



Impact of survey design in the estimation of habitual food consumption A study based on urban households of Mongolia



Nathalie Troubat*, Klaus Grünberger

FAO Statistics Division, Viale delle Terme di Caracalla, 00153 Rome, Italy

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ABSTRACT

This paper evaluates the impact of survey design on food consumption measurement using data from the Mongolia Household Socio-Economic Survey (MSES) 2007–2008. We exploit the fact that the MSES uses a diversified approach to collect food data by measuring consumption, acquisition and stocks using both, diaries and recall interviews. First, we estimate the effect of diary length on reporting of food consumption, finding a significant decrease of reported food over time. We conclude that shorter diaries would increase the quality of estimates and lower the costs of inquiry. Second, we show that recall interviews, combined with a measurement of stocks, perform well in measuring household food consumption compared to diaries. Third, we find cyclical variation in food consumption and acquisition not only between months, but also within months and weeks. Especially for food acquisition, we detect large difference within months, which can lead to biased estimates of food acquisition. This highlights the need for enumeration to be spread over time to overcome cyclicity on food acquisition and consumption.

1. Introduction

Household Consumption and Expenditure Surveys¹ (HCES) have been primarily designed to collect information on the value of the food acquired in order to better assess poverty or update food consumer prices. In many of these surveys information on the physical quantities of the food consumed by the households is also reported. This information, if correctly captured, can serve various purposes other than monitoring poverty. Most nutritionists regard 24-hour recall or observed-weighed food intake record data as ideal instruments for measuring food consumption. However, such surveys are infrequently available at national level in low-income countries because they are relatively expensive, difficult to implement and considerably prone to measurement errors (Fiedler et al., 2012a). HCES collecting food data represent therefore a valid opportunity to measure food consumption.

Considerable differences exist across HCES in survey design which is reflected in variability in food data quality and makes them at times unsuitable for conducting relevant analyses (Fiedler et al., 2012b). A recent study (Smith et al., 2014) found that of 100 HCES conducted over the last twenty years, only 13% were considered reliable enough to conduct food security or nutrition analysis. The study also revealed that survey design and questionnaires differed substantially across countries

and over time. Cost is the main constraint when designing a survey. Diaries are considered to be more cost intensive, but more accurate than recall interviews if well implemented. The cost of a survey is also a function of the frequency of field staff visits. The influence of the length of the enumeration period on the measurement quality is also a widely discussed topic. On the one hand, an increasing length of the enumeration period widens the time coverage of the survey, and therefore potentially enriches the information collected. On the other hand, it also increases various sources of bias, such as memory lapse for recall interviews and decreases filling rates of diaries due to fatigue. In order to provide survey practitioners with guidance for designing a high-quality, cost-effective survey, it is crucial to understand better how data collection influences the quality of the food consumption measurement.

In this paper we will address this question using data on food acquisition and consumption collected in the 2007/08 Household Socio-Economic Survey of Mongolia (MSES). In the MSES, different data collection approaches are used to survey food data in urban areas. We exploit the variation in data collection methods to analyze the impact of the type of enumeration on food consumption measurement. Using the food data collected through three consecutive diaries of ten days we apply an econometric model to estimate how households change their reporting of food consumption from one diary to another in order to

* Corresponding author.

E-mail address: nathalie.troubat@fao.org (N. Troubat).

¹ The expression Household Consumption and Expenditure Survey is generic and refers to all national sample surveys conducted in the country and collecting information on food consumption in values and quantities as well as household socio economic indicators.

evaluate potential quality loss of diaries over time due to respondents' fatigue. We also evaluate the importance of cyclical variation of food consumption between months, within months and between weekdays. From the food data collected through the diary and the recall interview methods we look at the differences between the two methods on the food consumption measurement. An additional feature of the MSES is that it collects data not only on food consumption, but also on acquisition and stocks. This information represents a unique opportunity to assess not only the differences between food consumption and food acquisition but also the impact on variability in the two distributions.

The paper is structured as follows: Section 2 discusses previous findings in the literature. Section 3 presents the details of the MSES. Section 4 analyzes food consumption data from diaries. In Section 5 we evaluate the performance of recall interviews in measuring food consumption by comparing them with food consumption data from diaries. In Section 6 we evaluate the impact of stocks on food measurement by comparing mean dietary energy consumption and coefficients of variation derived from food acquisition and consumption. The main conclusions are discussed in the final section.

2. Previous findings

Measuring food consumption using diaries is generally regarded as more reliable, but also more costly than using the recall method (Fiedler et al., 2012b). Comparing 12 Sub-Saharan surveys based on diaries or recall method, Smith et al. (2006) find that diaries measure a higher number of food groups consumed per household and provide better estimates of diet diversity. Gibson (2002) reports that in urban Papua New Guinea food consumption measured by diaries is 26% higher than using the recall method. Nonetheless, cases of Canada, Tanzania and South Africa question the latter finding, reporting equal or higher estimates of recall surveys (Brzozowski et al., this issue; Beegle et al., 2012; Statistics South Africa, 2008). Brzozowski et al. (this issue) find that average food expenditure reported in diaries of Canadian households decreases by 10% from the first to the second week of diary, attributing this decrease to respondent's fatigue in filling the diary. The effect of diary fatigue has been also documented in earlier studies (McWhinney and Champion, 1974; Stephens, 2003).

Another important aspect of survey design is the difference between the measurement of food consumption and food acquisition. Smith et al. (2006) provides a general discussion of the difference between estimates of consumption and acquisition. The distribution of acquired food is expected to have a higher variance and a higher mean than the distribution of consumption. The variance of acquisition surveys is higher, because daily food consumption is smoother than acquisition. During the reference period, households can either consume from stocks (under-estimating household consumption) or build stocks (over-estimating consumption). As a consequence, many households can have zero expenditure, albeit consuming from stocks (Gibson and Kim, 2012). Acquisition surveys are used to approximate aggregated consumption of population groups, rather than habitual consumption of single households. Acquisition data are anticipated to have a higher mean than consumption, because rotten stocks of food are already deducted in consumption estimates. However, empirical studies suggest, that the difference between averages of food acquisition and consumption is not always positive, but sometimes close to zero or even negative (Kaara and Ramasawmy, 2008; Martirosova, 2008; Smith et al., 2006; Bouis et al., 1992; Bouis, 1994). A further analysis of 81 HCES² conducted between 1988 and 2014, found that the average dietary energy from surveys focusing on acquisitions was only slightly higher than that from surveys focusing on consumption, but the

² Surveys analysed by the FAO food security analysis team from 2006 to 2014, using the ADePT-FSM software developed jointly by FAO and the World Bank (Moltedo et al., 2014).

variability was in turn much higher (a coefficient of variation of 76 compared to 52) (Conforti et al., this issue). This difference is of real concern for FAO, which is using the coefficient of variation derived from food data collected in HCES to estimate the prevalence of undernourishment (Wanner et al., 2014).

Additional to the length of diaries or recall periods, the time interval for which the respondents are asked to report food consumption or acquisition, may matter. In order to be representative, a survey needs to account for cyclical fluctuations in food consumption. Reasons for monthly fluctuations in food consumption can be climate, harvest season, festivities or the administrative calendar, etc. Surveys that do not capture the whole calendar year are usually not representative (Behrman and Deolalikar, 1989). Second, several studies show that expenditure patterns (for both food and non-food) vary systematically within the month, because households increase purchases after payments of income or social benefits (Stephens, 2003; Damon et al., 2013; Hastings and Washington, 2010). Third, food consumption in developed countries has been shown to vary between weekdays, with country-specific differences in the extent of the observed variability (McCarthy, 2014).

For several aspects of the impact of survey design on data quality, the evidence from the available literature is inconclusive. This applies to the choice between diaries and recall interviews, and to the difference also, between food acquisition and food consumption. Other aspects of survey design, like the impact of fatigue in diaries or the impact of seasonality, are less controversial, but few attempts have been made to estimate the magnitude of the potential bias different design options imply. This paper addresses these topics by using MSES data. Being a case study, the study cannot provide answers of global applicability, but it does add on further piece of empirical evidence to the discussion. Finally, the paper contributes to the ongoing international effort to derive guidelines for survey design aiming at measuring habitual food consumption.

3. The survey

The MSES was conducted over a period of one year from July 2007 to June 2008. The survey has been designed to be comparable with the 2002–03 HIES-LSMS that was integrating the Living Standards Measurement Survey into the annual Household Income and Expenditure survey to provide more complete analyses³ (MNSO et al., 2007). In urban areas, purchases of food were collected through a recall questionnaire with a reference period of one month. Food consumption was collected in turn through a diary administered over three periods of ten days.⁴

Fig. 1 outlines the protocol for data collection. Urban households were visited four times with a periodicity of one visit approximately every ten days. At the first visit, information was collected on the amount of food items currently in stock. At the last visit, information on ending stocks was collected. Between visits, households compiled a diary with the information on the amount of food consumed in the house during the period and the source of the consumed food (purchased, received for free and own production). At the last visit, households were also asked to recall all food items that were purchased, acquired from own production, received for free, sold or given to others during the past month. In combining the food acquired with the stock variations from recall interviews, we are able to construct a second indicator for food consumption, besides the direct measurement obtained from diaries. To illustrate how data are collected, we show the two questionnaires used for diary and recall interviews in Figs. A1 and

³ In the 2002–03 HIES-LSMS, the LSMS portion of the survey was administered to a sub sample of all the households that participated in the HIES.

⁴ The MSES contains also a sample of rural households, but a much simpler survey method was used for that sample. Because of the nomadic characteristic of Mongolian population, rural households were visited only once and no diary was administered.

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