption surveys on a regular basis is currently a constraining factor for the measurement and monitoring of food security using consumption. More information on the LSMS can be found at http://www.worldbank.org/lsms.

Demographic and Health Surveys are supported by the United States Agency for International Development (USAID), through Macro International, and were designed to collect data on health and other basic demographic and socioeconomic variables for children and women of reproductive age. The first DHS was conducted in 1984, and since then, they have been implemented in more than 80 countries, with more than 210 surveys completed to date. The surveys are generally conducted every 5–10 years, but periodicity differs across countries. Due to their strong focus on child health and nutrition, DHS are a high-quality

[6] http://www.brookings.edu/opinions/2012/0306_contradictions_poverty_numbers_kharas_chandy.aspx.

source of anthropometric measurements and other important indicators on feeding practices, maternal health, water and sanitation conditions, and other central dimensions of food security. However, no information on food consumption patterns, expenditures on food, or food frequency is captured within a standard DHS; traditionally, an asset-based index is used as proxy for welfare. In a few countries, DHS have been successfully combined with other consumption-based surveys; in these few cases, consumption expenditure information is available for the same DHS households. More information on the DHS program can be found at http://www.measuredhs.com.

Multiple Indicators Cluster Surveys are supported by the United Nations Children's Fund (UNICEF), and were originally designed to monitor progress on the goals established at the 1990 World Summit for Children. MICS assess progress on HIV/AIDS and malaria reduction, and have been conducted in 62 countries to date; data are usually collected every 3–5 years in line with different waves of the program. Main topics that are covered include the MDGs, nutrition, child health and mortality, water and sanitation, housing, reproductive health and contraceptive use, literacy, child protection, labor, and domestic violence. As a source of food security data, MICS bear similarities to the DHS, in that they both have a strong focus on children's health, feeding practices and environmental conditions affecting food utilization. MICS also routinely collect anthropometric measurements of children. Traditionally, no consumption information is collected in MICS, although for MICS V (2012–2015), the inclusion of a short consumption module is being considered. More information on the MICS can be found at http://www.childinfo.org/mics.html.

Comprehensive Food Security Vulnerability Analysis surveys are supported by the World Food Programme (WFP) to provide a picture of the food security situation and the vulnerability of households in a given country. The first CFSVA was conducted in 2003, and to date, more than 80 surveys have been conducted worldwide. Primary CFSVA topics include the socioeconomic and environmental context of households, food supplies, markets, livelihoods, coping strategies, nutrition, health, and education. While CFSVA do not collect information on food expenditures or food consumption, they are able to paint a detailed picture of food security within a country by drawing from the various aspects of food security on which data are collected, including food frequency, dietary diversity, and in some instances, anthropometric data. The food frequency information is generally used by WFP to compute a Food Consumption Score to measure household access to food as well as some dimensions of dietary quality. At times, some supplemental qualitative data is also collected to contextualize food security within the country. For more information on the CFSVA, see http://www.wfp.org/food-security/assessments/comprehensive-food-security-vulnerability-analysis.

The **Core Welfare Indicator Questionnaire** survey was originally created by the World Bank, jointly with the United Nations Development Programme (UNDP) and UNICEF, as a way to monitor socioeconomic indicators on a frequent basis on a large sample of households, to allow for finer disaggregation of the analysis at sub-national levels and for welfare quintiles. Information on poverty proxies is generally collected as an alternative to collecting consumption expenditure information, although in recent years consideration has been given in some countries to the inclusion of a consumption module. In order to accelerate the dissemination of analytical results, the questionnaires are in machine-readable formats with automated tabulation plans. While applicable to developing countries at large, to date CWIQ surveys have solely been conducted in a number of Sub-Saharan African countries.

A somewhat similar survey in content is the **Welfare Monitoring Survey**, supported by Statistics Norway in a number of countries and designed to monitor welfare conditions on a frequent basis through the collection of a minimum amount of information necessary for the identification and classification of vulnerable groups of households within a country. The key objective of the WMS is to provide policy-makers with annual household- and community-level information on a relatively large sample of households for policy formulation. WMS are primarily concerned with monitoring select socioeconomic indicators over time and, as they emphasize breadth over depth, they typically collect only partial food consumption data. Anthropometric data as well as other measures of food and nutrition security such as dietary diversity and detailed food expenditures are generally not available.

Finally, **Nutrition Surveys** based on 24-hour recall or direct observation bear mention, as they have long been considered the gold standard in the nutrition community to measure food intake at the household and individual level and contain by far the most rigorous measurement of food and nutrient intake of any of the surveys described here. However, given the prohibitive costs and the significant requirements in terms of skills and expertise, few countries have collected 24HNS on a regular basis, and the surveys do not have the oversight of a systematic centralized system, as do the abovementioned surveys. Striking a further distinction, 24HNS are often implemented on very small, non-representative samples, thereby limiting the ability to extrapolate their results to larger populations. 24HNS generally include a 24-hour dietary recall, health questionnaires, as well as anthropometric measurements, blood pressure measurement, and blood and urine samples, as well as information on the household environment and feeding practices.

In summary, a number of household survey initiatives are potentially available for improving our ability to monitor food security on a global level at an acceptable periodicity. The predisposition of each instrument – and the propensity of the sponsoring agencies – for collecting information both on consumption expenditure and other possible indicators varies considerably, but there are obvious gains from improved coordination in the collection of a few indicators. Given this, how can countries, supported by the international community, move towards repurposing some of these instruments to provide better value added in terms of food and nutrition security measurement? What could be the components of a strategy that moves us closer to creating an agreed core set of food security indicators to be collected by a larger number of countries on a more frequent basis? In the next section, we outline the foundation of a possible way forward.

4. Mainstreaming food security indicators into existing household surveys

No single indicator will ever be able to fully capture food security, just as no single survey will ever be able to collect all needed indicators at the correct periodicity. To compound the problem, no single institution has either the mandate or the ability to measure and monitor food security in its many dimensions on a global scale. Recognizing the magnitude of these issues, in addition to the low capacity and scarce resources of developing countries' agencies in charge of data collection, it is imperative to devise a multi-pronged strategy that relies on coordination at the institutional level, coherence and rigor at the technical level, and methodological improvements in the measurement adopted. The targets of the strategy should combine quick wins in the short-term (1–3 years) based on existing knowledge, with a more ambitious long-term agenda (4–10 years) aimed at both improving the information base and harmonizing methods for monitoring food security worldwide.

In terms of **short-term** improvements, a consensus emerged at the International Scientific Symposium on Food & Nutrition

Security Information (held in Rome, Italy, January 2012) on the desirability of a coordinated approach, where different agencies would ideally focus on a core set of common indicators while also simultaneously collecting their agency-specific items of interest. The viability of repurposing existing surveys in this way will depend on the extent of the required changes in each survey as well as the institutional commitment of the key individual players. However, in the short-term, the first steps towards this goal would be to (1) agree upon a set of small modifications to be made to the existing instruments, and (2) define appropriate methodologies in terms of sampling, survey design, indicators and analytical applications. While many inter-agency differences may still persist – for instance, in terms of the level of geographic representativeness of the different survey samples – at a minimum, such data collection efforts should be based on nationally representative probability samples, with finer spatial resolution pursued when feasible.

With regards to common indicators that could be standardized across existing surveys, one quick win would be to systematically include the collection of child anthropometric measurement into these survey instruments. Although the effort that would be involved in the appropriate training of large teams of enumerators (often with little or no prior experience in taking anthropometric measurement of small children) should not be underestimated, it is nonetheless likely to be feasible in most contexts. Furthermore, if the inclusion of child anthropometric measurement in existing surveys were to become standardized, it would then be relatively straightforward to incorporate anthropometric measurements of adults in a more systematic manner at little additional cost.

While collecting full consumption data is not an option, another short-term task could be the inclusion of a measure of dietary diversity with the intention of capturing some aspects of dietary adequacy as well as quality. Although no consensus yet exists on the 'gold standard' of dietary diversity indicators, selecting a single indicator and applying it consistently across surveys with a standard protocol would be a notable improvement over the current state of affairs.

There are also a number of quick wins towards improving consumption measurement that could easily be attained by making small changes to the existing HBS/IES and IHS/LSMS-type surveys. For instance, improvements in the treatment and conversion of non-standard units and crop conditions could bring about significant improvements at relatively little cost; the majority of surveys do not currently obtain this information. The systematic collection of quantities in all consumption surveys, including HBS, would also encourage the use of existing consumption surveys for food security purposes. The adoption of new technologies such as Computer Assisted Personal Interviewing (CAPI) in the collection of food consumption data has also proved to be a very valuable tool in improving data quality and reliability of consumption estimates (Caeyers et al., 2011). Finally, although not cost-neutral, increased frequency of the collection of food consumption data (i.e., at two or more points in time in the course of a year) would result in improved annualized aggregates, enhanced understanding of seasonality in consumption, and more precise identification of periods of higher vulnerability.

Aside from incorporating lessons learned from existing knowledge on food security in the short term, the international community must simultaneously undertake a more ambitious **long-term** agenda, aimed at expanding our understanding of food security measurement by establishing a empirically sound suite of indicators obtained from household surveys with which to capture the various dimensions of food security.

The multidimensional nature of food insecurity is in many ways akin to that of the concept of poverty, suggesting that lessons from the poverty measurement debate can be of use to our purposes in the food security domain. For instance, a common dilemma when dealing with the measurement of multidimensional concepts concerns the decision between composite indicators and one-dimensional indexes that look at specific features independently of the others. In the poverty debate, the more prominent expression of the two families of indicators are respectively the global income poverty data published regularly by the World Bank (Chen and Ravallion, 2012) and the Multidimensional Poverty Index (MPI) now included in UNDP's Human Development Report (Alkire and Santos, 2010; UNDP, 2010). To overcome the aggregation problems of composite indicators, while seeking to retain information on the multiple dimensions, Ravallion (2011) recently suggested the use of a 'dashboard' of the best possible indicator for each dimension. Ferreira and Lugo (2012) have proposed ways to reconcile this dichotomy by using three possible techniques (i.e., multivariate stochastic dominance, direct representation of the dependency structure, and copula functions) to account for each dimension independently, as well as for the interactions among them, thus exploiting desirable features of both composite and simple indicators while avoiding explicit or implicit value judgments about the trade-offs across dimensions.[7]

Interestingly, a similar debate has not taken place within the food security camp, where instead the concept of a suite of indicators (which has clear similarities to the 'dashboard approach') is much more widely shared among practitioners. In this respect, we expect that reaching a consensus on a food security dashboard (or suite) should prove to be more straightforward than in the case of poverty measurement, where the two camps are more polarized and the exchanges much more heated.

In moving towards establishing a suite of indicators, however, the food security measurement debate can learn from the poverty debate in permitting less than annual periodicity and less than global coverage as goals for a global monitoring system. FAO's mandate to produce annual global numbers for nearly all member countries has greatly constrained the agency's room to maneuver in selecting the type of data on which to base its estimates (unlike household surveys, Food Balance Sheets are available every year). In moving towards greater reliance on household surveys, it would be useful to consider the possibility of producing estimates that are not based on universal coverage and that are produced less frequently, while at the same time keeping in mind the need for complementary worldwide systems to contend with crises on a global scale.

Ultimately, the key to creating an empirically sound suite of indicators will involve conducting innovative methodological research towards the validation of selected indicators, including food consumption. Existing knowledge gaps must be addressed by systematically validating alternative methods and types of food security indicators across countries and contexts. This will require coordination across the various relevant agencies to ensure the validation of food security indicators against benchmark measures in a systematic manner; past trends of ad-hoc, haphazard research ought to be replaced by a well-planned, multi-agency coordinated effort to establish a core set of empirically valid indicators, with a renewed focus on improving food consumption measures.

As part of this process, due consideration must also be given to emerging issues. For example, as countries develop and urbanize, processed food consumed away from home comprises an increased share of individual diet. The proper quantification of these amounts, both in terms of values and caloric content, presents a major challenge from a measurement standpoint.

[7] Ferreira and Lugo (2012) also provide a useful, succinct, and up-to-date account of the multidimensional poverty indexes debate.

Nonetheless, it is increasingly necessary for this information to be incorporated into surveys in order to generate an accurate picture of household- and individual-level food consumption.

It is admittedly facile to call for international multi-agency coordination of these efforts without presenting concrete steps for creating a forum where such coordination could occur. However, from an institutional perspective, there are in fact a number of new initiatives that could provide a logical platform for moving the agenda forward on these issues. One such initiative is the recent creation of a new Inter-Agency Expert Group (IEG) on Food Security, Sustainable Agriculture and Rural Development, mandated by the United Nations Statistical Commission to work towards the improvement of food security measures, among a number of other issues. In light of the broad mandate of the IEG, the formation of a smaller technical team specifically mandated to conduct methodological research exclusively on food security measurement should be pursued, in order to deliver on that specific task.

Another key initiative linked to the IEG is the Global Strategy to Improve Agricultural and Rural Statistics, endorsed by the United Nations Statistical Commission in February 2010. The Implementation Plan of the Global Strategy calls for the development and testing of improved food security indicators, which directly aligns with the long-term agenda of achieving a comprehensive suite of reliable indicators with which to effectively measure food security. One of the intended foci of the Implementation Plan in the area of food security is on improving the Food Balance Sheet data towards the refinement of the FAO hunger estimates; however, household surveys also have a greater role to play in the revised methodology.

In considering the impact that an international multi-agency effort could have on the state of food security measurement on a global scale, it is useful to consider bear in mind that the most widely cited poverty indicator, the World Bank's $1-a-day poverty headcount, benefited greatly from the support of a generation of household surveys supported by the LSMS program. The LSMS surveys were deliberately launched to fill a perceived gap in household-level data on poverty and the progress towards its eradication; a similar degree of investment in both methodological development and data collection efforts is necessary if food security measurement is to realize similar strides in coverage, acceptance, and credibility. Given the current intensity of international attention to food security issues, the time is ripe to take advantage of the international initiatives mentioned above, or similar efforts, to direct concerted intellectual and financial resources towards improving the availability and quality of methods and data on household food security around the world.

5. Conclusion

The discussion in this paper has attempted to identify the elements of a strategy, built around a combination of short-term fixes and long-term methodological advancements, to reverse the existing trends of poor coordination and slow methodological innovation in food security measurement and monitoring. The focus on a small dashboard of indicators, collected on a regular basis by different stakeholders and through a number of available data collection options, is unquestionably feasible if agencies are able to reach a consensus to systematically pursue this objective. The poverty literature on multidimensionality remains a useful reference point for selecting different indicators and considering issues of aggregation across indicators. Existing household surveys can be to some extent repurposed to better suit food security goals, and improved harmonization across instruments can provide the necessary standardization across countries and over time to ensure the establishment and preservation of a minimum common denominator with which we can move forward. It should be clear from the exposition that instead of a one-size-fits-all type of instrument, our ultimate objective in this paper has been to instead advocate for the establishment of a protocol to which key players may adhere, while continuing to simultaneously obtain the data necessary to meet their agency-specific data requirements.

Lastly, it is essential to re-emphasize that while the focus of this paper has been on household surveys, they are by no means the sole vehicle with which the monitoring and measurement of household food security can be improved. Household surveys, particularly complex surveys like the LSMS and HBS, do have potential drawbacks, such as the time required for the collection of survey data, as well as common delays in the production of results. While new technologies such as mobile phones and CAPI can significantly reduce the time required for data processing, it is also necessary to invest further in real-time instruments such as sentinel site surveillance systems that can allow us to track the evolution of multiple food security indicators around the world (Barrett, 2010). Above all, it is worth recognizing that there is no silver bullet that has the potential to truly resolve international food security measurement issues, beyond the commitment of various international stakeholders to coordinate with one another towards the achievement of a common goal. By 2015, it is our hope that the international community will be able to declare the accomplishment of the 1st MDG, by credibly announcing that within the previous 25 years, humanity has indeed halved the proportion of people suffering from hunger worldwide.

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