

# Food counts - Measuring food consumption and expenditures in household surveys

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DOI: 10.1481/icasVII.2016.b10d

## ABSTRACT

The objective of this paper is to summarize a set of state-of-the art analyses of the key issues involved in the measurement of food consumption in national household surveys. Food consumption data from household surveys are possibly the single most important source of information on poverty, food security, and nutrition outcomes at national, sub-national and household level, and contribute major building blocks to global efforts to monitor progress towards the major international development goals. This objective is achieved through a series of case studies from a diverse set of countries--including developing countries, the OECD, Canada and the U.S.--addressing the main outstanding research issues as identified by a recent assessment of 100 existing surveys (Smith et al., 2013). The individual research papers examine, both theoretically and empirically, how survey design options affect the quality of the data collected and, in turn, the implications of those options for statistical inference and policy analysis.

**Keywords:** Food Consumption; Household Surveys; Survey Methods

## PAPER

### 1. Background and justification

Food constitutes a core component of a number of fundamental, broad-based welfare indicators, such as food security, nutrition, health, and poverty. It makes up the largest share of total household expenditure in low-income countries, on average accounting for about 50% of the household budget (USDA, 2011). Low levels of access to food was an important factor contributing to the estimated 850 million individuals who were chronically undernourished in 2012-14 (FAO, 2014). Proper measurement of food consumption is therefore central to the assessment and monitoring of the well-being of any population, and therefore is of interest to multiple international, national, and local agencies, and to several development domains – social, economic, and human. Data on food consumption are needed, for example, to monitor the achievement of the United Nations' First Millennium Development Goal, to eradicate extreme poverty and hunger, and may play an even greater role in monitoring the ambitious post-2015 sustainable development agenda. Similarly, its measurement is crucial to assess and guide FAO's mandate to eradicate hunger, food insecurity and malnutrition, as well as the World Bank's twin goals of eliminating extreme poverty and boosting shared prosperity. Sound food consumption data is also required by national and local governments, as well as non-governmental organizations, to guide their local and regional analysis, programming and policymaking. The lack of food consumption data or its mis-measurement may result in the mis-allocation of funding and may compromise the design, monitoring and evaluation of programs or policies.

The last two decades has witnessed unprecedented progress in the production and dissemination of household consumption and expenditure data across the developing world. In 1990, the World Development Report published by the World Bank was based on data from only 22 countries, and no country had more than one survey. Today there are 125 countries with consumption or expenditure information, and many of them have multiple surveys, adding to a total of more than 850 surveys (Ravallion and Chen, 2011). The number of countries with no poverty data over a 10 year period declined from 33 percent to 19 percent since the 1990s, whereas the share of countries with 3 or more data points over a 10 year period increased from 27 to 41 percent over the same period (Serajuddin et al., 2015).

Depending on their primary objective, the surveys collecting information on household consumption or expenditure take different forms, including Household Budget Surveys (HBS), Income and Expenditure Surveys (IES), or multi-purpose' or integrated' household surveys, like the Living Standards Measurement Study surveys. We refer to this family of surveys, which are usually nationally and sub-nationally representative, as Household Consumption and Expenditure Surveys (HCES).

While the variety of HCES purposes naturally translates into different designs, the dramatic increase in the number of household surveys in developing countries has been associated with a proliferation of approaches and methods used in the collection of food data that is not only due to their different purposes or country-specific considerations. While there exist international guidelines and recommendations for the design and implementation of each of the distinct types of HCES surveys, they are specific to each type of survey, are generally not prescriptive, lack coherency and usually leave much flexibility to national survey statisticians. Consequently, we observe heterogeneity in methods, even within the same type of survey, both across countries, as well as within countries over time.

The notion that survey design matters is not new, as the work of Mahalanobis and Sen (1954) and Neter and Waksberg (1964) more than half a century ago testifies. Despite the fact that consumer spending plays a central role shaping a variety of key economic behaviors—savings, earning processes, insurance, responding to shocks and tax policies among others (Browning et al. 2014)—the issue has traditionally been largely neglected by economists. The longstanding relative neglect of food consumption metrics has also contributed to the lack of guidelines and has been another source of the proliferation of variability in HCES questionnaire design, data collection methods and data processing practices. The lack of coherence is the outcome of limited and inadequate guidance, the lack of a body of conceptual, theoretical and empirical literature, including the lack of empirical examples of the tradeoffs involved in alternative available survey design options. In combination with the low level of funding that most low- and middle-income countries' national statistical organizations—which are the HCES implementing agencies of—have experienced over the past two decades, this confluence of factors has trapped many countries in a vicious cycle of statistical underdevelopment and underperformance which manifest themselves in many ways (Kiregyera 2014: 2). This situation is not unique to HCES: it is part of a broader, national statistics for development problem that has attracted increasing attention in recent years (Jerven 2013), and has spawned growing recognition of the need for a global strategy for improving statistics. This is encouraging. It makes for a more enabling environment for introducing change, suggesting the timing is good and the prospects for addressing common roots of these problems are promising. To date, much of the focus has been on agricultural and rural statistics (FAO 2010; World Bank, et al., 2011). While it is clear that there is a great deal of overlap between food and agriculture issues (Carletto et al., 2015), there remains a longstanding past due and increasingly urgent need to more directly address food consumption issues per se (Herforth & Hoberg 2014, Fiedler et al., 2012).

In recent years there has been a surge of interest in the measurement of household expenditure. Most of this interest has been generated by two factors: a) increasing evidence that changes in survey instruments over space and time compromise our ability to draw inferences and conduct trend analysis, and b) the persistent fall in the quality of Consumer Expenditure Surveys; particularly that related to under-reporting in developed countries. These concerns prompted two recent assessments of the current state of measurement of household expenditures. One, initiated by the U.S. Bureau of Labor Statistics with the aim of producing recommendations for re-designing the U.S. Consumer Expenditure Survey, was undertaken by an expert panel formed by the National Research Council's Committee on National Statistics (Natl. Res. Council., 2013). The second was the 2011 Conference on Research in Income and Wealth sponsored by the National Bureau of Economic Research, which focused on improving the measurement of consumer expenditures (Carroll et al, 2014). However, these initiatives were restricted to developed countries, only focus on total household expenditure - as opposed to food expenditure, and focus primarily on one particular type of survey - HBSs. Nevertheless, they provided useful lessons for all countries: they further demonstrated the enormous heterogeneity in methods and the growing urgency of a strategy, or at minimum criteria, for guiding countries through the diverse, oftentimes conflictive available possible approaches, while calling attention to the limited consensus as to how best to collect these data, and renewing the call for more research in these areas.

With respect to evidence from developing countries, Deaton and Grosh (2000) provided a comprehensive review of the issues and data needs for the measurement of consumption in household surveys, drawing on the lessons derived from LSMS surveys. The bulk of that work is now more than 20 years old. Since then a few other papers have analyzed the implications of particular aspects of survey design on total expenditures, poverty and inequality measures. For example, Jolliffe (2001) and Pradhan (2001) evaluate the impact of varying the length of the consumption list in El Salvador and Indonesia respectively; Gibson et al (2003) look at the effect of changing the length of the data collection period for the case of China; Beegle et al (2012) compare results from 8 questionnaire designs which include variations in methods of data capture, level of respondent, length of reference period, number of items in the recall list, and the nature of the cognitive task required of the respondent; and Backiny-Yetna et al (2014) compare different data collection methods, which include 7-day recall period, a 7-day diary, and a usual month'.

There is arguably a need for more systematic research on some topics before a general consensus about best practices on the collection of food consumption or expenditure data in household surveys can be derived. While the lack of broadly accepted practices affects all aspects of household consumption or expenditures, it is particularly pronounced in the case of food consumption: not only because there exist few papers that focus explicitly on food (e.g. the work by Backiny-Yetna et al, 2014), but also because the research has almost exclusively looked at only mean expenditures, and poverty or inequality measures.

The impact of survey design on other moments of the distribution is less-well understood, and as mentioned before, with increasing interest in using the data to analyze other dimensions of well-being, such as food security, health, diet quality, nutrition and the agriculture-nutrition nexus, which has given rise to the need for additional, more detailed information, The increased availability of HCES has sparked the use of these surveys in ways not conceived of when they were first designed. While some HCES—such as LSMS—were originally designed to be multi-purpose, others, such as HBSs, were originally more narrowly focused. HBS, for instance, originally had the clear goal of collecting the data necessary to (1) define and update the basket of commodities for the Consumer Price Index (CPI), (2) measure household consumption for the System of National Accounts (SNA), and, in some cases, (3) define the country's poverty line in order to track the living standards of the population, study the determinants of poverty and of other dimensions and dynamics of well-being, and to better understand public program coverage, participation and impacts. As they and other HCES have morphed into or become more multi-topic surveys, they have collected additional data. In some cases they have been modified to provide a more comprehensive picture of the household and, in some cases, of the individual household members' characteristics. While still collecting the consumption data required to comply with their original mandate to measure economic conditions, poverty and inequality, they have come to collect more information on a wider array of topics, such as housing conditions, education, health, assets/wealth, employment, and income, among others. Moreover, as the data are being increasingly re-purposed by new stakeholders with altogether new interests, they have brought with them demands for altogether new types of data and new approaches to the surveys. HCES are now being used to for a host of new food consumption and nutrition-related analyses, which they were never intended to support. Among these new applications are the use of HCES to conduct subnational food security analysis, compile subnational food balance sheets; assess diet quality and dietary change (Monteiro et al., 1994; Nascimento et al., 2011; Levy et al., 2012, Coates 2013); analyze the relationship between household food expenditure and malnutrition (Campbell et al., 2010); estimate sodium intakes (Sarno et al., 2009); identify and monitor overweight and obesity (Kolodinsky & Goldstein 2011; Lobato 2009); to measure nutrient availability or proxy nutrient intakes (Pérez-Cueto et al., 2006; Bermudez et al., 2012; Fiedler & Helleranta 2010; Fiedler et al., 2012; Fiedler et al., 2013a; Fiedler et al., 2013b; Fiedler et al., 2013c; Fiedler et al., 2014a; Fiedler et al., 2014b; Fiedler & Lividini, 2014; Fiedler 2014); assess the adequacy of availability of fruits and vegetables to meet global health needs (Siegel et al., 2014); identify the most common food sources of specific nutrients (Bermudez et al., 2012; Fiedler et al., 2013a); to identify the number, percentage and location of households that acquire fortified or fortifiable foods, and model the impact of fortification programs (Fiedler & Afidra 2010; Nascimento et al, 2011; Marchioni et al, 2011; Claro & Monteiro 2010; Levy et al. 2012; Levy et al, 2009 Bermudez et al., 2012; Fiedler & Helleranta 2010; Fiedler et al., 2012; Fiedler et al., 2013a; Fiedler et al., 2013b; Fiedler et al., 2013c; Fiedler et al., 2014a; Fiedler et al., 2014b; Fiedler & Lividini, 2014; Fiedler 2014; Ricciuto et al., 2007; Beatty 2008; Kirckpatrick & Tarasuk 2008; Monteiro et al., 2000; Mondini & Monteiro 1994); to model the impact of biofortification programs (Fiedler et al., 2013; Fiedler & Lividini 2014; Lividini & Fiedler 2015; Fiedler & Lividini 2015), as well as to conduct feasibility and cost-benefit analyses of individual fortification, biofortification and supplementation programs, as well as of portfolios of combinations of programs (Fiedler et al., 2013; Fiedler & Lividini 2014).

This blossoming of the use of HCES to address food and nutrition issues reflects the intersection of three sets of events: (1) the growth in evidence-based policy, (2) the fact that food and nutrition issues have been at center-stage in international development for the past decade, and (3) the fact that there has long been a dearth of nationally representative dietary assessment studies which has severely constrained the nutrition evidence base and has throttled global progress in improving nutrition. Despite various shortcomings, household consumption and expenditures surveys (HCES) are increasingly being used to address the food and nutrition information gap because they contain a wealth of information about food acquisition and consumption; are being done with increasing frequency in an increasing number of countries (Serajuddin, 2015); have large samples; are statistically representative at subnational levels; and are much less costly than other dietary assessment data sources because these multi-purpose surveys are already being conducted and paid for by other government agencies (Fiedler 2013).

While there has been a surge of interest and HCES analyses of nutrition and food security issues, the potential of this particular type of repurposing of HCES has yet to be realized for several reasons. First, there is a lack of awareness of public nutritionists and food policy analysts about what these data contain. Second, there is a need for further research and action to improve the quality and utility of these data. To date, the nutrition community's HCES-related role has been overwhelmingly that of a passive user of HCES data from surveys that have already been conducted. Many HCES shortcomings, however, stem from design and implementation issues. If the nutrition community—with its unique skills and experiences—were to get more proactively involved in the design, implementation and analyses of HCES, they could be strengthened substantially as a tool for evidence-based food and nutrition programming and policymaking. At the heart of this Special Issue of Food Policy is the distillation of what we currently know about household survey design, the identification of better practices, the presentation of original, state-of-the-art research addressing the key methodological agenda items involved in strengthening HCES, which were recently identified in a review of 100 HCES (Smith et al., 2013). These are essential next steps to build global momentum and global consensus to enable exploiting this unique, shared, golden opportunity to re-purpose HCES and enable their better fulfilling this role, while at the same time

making public nutritionists and food policy analysts more aware of what HCES have to offer.

A majority of the papers to be included in this Special Issue were initially prepared for a workshop jointly organized by FAO and the World Bank in Rome in November, 2014. They reflect a diversity of disciplinary approaches (statistics, economics, nutrition, food security analysis), and broad geographical coverage (with studies from African, Asian, Latina American and OECD countries – EC, US, Canada).

The main commonality linking the studies in the Special Issue is that they look at alternative or new methods from existing datasets, sometimes purposely collected for methodological studies, in order to identify the implication of survey design for measurement and analysis, and to translate those into recommendations for scalable approaches for future survey design.

The start of this work program was preceded and to some extent sparked by a desk review of the reliability and relevance of the food data collected in national household consumption and expenditure surveys, which was jointly led by the International Household Survey Network (IHSN), FAO and the World Bank (Smith et al, 2013). That assessment identified the multiple purposes these household surveys serve, proposed a method to assess the reliability and relevance of survey questions, and applied the method to 100 household surveys from low- and middle-income countries, a sample that resulted from selecting the most recent nationally representative household survey from each developing country, with the only condition of having enough documentation. The assessment points to many areas where survey design and questionnaires can be significantly improved, among which five were selected as key themes for the Rome workshop and this Special Issue. They are the following:

- Measuring food acquisition versus measuring food consumption. The term food consumption is interpreted in many ways. For the economists it is the amount of money spent to acquire food; for the food security analysts, it is the amount of food available for consumption; while for the nutritionists it is the amount of food actually eaten. Food data were initially collected in HCES simply to construct the consumer price indices or to inform national accounts. Therefore, the food data collected referred primarily to items acquired through purchase by the household during the reference period. Over the years, food items procured through own-production, barter, gifts and payment-in-kind were introduced into these surveys to better apprehend food acquisition in rural areas. These surveys aimed at capturing food that was acquired by the household in order to be consumed. However, with time, surveys have been also focusing on food items actually consumed by the household and the various sources from which food was acquired (purchases, own-production or gifts). Papers in the volume will address issues related to the differences between food data collected in acquisition type versus consumption type surveys and the use of these data to conduct specific analysis on consumer behavior.
- Measuring Individual vs Household Consumption. The food consumption/expenditure modules of household consumption and expenditure surveys (HCES) capture household, but not individual, level information. Yet, food and nutrition policies and programs often require information about which foods and nutrients are consumed by which groups of individuals, and in what quantity. While individual dietary intake data are often more appropriate for meeting these information needs, HCES are more widely available and conducted more regularly than individual-level dietary assessments. Furthermore, most dietary surveys do not assess the intake of all household members, making it difficult to plan programs, such as fortification programs, that are intended to benefit more than just one type of target individual. Until individual-level dietary data collection becomes routinely available, understanding whether and how household-level data can be used to approximate actual individual food and nutrient consumption is a worthwhile undertaking. Some of the papers in the volume will assess methodologies for deriving individual level estimates from household data.
- Recall and reference periods: benefits of bounding recall, and impact of length of recall periods on recall quality and telescoping. Nutritionists favor shorter recall periods (e.g. 24-hour recall) whereas expenditure surveys commonly use recall of 1 week or more. The impacts of recall period decisions on the quality of the data for different uses are far from being fully understood, and some of the papers in the volume will address some of the questions related to that. To assess usual consumption, how many times should data be collected from households and for what observation or reference period? What difference will extending reference periods and conducting repeat visits actually make to estimates of poverty and nutrient insufficiencies?
- Food consumed away from home (FAFH) and cooked/packaged meals. FAFH and prepared foods represent an increasing share of food consumption, and will continue to do so as GDP per person grows, and food systems evolve. This is an area where many surveys could improve, but where evidence on the robustness of alternative methods is weakest. A sub-set of the papers in this volume will look at the implication and methods for capturing FAFH, whether eaten in commercial or public establishments (e.g. restaurant, schools).
- Length and specificity of survey food lists. For many analytical purposes survey food lists need to be sufficiently detailed to accurately capture consumption of all major food groups making up the human diet. There are trade-offs in the decisions involved with coming up with a survey food lists of the 'optimal'

length and specificity, that are not well understood. Some of the papers in the volume will attempt to provide evidence to help survey design practitioners and analysts address those concerns, and highlight the implications for policy analysis.

## 2. Research findings

The key aspects of the special issue are as follows:

1. The special issue brings together a collection of empirical studies on the implications of different survey design options for the measurement and estimation of different indicators and parameters of crucial importance to several development domains. The data used in these studies include nationally-representative data and detailed case studies across a range of countries from several of the main developing regions, as well as from developed countries. The results of the study will therefore be of interest to a global audience.
2. The special issue confronts the issue of survey design prioritized by a major international review, thus responding to the research needs and priorities reflecting the shared concerns of the main international experts on the topic. In addressing those concerns, the special issue will draw on expertise from a range of disciplines and institutional backgrounds, mirroring the diverse readership of Food Policy.
3. All the papers in the special issue have now been received and the findings will be summarized in the final version of this papers when it is submitted by the deadline of July 15.

**Table 1 - List of papers**

Lead author and paper	Country
1. Jed Friedman (World Bank): <i>The nature of food consumption reporting error in survey: evidence from a randomized experiment in Tanzania</i>	Tanzania
2. Celeste Sununtnasuk (IFPRI), <i>Assessing the adequacy of the Adult Male Equivalent in estimating the intrahousehold distribution of energy and nutrients: Evidence from the 2011-2012 Bangladesh Integrated Household Survey</i>	Bangladesh
3. Reina Engle-Stone ( UC Davis): <i>Investigating the Significance of the Recall Period of Household Consumption and Expenditures Surveys for Food and Nutrition Policymaking</i>	Bangladesh
4. Nathalie Troubat (FAO): <i>Impact of survey design in the estimation of habitual food consumption of Mongolian urban households</i>	Mongolia
5. Mark Denbaly (USDA-ERS): <i>Lessons Learned from the National Household Food Purchase and Acquisition Survey (FoodAPS)</i>	USA
6. Renos Vakis (World Bank): <i>What's in the Meal? Improving Measurement of Food Away from Home and Poverty in Peru</i>	Peru
7. Carlo Cafiero (FAO): <i>National food security assessment through the analysis of household surveys food consumption data: the case of Brazil's Pesquisa de Orçamento Familiares 2008/09</i>	Brazil
8. Jennifer Coates (Tufts) - <i>Estimating Individual Consumption from Household Consumption and Expenditure Survey Data for Nutrition Programming Decisions</i>	Ethiopia and Bangladesh
9. Thomas Crossley (University of Essex and Institute of Fiscal Studies, UK): <i>A Comparison of Recall and Diary Food Expenditure Data</i>	Canada
10. Maria Laura Louzada (University of Sao Paulo): <i>Assessing the consumption of ultra-processed foods through household food acquisition and individual food intake data: evidence from Brazil</i>	Brazil
11. Jack Fiedler (IFPRI): <i>Developing the Agenda for Strengthening Household Consumption and Expenditure Surveys: How Important are Meals Away from Home and Numbers of Partakers?</i>	India, Nigeria, Bangladesh
12. Prosper Backiny-Yetna (World Bank): <i>The Impact of Household Food Consumption Data Collection Methods on Poverty and Inequality Measures in Niger</i>	Niger

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(all Caps, character 14 pt, bold, adjust Left) 2 lines space 12 pt between last session and references The second line of a reference has 0,5 cm indent.

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