Chapter XXIII
Living Standards Measurement Study Surveys

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Abstract

The Living Standards Measurement Study (LSMS) programme arose from the need to improve statistical data at the household level required for designing, implementing and evaluating social and economic policy in developing countries. The focus of the LSMS programme has been on understanding, measuring and monitoring living conditions, the interaction of government spending and programmes with household behaviour, ex ante and ex post assessments of policies, and the causes of observed social sector outcomes. The resulting LSMS surveys use multiple survey instruments to obtain data needed for these purposes and rely on significant quality control mechanisms to ensure high-quality relevant data. Especially in recent years, the LSMS programme has emphasized the process of involving data users in the design of the surveys and has worked on issues of sustainability. The present chapter provides an overview of what LSMS surveys are, and the key design and implementation methods used in the surveys, as well as the efforts to promote analytic capacity. An assessment of the costs of the survey and the quality of the data obtained is included, as are examples of the policy uses of LSMS survey data. The chapter also discusses computations of the average sample design effects and intra-class correlation coefficients of some household- and individual-level variables using selected LSMS surveys.

Key terms: poverty measurement, living standards, survey methodology, design effect, intra-class correlation, quality control.

A. Introduction

1. Public sector expenditures for social services and infrastructure represent significant amounts of resources, both in absolute and in relative terms. It is not unusual for health and education spending to each account for 3-4 per cent of gross domestic product (GDP). Depending on the country, this can range from several million to hundreds of millions of dollars. Major changes in economic policies concerning taxes and prices substantially alter both relative and absolute welfare levels. Yet often, owing to a lack of data, policies are designed, implemented and revised with little information on their overall effectiveness in improving the lives of the country's population. The absence of appropriate household-level data forces policy makers to rely on administrative data that, while adequate for some purposes, often severely limits the ability to understand household behaviour, how government policies affect households and individuals and the determinants of observed social sector outcomes. Filling in such gaps in understanding is the role of household surveys.

2. The Living Standards Measurement Study (LSMS) surveys are one instrument that Governments can, and do, use to better understand the causes of observed outcomes as well as the impact of their policies. The LSMS survey goes beyond simply measuring outcomes to allowing connections to be made among the myriad factors that affect or cause these outcomes. Single-topic household surveys provide important and in-depth information on a specific topic of interest, but are inadequate for explaining why certain outcomes exist and the range of the factors are that affect them. The goal of the LSMS survey is to explore the linkages among the various assets and characteristics of the household on the one hand, and the actions of government on the other, and, thus to understand the forces affecting each sector, set of behaviours or outcomes. Deepening government's understanding of the factors that affect living conditions serves to improve policies and programmes. In turn, this can lead to a more efficient and effective use of scarce government and private resources and better living standards.

3. LSMS surveys are a collaborative effort on the part of the country Governments that administer the surveys, the principal users of the data in the countries and the World Bank as well as other bilateral and multilateral donor organizations.[46] While based on a core set of concepts, each LSMS survey is substantially customized to meet the specific needs of the individual Governments at a given point in time. The principal implementing agency is usually the national statistical office (NSO) which takes the lead in questionnaire design, sample design, and fieldwork methodology using the techniques found by the LSMS to be most effective.

4. The present chapter provides an overview of the Living Standards Measurement Study. First a short history of the programme is provided, followed by information on the key features of the LSMS survey. This, in turn, is followed by a section explaining how LSMS design features have affected the quality of the data collected. The final section provides some examples of ways in which LSMS survey data have been used.

[46] Inter alia, other institutions that have partnered LSMS surveys are the Inter-American Development Bank, United Nations organizations such as the United Nations Development Programme, the United Nations Children's Fund, the United Nations Population Fund, and bilateral donors from Canada, Denmark, the United Kingdom of Great Britain and Northern Ireland, Japan, Norway, Sweden and the United States of America.

B. Why an LSMS survey?

5. The LSMS efforts to respond to the need of policy makers for quality data started in 1980. After a five-year period of work that included reviewing existing household surveys and extensive consultation with researchers and policy makers to determine the types of data needed, as well as with survey methodologists on how best to design the actual fieldwork procedures, the first LSMS surveys were piloted in Côte d'Ivoire and Peru in 1985. These two first surveys were, specifically, research projects testing the full methodology to determine the usefulness and quality of the data that could be obtained.[47] The success of these first two surveys has been responsible for the over 60 LSMS surveys that have been carried out in over 40 countries since 1985 (see annex I for a complete list).

C. Key features of LSMS surveys

6. The following is a summary of key features of the LSMS. The reader is referred to the 1996 LSMS Manual for more detailed information about the surveys and how to implement them.[48]

1. Content and instruments used

7. Up to four separate survey instruments are part of the LSMS surveys. The instruments are: (a) a household questionnaire for collecting information at the household and individual levels, as well as at the level of household economic activities (agriculture and home businesses); (b) a community[49] questionnaire for collecting data on the environment in which households function with a focus on the available services, economic activities, access to markets and, lately, social capital; (c) a price questionnaire administered in every area where households are located to allow cost of living adjustments;[50] and (d) facility questionnaires administered to local service providers to obtain information on the types and quality of services available to households. Figure XXIII.1 relates the instruments used to the policy purposes of LSMS surveys and the variables needed.

[47] For a more detailed account of the history of the LSMS, see Grosh and Glewwe (1995).

[48] In Grosh and Muñoz (1996).

[49] Note that this is not a "community" in the sociological sense, but rather a mechanism to collect information about the areas where the households selected for the survey are located.

[50] National consumer price indices are often inadequate for this purpose, as they tend to be urban and even when rural areas are included, prices are not captured at the appropriate level of disaggregation.

Figure XXIII.1. Relation between LSMS purposes and survey instruments

Purpose	Indicators	Instruments
Individual and household measurement of welfare		
Levels, distribution and correlates	Consumption Income Wealth, savings Human capital Anthropometrics	Household questionnaire Price questionnaire
Analyse policy		
Who benefits from programmes/public spending	Use of services Who receives services, transfers	
Impact of public spending/programmes Availability of services Quality of services Price of services	Costs of services Impact of policies Distance to nearest service Types of service provided Personnel, budget, other inputs	Household questionnaire Community questionnaire Facility questionnaire Price questionnaire
Effect of economic policies	Net transfers between sectors	
Identify determinants		
Why observed outcomes occur What affects household behaviour	Household composition, human capital, welfare, services available, etc.	Household questionnaire Community questionnaire Facility questionnaire Price questionnaire

8. The contents of the survey instruments reflect the priority data needs of the country implementing the survey at a given point in time. As the overarching concern is measuring living standards, in all their varied facets, the household survey instrument, in particular, aims to collect information on the wide range of topics affecting these. Table XXIII.1 shows the content of a typical LSMS survey, this one from Viet Nam in 1997-1998.

Table XXIII.1. Content of Viet Nam household questionnaire, 1997-1998

First visit	Second visit
Household roster	Fertility
Education	Agriculture, forestry and fishing
Health	Non-farm self-employment
Labor	Food expenses and production
Migration	Non-food and durable goods
Housing and utilities	Income from remittances
	Borrowing, lending and savings
	Anthropometrics

9. There is a high level of questionnaire customization for each country which has led to variations in the overall content of the survey instruments as well as the inclusion of new modules and topics over the years. For example, in Bosnia and Herzegovina in 2001, the health module was expanded to incorporate questions on depression in an effort to measure the incidence of this mental health ailment and identify the linkages between it and other aspects of welfare and labour-market participation. In Guatemala in 2000, a module on social capital was added to collect information on the social dimensions of poverty such as participation in community/government programmes and collective actions, causes of exclusion in the society, perceptions of welfare, and perceptions of, and access to, justice. In Albania, Brazil, Nepal, Jamaica, South Africa and Tajikistan, questions were added on subjective measures of poverty in an attempt to examine the relation of these to other measures.[51] Table XXIII.2 presents a sample of modules that have been added in recent years. In summary, while a standard package of modules exists, each country's LSMS survey reflects the country's priorities, data needs or concerns at the time of the survey. A recent research project in the World Bank on "Improving the Policy Relevance of LSMS Surveys" has led to a new book outlining, by topic, the policy questions that can be addressed by LSMS data and providing guidance on questionnaire design. [52]

Table XXIII.2. Examples of additional modules

Topics	Countries and year
Activities of daily living	Kosovo (2000), Kyrgyzstan (1993, 1996, 1997, 1998), Jamaica (1995) Nicaragua (1993)
Disability	Nicaragua, (1993)
Impact of AIDS-related mortality	United Republic of Tanzania-Kagera (1991-1994)
Literacy and/or numeracy tests	Viet Nam (1997-1998), Jamaica (1990), Morocco (1990-1991)
Mental health	Bosnia and Herzegovina (2001)
Privatization	Bosnia and Herzegovina (2001), Kyrgyzstan (1996, 1997)
Shocks/vulnerability	Bolivia (1999, 2000), Guatemala (2000), Paraguay (2000-2001) Peru (1999)
Social capital	Guatemala (2000), Kosovo (2000), Panama (1997), Paraguay (2000-2001)
Subjective measures of poverty	Albania (2002), Brazil (1996), Jamaica (1997), Nepal (1996), South Africa (1993), Tajikistan (1999)
Time-use	Guatemala (2000), Nicaragua (1998), Jamaica (1993), Pakistan (1991) Morocco (1990-1991), United Republic of Tanzania-Kagera (1991-1994)

[51] For more information on the social capital work in Guatemala, see World Bank (2002b). For further information on the subjective measures of poverty, see Pradhan and Ravallion (2000), Ravallion and Lokshin (2001), Ravallion and Lokshin (2002). Analysis of the Bosnia and Herzegovina data is ongoing.

[52] In Grosh and Glewwe, eds. (2000).

10. The questionnaire design phase is a process aimed at ensuring that relevant policy issues are identified and incorporated. In most countries, a Data Users' Group or Steering Committee is formed with members from different line ministries, donors and academics along with the National Statistical Office (NSO). This group is responsible for identifying the data needs for specific policies to ensure that the appropriate data are collected. On average, the questionnaire design phase takes about eight months and involves as many actors as possible. This rather lengthy process has the additional benefit of generating demand for, and ownership of, the resulting data. This, in turn, leads to a greater use of the data in policy than would otherwise obtain.

2. Sample issues

11. Typically, LSMS surveys are national surveys using multistage probability samples of households.[53] The overall samples are small (relative to several other surveys), usually ranging from 2,000-5,000 households. There are two main reasons to limit the sample size. First, there is a concern for quality and the need to balance sampling error with non-sampling error (see sect. C.4. below for further discussion of this point). Second, the analytic focus of the LSMS surveys is on the determinants or relationships among characteristics of households and not on precise estimates of specific rates, ratios or means. For these reasons, LSMS samples are kept reasonably small and, usually, are not large enough for the survey results to be disaggregated to small geographical areas such as States, municipalities or departments.

12. Probability sampling is used in all LSMS surveys, although the actual design used varies by country and situation.[54] Domains of study are identified (urban/rural, regions) and within each domain a stratified two-stage cluster design is used.[55] As is the case in most household surveys, LSMS surveys use a cluster design in lieu of a simple random sample (SRS). This stems from cost considerations, even though cluster designs reduce the precision of the estimates (see sect. E.4 below for more on sample design effects that arise from using multistage sampling, as well as annex III). The primary sampling units (PSUs) are geographically defined area units selected with probability proportional to size. The sample frame is typically the most recent population census in the country, but alternatives have been used when the census was unavailable or irrelevant (see Basic Information Documents for the Nicaragua 1993 LSMS, where voting registers supplemented outdated census information; and the Bosnia and Herzegovina 2001 LSMS, where extensive listing operations were needed owing to the civil war, for examples).

13. Once the PSUs have been selected, an enumeration of these PSUs is carried out to ensure that an accurate and up-to-date listing of all dwellings and households is available. This listing operation is carried out as close in time as possible to the fieldwork for the actual survey. To avoid any potential biases, it is conducted not by the interviewers themselves but, instead, by the

[53] Actually, as with most household surveys, it is the dwelling that is selected and then all households found in the selected dwelling are interviewed. Note that when a panel design is used, whether it is the dwelling or the household that is followed will depend on the purpose of the panel and logistic issues.

[54] The Basic Information Document for each survey provides the details of the sample design for the individual survey. These can be found on the LSMS web site: http://www.worldbank.org/lsms/.

[55] Three stage designs have been necessary in some countries, however.

cartography department of the NSO. With a complete current list of all dwellings in the PSU, the secondary sampling units (households) are systematically selected, usually a fixed number of households within each PSU, typically from 12 to 18. Data are then collected from all members of the household. While the sample design of LSMS surveys is intended to encompass national coverage, in some cases, owing to civil conflict or natural disaster, specific areas may be excluded.

14. LSMS survey estimates generally require the use of sample weights. Even when the original sample design calls for a self-weighted scheme, for example, as in Ghana, Nicaragua (1993) and Tajikistan, varying non-response rates create the need for differential weights to be used in the analysis of the data. In fact, most of the sample designs are not self-weighted. Often, the design of the sample in a given country is affected by that country's analytic considerations. For example, population subgroups that are small but of interest to the government (ethnic minorities, remote regions, those engaged in a particular economic activity or in an important government project area) may need to be oversampled to ensure that there are enough cases to permit a separate analysis of them. Again, such sample designs lead to the need for sample weights in the analysis of the data. A final point that must be kept in mind, given the sample designs used in LSMS surveys, is that statistical tests of significance carried out on the data must take into account the multistage nature of the design as well (see the chaps. in this publication on sample design effects for details on this issue).

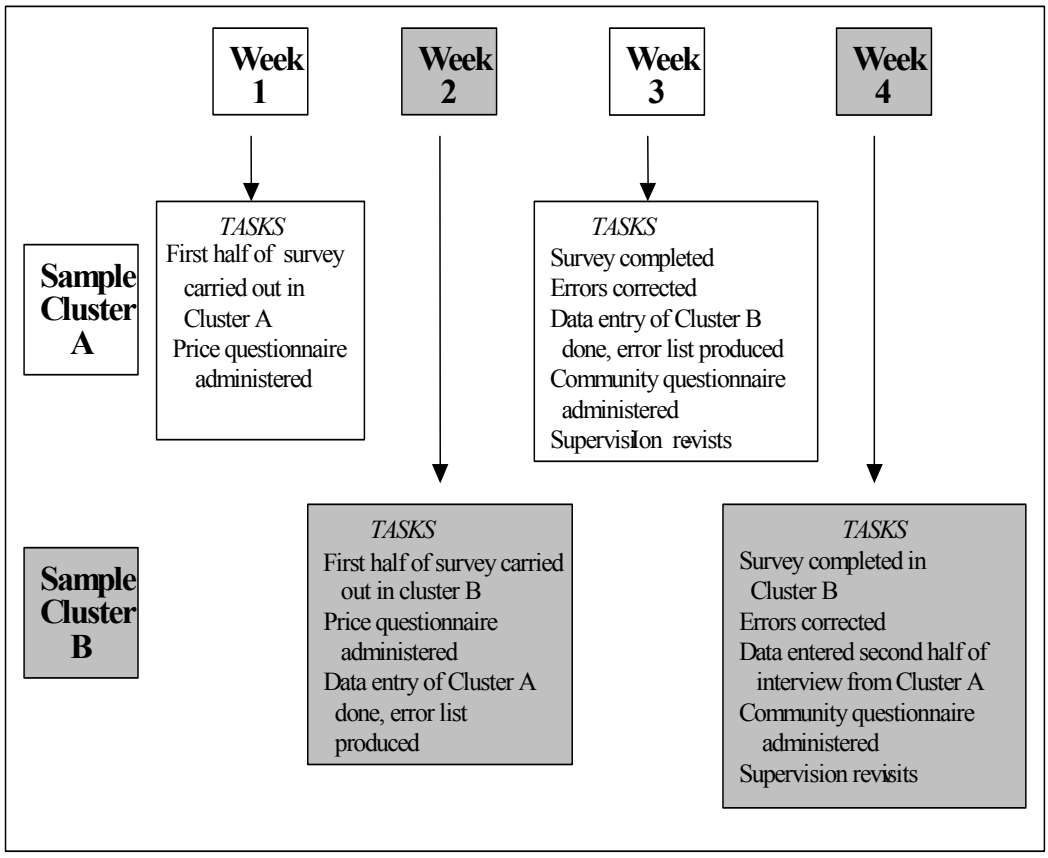
3. Fieldwork organization

15. As seen above, the goals of LSMS surveys drive the structure and content of the surveys: they also are reflected in the fieldwork methods used. The fieldwork for an LSMS survey is designed so that data are collected by mobile interview teams which incorporate data entry activities and strong supervision.[56] Each household is visited at least twice with a two-week period between visits. Figure XXIII.2 shows graphically the way in which fieldwork is carried out. Fieldwork is designed so that each interview team completes the interviews in two selected communities (PSUs) per month. The teams work in the first community in the first and third weeks of the month and in the second community in the second and fourth weeks. The first half of the questionnaire is completed in the first visit, made in week 1 or 2 depending on the community. Between visits, the data from the first visit are entered and checked for errors. The second visit is used to correct errors from the first visit, to administer the second half of the survey, and to provide a fixed time period for the information collected on food expenditures.[57] Data are typically collected throughout a 12-month period, in order to allow seasonal adjustments where necessary, although many countries have opted for shorter periods.

[56] See annex II for more details on the interview teams.

[57] While two visits are formally scheduled, the use of direct informants for all sections of the questionnaire means that, in fact, interviewers visit each household as many times as are needed in order to interview all household members.

Figure XXIII.2. One-month schedule of activities for each team



16. The supervisor is responsible for administering the community and price questionnaires in parallel with his or her team of interviewers collecting the household-level data in the PSU. Facility surveys may require additional personnel to administer.

4. Quality

17. A fundamental and ongoing concern with LSMS surveys is to ensure the high quality of the data obtained. The complexity of the survey makes quality control mechanisms of particular importance. As can be seen in table XXIII.3, the quality controls take a variety of forms, from the simplest - relying on verbatim questions, explicit skip patterns, questionnaires translated into the relevant languages in a country, and closed-ended questions to minimize interviewer error - to the more complex one consisting of concurrent data entry with immediate revisits to households to correct inconsistency errors or capture missing data. Clearly, not all of these quality controls are unique to LSMS surveys, but given the complexity of LSMS surveys, the emphasis has been on incorporating a complete package of quality controls. In addition to the above-mentioned controls, and, perhaps more controversially, the LSMS programme has opted for a small sample size to minimize non-sampling errors. The logic of this is that while sampling errors can be large when small sample sizes are used, such errors can at least be quantified. Non-sampling errors, by contrast, arise from many sources and their magnitude is virtually impossible

to measure; it is well-known, however, that the totality of non-sampling error tends to increase as sample size increases. Thus, the decision was made to limit these non-sampling errors even if this would restrict the level of geographical disaggregation possible with the survey data. The emphasis in LSMS surveys on exploring the relationships among aspects of living standards, as opposed to measuring with great precision specific indicators or rates, means that this decision is less of a hindrance than it might be in other surveys.[58] Finally, recent methods to link LSMS survey data (and others) to census data that allow an imputation of poverty within the census data, serves to reduce, to some extent, the small sample size issue, at least in terms of poverty and inequality measures.[59]

Table XXIII.3. Quality controls in LSMS surveys

Area of quality control	Controls
Questionnaire	Verbatim questions Explicit skip patterns Minimal use of open-ended questions Written translation into relevant languages [a/] Sensitive topics placed at end Packaging: one form for all household and individual data
Pilot phase	Formal pilot test of questionnaire and fieldwork
Direct informants	Individuals and best informed
Concurrent data entry	Check for range, consistency errors Revisits to households to make corrections
Two-round format	Reduces fatigue Creates bounded recall period Allows for checking of data entry and correction with households
Training	Intensive training of interviewers (one month), supervisors and data entry staff
Decentralized fieldwork	Mobile teams made up of supervisor, from two to three interviewers and data entry operator with computer and printer, and driver with car
Supervision	One supervisor per two to three interviewers
Small sample size	Limit non-sampling error
Data access policy	Open use of data to all researchers and institutions

a/ In countries where some languages do not have a written form (indigenous languages in Panama, for example), bilingual interviewers are used instead. This is not a perfect solution and should be avoided unless absolutely necessary.

[58] A labour-force survey, for example, which is supposed to show very small changes in unemployment rates over time, will require a much larger sample than that needed to analyse the determinants of unemployment, which would be more the focus of analysis of the LSMS survey.

[59] See sect. E below on the uses of LSMS data for more on this technique.

18. Another quality control mechanism incorporated by the LSMS surveys is the use of direct informants, also called self-respondents. This has two key advantages. It reduces the burden on any given respondent and thus lessens respondent fatigue. The household questionnaire is actually a series of short (10-15 minute) individual interviews, with only the best-informed respondents for consumption, agriculture and household businesses facing longer interview periods.[60] The use of direct informants also improves the quality of the data obtained by ensuring that the most knowledgeable person is answering the questions.[61] It is unreasonable to expect that any person in the household can give accurate and complete data on the health, education, labour, migration, credit and fertility status or activities of all other household members -- it is simply too much information. In addition, there may be incentives within a household to keep some information from other household members (credit, savings, earnings, and contraceptive use are all activities about which information might not be shared). Using direct informants is thus the only way to ensure accurate information on each household member. Interviewers are trained to, as far as possible, conduct the individual interviews in private.

19. Training of all staff involved in each LSMS survey is a further quality control mechanism. This takes the form of "on-the-job" training for the staff of the NSO, as well as more formal courses as needed. For the field staff, interviewers, supervisors and data entry operators, substantial resources are invested in formal training. Typically, the training for field staff is four weeks long and incorporates both theory and practical exercises. Upon completion of the training, field staff are selected based on their having passed the training course. A satisfactory result is usually based on a combination of successful participation during the course and the passing of a formal test at the end.

20. A final method to improve data quality that is often missed is promoting open access to the microdata resulting from the survey. Ensuring the widespread use of the data sets by a range of researchers and policy makers leads to careful checking of existing data; and by creating a feedback loop to data producers, this serves to increase the quality of future surveys. Open data access agreements have been reached for most LSMS survey data sets and efforts are made to help Governments disseminate such data. Although the World Bank does not own the LSMS survey data sets, permission has been given to the World Bank to directly disseminate over half of them (in fact, 30 per cent of all data sets can be downloaded directly from the LSMS web site).[62] Of the remaining data sets, the majority can be distributed once the Government approves the individual request. Feedback from those who have requested this type of permission indicate that permission is granted in about 90 per cent of the cases.

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[60] Even for the "best informed" respondents, the actual interview time is kept to under one hour, as this is considered the maximum time during which one person should be interviewed. For some specific households, however, this time limit may be exceeded and care needs to be taken to avoid informant fatigue and the resulting decrease in data quality associated with it.

[61] In the case of children under age 10 or age 12, or of household members unable to communicate, proxy respondents may be used. When proxy respondents are used, the identification code of the actual respondent is noted.

[62] http://www.worldbank.org/lsms/.

5. Data entry

21. Concurrent data entry entails using sophisticated data entry software that checks for range errors, inter- and intra-record inconsistencies and, when possible, even checking data against external reference tables (for example, those providing anthropometrics, crop yield data and prices). Data are entered in the field on laptop computers during the data-collection phase, and data entry operators are an integral part of the mobile survey teams. Data are entered immediately after each interview has been conducted and a list of errors, inconsistencies and missing information is produced from the data entry process. The interviewer then returns to the household to clarify, with the household members, any problems and to complete any missing information. This method avoids lengthy batch cleaning of data after the survey has terminated. Such cleaning is best avoided: although it tends to create internally consistent data sets, these are not the ones that best reflect each individual's situation. It also requires substantial time, thus delaying the use of the data and, in the worst case, rendering some of them obsolete. With the advent of inexpensive, yet powerful, computers and new software developments, it is likely that some LSMS surveys will be carried out completely electronically using the computer-assisted personal interview (CAPI) methods. This is an avenue that is presently being explored given its potential for decreasing the time between fieldwork and publication as well for higher data quality.[63]

6. Sustainability

22. At the simplest level, the three greatest impediments to sustainability, to the long-term implementation of LSMS surveys and to the use of the resulting data in policy-making, are budget constraints, staff turnover and a lack of analytic capacity. While no blueprint for ensuring sustainability exists, experience with the LSMS has provided several pointers on how to increase the likelihood of achieving sustainability. The first highlights the importance of involving policy makers and data users in the design and analysis phase. This essentially begins the process of creating a demand for the LSMS results and the use of the data in policy decisions. As it is these end-users who benefit from the data (not the NSO per se), this is the group that has the most incentive to ensure that budget needs for future surveys are met during the budget allocation process within the government. Often, creating or identifying one or more "champions" of the survey and data outside of the statistical system is key to sustainability.[64]

23. The second key lesson is that achieving sustainability is a long-term process: investing in one-off surveys has little long-term impact. A more systematic effort over several years is needed to train a critical mass of staff, demonstrate the effectiveness and use of the instruments, create the linkages between producers and users, and adapt the methodology to a country's needs and skills. Additionally, investment in proper documentation of survey efforts, archiving of data and dissemination activities help to ensure that institutional memory does not leave with any

[63] The use of CAPI systems is one factor in the ability of the United States Bureau of the Census to publish results of its monthly labour-force survey (Current Population Survey) within 10 days of fieldwork. An experiment to compare the costs and benefits of CAPI with concurrent data entry for LSMS surveys is planned for Albania in 2003.

[64] Jamaica offers one example of this approach. Demand originally came from the Prime Minister's office and the Ministry of Planning has been involved in every stage of the survey design and use with the Statistical Office implementing the survey. The LSMS has been carried out annually since the late 1980s in Jamaica. See Grosh (1991) for more on this example.

particular staff member. Close to 40 per cent of the countries that have conducted one LSMS survey have conducted multiple surveys.

24. Finally, building analytic capacity needs to be an explicit goal.[65] This increases the use of data, thus helping to create demand for future data sets. In addition, increasing the skills of the NSO staff and, thus the NSO's profile within government, may entice staff to stay on.[66] Finally, outside forces may also help to increase the demand for data. The Poverty Reduction Strategies being designed by countries receiving concessionary lending from the World Bank and the International Monetary Fund (IMF), and the Millennium Development Goals, all require data on the measurement and monitoring of poverty and key social indicators. The long-term nature of such goals can help to foster monitoring and evaluation systems that rely heavily on household surveys such as the LSMS surveys along with administrative and project data.[67] A recent evaluation of the Inter-American Development Bank-World Bank-Economic Commission for Latin America and the Caribbean (ECLAC) project to improve household surveys[68] underlines the long-term nature of sustainability and raises the additional issue of transition from donor financing to local financing that must also be addressed.[69]

D. Costs of undertaking an LSMS survey

25. The attention to quality has serious implications for the costs, in both time and resources, of the surveys fielded. LSMS survey costs range from US$ 400,000 to US$ 1.5 million, depending on the country and the year. On a per-household basis, this is commensurate with other complex surveys such as Income and Expenditure Surveys and Demographic and Health Surveys. Costs, of course, vary based on the capacity of the NSO, the state of existing statistical infrastructure, the goals of the survey, and the difficulty of movement within the country. Costs are substantially lower in cases where the implementing agency already has good infrastructure and experienced staff. Funds for each survey typically come from a variety of sources: government budgets (for the NSO or from other agencies), bilateral donations and multilateral donations and credits. In some cases, the private sector has also funded part of the survey costs.[70]

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[65] A summary of lessons learned in LSMS surveys in terms of building analytic capacity can be found in Blank and Grosh (1999).

[66] There is always a concern about maintaining the separation of data collectors from data analysts. Issues of credibility must be kept in mind when the barrier is relaxed.

[67] The creation of the Partnership in Statistics for Development in the Twenty-first Century (PARIS21) initiative to support the improvement of data for such purposes underlines the importance of sustainable data collection, analysis and use.

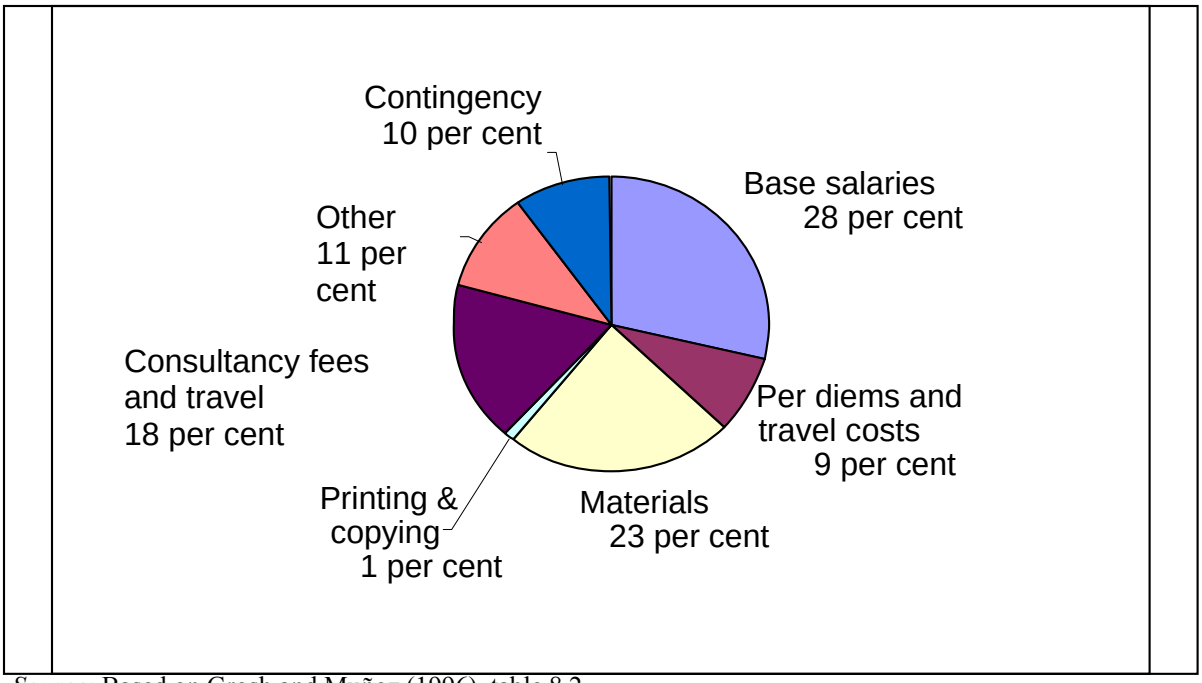
[68] The Inter-American Development Bank-World Bank-ECLAC project is entitled "Improving Surveys of Living Conditions", but is more commonly known by its Spanish acronym: MECOVI.

[69] See Ryten (2000).

[70] For example, in Peru, a limited amount of space on the questionnaire is reserved for private firms or researchers who pay to have specific questions added to the questionnaire in any given quarter.

26. In general, the cost of an LSMS survey reflects the methods adopted, the size of the sample, and the complexity of the fieldwork. Figure XXIII.3 shows the cost components of an LSMS survey and each one's relative weight.[71] (A simple exercise to help the reader start a budget for an LSMS survey can be found in annex II.)

Figure XXIII.3. Cost components of an LSMS survey (share of total cost)



Source: Based on Grosh and Muñoz (1996), table 8.2

27. The largest component of costs is for salaries. Almost three quarters of this cost is for field staff: interviewers, supervisors, data entry operators, anthropometrists and drivers. The field staff for LSMS surveys is large (relative to the sample size) owing to the high supervisor-to-interviewer ratios (typically 1 to 3), the size of the questionnaire and the use of direct informants which limits the number of households that can be visited per day, the inclusion of data entry in the field teams, and the provision of transport to each team member to ensure the mobility and integrity of the team by providing each with transport. Other salaries are for office staff: typically these are staff of the NSO, although a project coordinator may be contracted from outside if needed.

28. The second largest cost component is for materials and equipment. This covers computers and vehicles (either purchase or rental), and maintenance, as well as other office equipment. This is the component that varies the most widely based on existing infrastructure in the NSO or implementing agency. Also, funding sources can increase costs if vehicle purchases are prohibited: renting the needed vehicles can sometimes be significantly more expensive.

[71] The present section on costs is based on Grosh and Muñoz (1996) and a presentation of Juan Muñoz at the World Bank course on poverty and inequality, 26-28 February 2002.

29. Technical assistance is the third major component of costs. Again, this will vary substantially depending on the existing skills and experience in the implementing agency. Countries carrying out second or third LSMS surveys obviously require much less technical assistance and equipment. Typically, the types of skills most needed from technical assistance are sampling, questionnaire design, data entry customization, fieldwork organization and analytic techniques.

30. The costs of an LSMS survey are, of course, justified if the result truly is better-quality data that may be used to improve policy. While costly in absolute terms, relative to the magnitude of spending on social policy, LSMS surveys are not expensive. The following section provides evidence from recent LSMS surveys for the quality of LSMS survey data. Examples of quality are given in terms of missing data, usefulness of data for LSMS purposes, internal consistency and design effects.

E. How effective has the LSMS design been on quality?

1. Response rates

31. A first measure of quality is the overall response rate to the survey: do households selected in the sample respond to the survey or are a substantial number not included, thus potentially biasing the final results?[72] Examining response rates is useful, as these are an indicator of the quality of training, questionnaire design and interviewers as well as of the sample selection procedures (enumeration, updating of maps and the like). Many countries' LSMS surveys have achieved remarkably high response rates. Table XXIII.4 shows the response rates from recently completed LSMS surveys. However, LSMS surveys are not immune to the impact of country-specific situations. In post-conflict countries, where the expected levels of trust are low, response rates have also been lower as witnessed by the LSMS surveys in Bosnia and Herzegovina and Kosovo. The lower response rates in Jamaica, however, perhaps better illustrate the power of the quality control mechanisms. Jamaica has used fewer of the standard LSMS field techniques and quality control measures: this does appear to have translated into lower response rates.[73] In Guatemala, the low response rate was probably due to the length of time between the date of completion of the listing of households and the dates during which the survey was in the field. For the later interviews, this period was nine to ten months.

[72] Participation rates refer to the household as a whole, and not to individual members of that household.

[73] See World Bank (2001) for more details on the fieldwork of the Jamaica Survey of Living Conditions.

Table XXIII.4. Response rates in recent LSMS surveys

Country	Year	Number of selected dwellings	Actual sample size	Response rate [a/] (percentage)
Bosnia and Herzegovina	2001	5 400	5 402	82.6
Ghana [b/]	1998-1999	6 000	5 998	97.4
Guatemala	2000	8 940	7 468	83.5
Jamaica	1999	2 540	1 879	74.0
Kosovo	2000	2 880	2 880	82.0
Kyrgyzstan	1998	2 987	2 979	99.7
Nicaragua	1998-1999	4 370	4 209	96.3
Tajikistan	1999	2 000	2 000	..
Viet Nam	1997/98	5 994	5 999	93.9

a/ Bosnia and Herzegovina, Ghana, Kosovo, Tajikistan and Viet Nam used replacement households. Response rate was based on completed interviews minus replacement households divided by planned sample size. In Bosnia and Herzegovina, 938 replacement households were used; in Ghana, 155; in Kosovo, 519; and in Vietnam, 372. The authors were unable to determine the number of replacement households in Tajikistan.
b/ The Ghana survey was conducted in seven visits to each household. The final sample size figure is the number of households that participated in all seven visits.
Note: Two dots (..) indicate data not available.

2. Item non-response

32. Calculating the percentage of item non-response is another indicator of quality. A review of this issue in the three earliest LSMS surveys showed item non-response to have been fairly insignificant (less than 1 per cent of responses were missing for 10 key variables).[74] It is also of interest to compare rates of item non-response in LSMS surveys with those obtained in other surveys that do not have the same quality control mechanisms. This is not always possible; however, one small comparison is given here. A 1998 review of labour-force surveys in Latin America compiled information on the frequency of missing values for labour income of salaried workers, self-employed individuals and employers.[75] Three of the countries cited also carried out LSMS surveys within a year of the labour-force surveys. As can be seen in table XXIII.5, in these countries, the LSMS surveys did substantially better than -- or at least as -- well as labour-force surveys, for most of the comparisons. While only a limited example, this appears to demonstrate the positive effect of the LSMS investment in quality controls.

[74] In Grosh and Glewwe (1995).
[75] In Feres (1998). While income is not the focus of either labour-force surveys or the LSMS surveys, income information is collected in similar fashions in the two types of surveys.

Table XXIII.5. Frequency of missing income data in LSMS and LFS

Country	Survey	Percentage of missing income data for			
		Salaried workers	Self-employed	Employers	Percentage of direct informants
Ecuador	LFS, 1997	6.3	6.7	13.2	..
	LSMS, 1998	3.6	8.5	6.5	96.5
Nicaragua	Urban LFS, 1997	1.0	1.4	5.7	..
	LSMS, 1998	1.1	1.0	4.7	84.6
Panama	LFS 1997	2.9	36.2	26.0	..
	LSMS, 1996	1.0	3.5	8.4	98.7

Source: The information on Labour-force Surveys (LFS) is from Feres (1998); for the LSMS surveys, calculations by authors.
Note: For Nicaragua, in the 1998 LSMS survey, the percentage of missing data did not include zeros, as the interviewer instructions had interviewers coding a zero response here if the person received income not in cash but in kind. In this category were subsistence farmers whose income was calculated elsewhere in the module in agricultural production.
Two dots (..) indicate data not available.

33. Instead of just toting up the number of missing responses, perhaps a better overall test of the quality of the data is the extent to which it can be used. For LSMS surveys, which have a main goal of measuring welfare, it is most relevant to determine the extent to which the collected data are adequate for this purpose. The most commonly used money-metric measure of welfare, for its theoretical and practical advantages, is total household consumption. This is a complex measure that requires data from a range of modules in the questionnaire: at both the individual and household levels. Typically, consumption data are taken from the housing module (use value of housing, utilities and other housing expenditures), the durable goods module (to calculate the value of the flow of services), the education module (private, out-of-pocket expenditures), the food consumption module (purchased, home-produced and gift foods), the agricultural module (for home-produced food consumed by household if not captured in the food consumption module) and the non-food expenditure modules (for items ranging from soap to household furnishings).

34. Table XXIII.6 shows the percentage of households for which it was possible to construct such a consumption aggregate. For most of the surveys, very few households had to be dropped from the analysis owing to lack of data. The exception is Ghana. It is not clear what the main problem was in the case of Ghana, 1998: the sample was a bit larger than others but not as dramatically so as in the Guatemala case. The fact that some food consumption data were collected via a diary (as opposed to use of the standard LSMS methodology) may have been a factor: unfortunately, the documentation on the survey does not address this issue.[76]

[76] See Ghana Statistical Service (2000).

Table XXIII.6. Households with complete consumption aggregates: examples from recent LSMS surveys

Country	Year	Final sample size	Households with complete consumption aggregate (percentage)
Bosnia and Herzegovina	2001	5 402	99.9
Ghana	1998-1999	5 998	87.7
Guatemala	2000	7 468	97.4
Jamaica	1999	1 879	99.8
Kosovo	2000	2 880	100.0
Kyrgyzstan	1998	2 979	99.4
Nicaragua	1998-1999	4 209	96.0
Tajikistan	1999	2 000	100.0
Viet Nam	1997-1998	5 999	100.0

3. Internal consistency checks

35. Ensuring the internal consistency of the data is also crucially important. The fact that the complexity of the survey instruments makes it difficult for interviewers to monitor this during the interview process, explains why so many of the quality controls address consistency issues. Three examples of internal consistency checks are shown in table XXIII.7. The first check determines how well the community questionnaire could be to be linked to the household data. The second check shows the percentage of children of pre-school or school age, as identified in the roster, that have complete information on their schooling/pre-schooling. The third check determines whether those identified as self-employed in the labour-force module have reported details of their activities in the non-agricultural household business module.

Table XXIII.7. Internal consistency of the data: successful linkages between modules (Percentage) [a/]

Country	Correct link between:			
	Household survey and community survey [a/]	Roster and education module [b/]		Employment module and non-agricultural household business module [c/]
		Pre-school	Primary	
Bosnia and Herzegovina	...	99.5	99.8	90.4
Ghana	99.9	..	96.5	70.2
Guatemala	100	100	100	93.0
Jamaica	..	..	96.4	..
Kosovo	100	..	100	58.6
Kyrgyzstan	100	86.5	98.4	93.1
Nicaragua	..	97.9	97.5	62.0
Tajikistan	100	..	99.9	..
Viet Nam	100	..	99.6	98.1

Notes: Table refers to percentage of correct linkages. Bosnia and Herzegovina, Jamaica and Tajikistan did not include community questionnaires. Jamaica, Kosovo, Tajikistan and Viet Nam did not include a special module on pre-school. Jamaica and Tajikistan did not collect information on non-agricultural household businesses.

Two dots (..) indicate data not available.

a/ Comparison of the households with the communities in which they were located.

b/ Comparison of the age variable from the roster with the presence of individuals in the education module.

c/ Comparison of those indicating they were self-employed in the employment module with the presence of information in the non-agricultural household business module.

36. As can be seen from the table, the first two checks show data quality to have been quite high. The third check does, however, show problems. This indicates a lack of appropriate controls in the field between the two visits to the households. Only in the case of Viet Nam was an explicit question included for the interviewer in the second visit to ensure that this module would be completed. Clearly, a similar check is needed for all surveys.

4. Sample design effects

37. A final criterion for judging LSMS surveys concerns the sample size and design. When using data from any household survey based on a complex design with multiple stages, stratification and clustering, the true variance of the estimates is calculated by taking into account these features of the sample design as well as weighting. The design effect is the ratio of the true variance of an estimate, taking into account the multistage sample, to the variance of the

estimate that would have been obtained if a simple random sample of the same size had been used.[77] Thus, a design effect of 1 indicates that there has been no loss in precision in the sample estimates owing to use of a multistage design, while a design effect greater than 1 shows that use of the multistage design has lowered the efficiency of the sample and the precision of the estimates.

38. As part of the LSMS activities, a review of the design effects on key variables and indicators was carried out on some of the earlier LSMS surveys. The review, conducted by Temesgen and Morganstein (2000), highlighted several key points that must be taken into account when using LSMS survey data (and data from other households surveys using multistage sample designs of course) and designing appropriate samples.[78] The main point was that the multi-topic nature of the LSMS surveys complicates the process of designing an efficient sample. Design effects vary widely among both individual-level and household-level variables, as can be seen in table XXIII.8, taken from the work of Temesgen and Morganstein (2000). In short, minimizing the design effect of one variable may well lead to increasing it for other variables. Second, the trade-off between non-sampling and sampling errors is clear. Design effects can be high in LSMS surveys. The table indicates that, to the extent that LSMS surveys are used to produce means, ratios and point estimates, it is critically important that the sample design be taken into account and that careful attention be paid to the proper use of the data.

Table XXIII.8. Examples of design effects in LSMS surveys

Country	Per capita consumption			Access to health care			Unemployment rate		
	All	Rural	Urban	All	Rural	Urban	All	Rural	Urban
Côte d-Ivoire, 1988	6.7	3.6	5.5	6.3	5.7	2.2	7.0	4.4	5.7
Ghana, 1987	1.9	3.1	1.8	2.9	3.0	5.0	1.7	1.5	2.0
Ghana, 1988	3.2	2.9	2.9	2.2	2.5	3.6	1.3	1.1	1.4
Pakistan, 1991	1.6	1.1	2.6	5.0	4.0	5.2	4.6	4.7	2.5

Source: Temesgen and Morganstein (2000).

39. As with other surveys, it is interesting to note that the design effect varies not just among variables, but also geographically within a country for the same variable and for a specific variable over time. Finally, the design effects can be hugely different between countries. A careful review of intra-class correlations and design effects in previous surveys, when these exist, will help in refining the design for future LSMS surveys. Care must be taken in presenting and interpreting the results of LSMS and other surveys using multistage samples because the sample design used can be complicated.

[77] See annex III of this chap. or other chaps. in this publication for additional information on sample design issues.
[78] Several of the tables from the report of Temesgen and Morganstein are included in annex III of this chapter.

F. Uses of LSMS survey data

40. Over the years, LSMS survey data have been used for a wide variety of policy and research purposes. Some of these have been chronicled elsewhere[79] and an extensive, albeit partial, bibliography of papers and reports based on LSMS survey data can be found by the interested reader on the LSMS web site. That bibliography shows the scope of the use of LSMS data for analytic purposes but the uses of the data are certainly not limited to what is found therein. The existence of ongoing research and questionnaire revisions and amendments mean that the range of uses is constantly changing. To demonstrate the variety of ways in which LSMS data have been used and combined with other data, it is perhaps more worthwhile to focus on one particular use – targeting of government programmes to the poor, for example – rather than to attempt a comprehensive examination of the uses of those data.

41. First, an early example from Jamaica shows how a simple analysis can provide a Government with clear information on the effects of targeting the poor using alternate programmes. In the Jamaica case, as outlined in Grosh (1991), three major nutrition programmes existed: generalized food subsidy, food stamps and school feeding programmes. The LSMS survey in Jamaica made it possible to quantify the value of the benefits received by poor households from the three programmes and showed that the food subsidy, unlike the other two programmes, was highly regressive. This analysis was one element in the decision to eliminate subsidies and to increase resources to the other two programmes.

42. A second tool that can be created using LSMS survey data is for geographical targeting to poor areas. By taking advantage of census data, the LSMS survey data can be used to construct poverty maps for allocating resources and programmes to poor areas.[80] The method relies on the existence of an LSMS survey and census data within a few years of each other.[81] The LSMS survey provides a solid welfare measure (total household consumption) but, owing to the small sample size, the ability to disaggregate the resulting poverty data is limited to only urban and rural areas, and a few large regional breakdowns of the country. Clearly, this does not meet all the needs of Governments trying to focus resources on poor areas nor does it help, in decentralized systems, in the allocation of resources to local government. Additionally, within large regions, there is often a great deal of heterogeneity in terms of poverty levels of the population that goes undetected in a small sample household survey.

43. To be able to provide poverty information at smaller levels of aggregation requires a data set with a sample size several orders of magnitude larger than that of an LSMS. The largest data set in any country is, of course, the population census. However, because it covers the whole population, a census collects very limited information from each household and is usually

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[79] See Grosh (1997), for example.

[80] For more on the methodology of creating poverty maps using the welfare measure from surveys and linking to census data see: Hentschel and others (2000); Elbers, Lanjouw and Lanjouw (2002; 2003); Elbers and others (2001); and Demombynes and others (2001). Further work is being done on using this technique to link two surveys together; however, estimating correct standards errors from such a linkage is impossible.

[81] Other household surveys can be used as long as they provide a robust money-metric measure of welfare such as total consumption or total income.

conducted only once every 10 years. Thus, it is not possible to construct an adequate poverty measure from the census. An innovative vein of work that allows survey data and census data to be linked is being tested. This technique takes advantage of the LSMS-provided welfare measure and the census-provided coverage. The method entails estimating poverty in the LSMS survey data by using a vector of variables found in both the census and the survey. The parameters estimated from this are then used with the census data to predict the probability of being poor for each household and creating headcount ratios for small areas using the census data. The resulting poverty maps provide a tool for government in the allocation of resources. Examples of such poverty maps can be found in Ecuador, Guatemala, Madagascar, Nicaragua, Panama and South Africa.

44. A third example of the use of LSMS survey data for improving the targeting of social programmes is derived from an evaluation of the Emergency Social Investment Fund (or FISE, after its Spanish acronym) in Nicaragua. The evaluation addressed issues of targeting as well as the impact of the FISE investments in communities in the areas of water, latrines, education, health and sewerage. [82] In this case, a national-level LSMS survey was planned. An oversample of households was included consisting of households from FISE project areas as well as from similar communities without FISE programmes. The other source of data was project and administrative records that were used to evaluate the administrative costs of the project.

45. The oversample of households in FISE and similar non-FISE communities allowed the creation of both control and treatment groups to measure the impact of the FISE investments and the effectiveness of their targeting. In addition, the national sample from the LSMS survey was used to create a second control group (using propensity matching techniques) which increased the strength of scope of the evaluation. The evaluation of the effectiveness of targeting was carried out both at the community level (were FISE investments progressive in terms of the communities where projects were carried out?) and at the individual level (within communities with FISE projects, were the poorer segments of the population more or less likely to benefit from the FISE investment?).

46. The evaluation was able to show, with statistically significant results, the overall efficiency of targeting and allowed the main project types to be assessed based on targeting criteria. The study showed that sewerage projects were highly regressive, while latrines and primary education projects were systematically progressive, reaching the 17 per cent of the population classified as extremely poor. The immediate result of the evaluation was the suspension of sewerage projects and a decision to focus on improving the outreach to, and investments in, extremely poor communities. The cost of this very complex evaluation of the FISE project represented 1 per cent of the investments made by the project up to the date when the evaluation was done.

[82] See World Bank (2000) for details on the goals of the evaluation, the methods employed and the results.

G. Conclusions

47. The results of LSMS surveys have demonstrated the value of the approach. Data have been used by Governments to understand the effect of present policies, to redesign policies and to better target resources to groups and areas. The emphasis on quality has paid off in terms of lower levels of errors and greater usefulness of the data. There are, however, trade-offs involved with this approach. Costs are relatively high, the smaller sample size limits the level of disaggregation that can be obtained, and the upfront planning and design are time-consuming; however, data can be produced rapidly once work is begun and the links with policy makers increases the use of the data.

48. Clearly, there are advantages to incorporating LSMS surveys in a country's system of household surveys. How often such a survey is needed will depend on several factors. First, the analytic needs of the country should drive the decision to carry out one or multiple surveys over time. While many government programmes can be evaluated with cross-sectional data (targeting, incidence, even impact using propensity matching score techniques), repeated cross-sections and panel data sets are needed for other types of analysis of changes over time and the impact of policies and events.

49. A second consideration, in terms of the frequency of implementing LSMS surveys, is that concerning the analytic capacity in the country. Data need to be analysed as an input to policy makers and in order that each future round of the survey may be improved based on the previous round's findings. If the data cannot be analysed quickly, much of the investment in multiple rounds of the survey may be lost. In such a case, it may make sense to leave a significant time gap (three years, for example) between surveys.

50. Finally, budget and logistic issues are often as important as substantive ones in deciding how often or when to do specific surveys. Thus, the frequency with which any survey is conducted will reflect the act of balancing the importance of its results against those of other surveys. Also, it is important to remember that no one source of data is adequate for all needs. Administrative records, and project management information system (MIS) data, as well as a system of household surveys, are required by Governments for both macro and microeconomic policy. In conjunction with an overall system of surveys in a country, LSMS surveys can lead to a substantial improvement in the understanding of how a Government's policy and spending affect the lives of its population.

Annex I
List of Living Standard Measurement Study surveys

Country	Year	Household count
Albania	1996	1 500
Albania	2002	3 600
Armenia	1996	4 920
Azerbaijan	1995	2 016
Bolivia	1999	...
Bolivia	2000	5 032
Bolivia	2001	..
Bosnia and Herzegovina	2001	5 402
Brazil	1996-1997	4 940
Bulgaria	1995	2 500
Bulgaria	1997	2 317
Bulgaria	2001	2 633
Cambodia	1997	6 010
China: Hebei and Liaoning	1995 and1997	780
Côte d'Ivoire	1985	1 588
Côte d'Ivoire	1986	1 600
Côte d'Ivoire	1987	1 600
Côte d'Ivoire	1988	1 600
Ecuador	1994	4 500
Ecuador	1995	5 500
Ecuador	1998	5 801
Ecuador	1998-1999	5 824
Gambia	1992	1 400
Ghana	1987-1988	3 200
Ghana	1988-1989	3 200
Ghana	1991-1992	4 565
Ghana	1998-1999	5 998
Guatemala	2000	7 276
Guinea	1994	4 705
Guyana	1992-1993	5 340
India: Uttar Pradesh and Bihar	1997-1998	2 250
Jamaica	1988-2000 (annual)	2 000-7 300
Kazakhstan	1996	1 996
Kosovo	2000	2 880
Kyrgyzstan	1993	2 000
Kyrgyzstan	1996 (spring)	..
Kyrgyzstan	1996 (autumn)	1 951
Kyrgyzstan	1997	2 962
Kyrgyzstan	1998	2 979
Madagascar	1993	4 504
Malawi	1990	6 000
Mauritania	1987	1 600
Mauritania	1989	1 600

Mauritania	1995	3 540
Morocco	1991	3 323
Morocco	1998	..
Nepal	1996	3 373
Nicaragua	1993	4 200
Nicaragua	1998-1999	4 209
Nicaragua	2001	4 290
Niger	1989	1 872
Niger	1992	2 070
Niger	1995	4 383
Pakistan	1991	4 800
Panama	1997	4 945
Papua New Guinea	1996	1 396
Paraguay	1997-1988	4 353
Paraguay	1999	5 101
Paraguay	2000-2001	8 131
Peru	1985	5 120
Peru (Lima only)	1990	1 500
Peru	1991	2 200
Peru	1994	3 500
Russian Federation [a/]	1992	6 500
South Africa	1993	9 000
Tajikistan	1999	2 000
United Republic of Tanzania: Kagera	1991-1994	840
United Republic of Tanzania: national	1993	5 200
Tunisia	1995-1996	3 800
Uganda	1992	9 929
Viet Nam	1992-1993	4 800
Viet Nam	1997-1998	5 999

Note: Two dots (..) indicate data not available.

a/ The 1992 Russian Longitudinal Monitoring Survey was conducted using World Bank financing. Subsequent surveys did not involve World Bank participation. For more information, see the Carolina Population Center web site: http: //www.cpc.unc.edu/projects/rlms/rlms_home.html.

Annex II
Budgeting an LSMS survey

As noted in the text of chapter XXIII, no two LSMS surveys are exactly alike, nor are any two NSOs, or the costs associated with salaries, transportation, equipment, etc. in different countries. Thus, it is impossible to provide information on how much an LSMS survey will cost in a specific place at a specific time. The chapter provided an example of the share of different types of costs in the total cost of a survey. The following is a small exercise designed to help one get started on budgeting. It simply provides a quick guide to estimating the most basic salary costs for the fieldwork. Using this guide with real costs in the country of interest, one can obtain a very rough approximation of what an LSMS survey might cost.

On average, given the complexity of the survey instrument and the use of direct informants, an interviewer can complete two half-interviews per day (refer to figure XXIII.2 in the text on how the survey is implemented). In other words, he or she can complete one round of the survey in two households. If we assume a six-day workweek (whether the "day off" is taken every week or distributed in some other way per month), an interviewer can complete 24 households per month.

Let us assume that a sample of 4,000 households is needed. If each interviewer can complete 24 households per month, a total of 167 interviewer months are needed to carry out interviews of 4,000 households. If the fieldwork takes place over a 12-month period, then 14 interviewers are needed. For each pair of interviewers, one supervisor, one data entry person and a driver and car are needed. So the total fieldwork staff (not counting regional supervision by staff of the NSO) comprises:

14 interviewers
7 supervisors
7 data entry operators
7 drivers

If planners use the parameters set out below, then the salary costs of the fieldwork portion of the survey will be:

Item	Cost per individual per month	Number of months	Cost
14 interviewers	500	13	91 000
7 supervisors	575	13.5	54 338
7 data entry operators	525	14	51 450
7 drivers	300	13	27 300
Rough estimate of field salary costs			224 088

Note: While the fieldwork takes only 12 months, an extra month is added to cover cost of the training (where field staff are usually paid something) and/or any delays in the survey work. Data entry operators are often kept on an extra month to finalize and clean the data set if needed.

According to figure XXIII.3, fieldwork staff costs, which represent three quarters of the total salary costs of the survey, in turn represent 28 per cent of the survey costs. Based on a simple calculation, in this case, a rough estimate of the cost of the survey is found to be 1,067,086.

Clearly this number is only a very rough approximation. Details on other costs such as those for technical assistance and so on are needed. However, this simple starting exercise can be useful in beginning the process of budgeting an actual survey. The reader is referred to chapter 8 of Grosh and Muñoz (1996) for a detailed presentation on how to design a realistic budget for an LSMS survey.

Annex III
Effect of sample design on precision and efficiency in LSMS surveys[83]

A. Introduction

Other chapters in this publication provide detailed information on sampling issues and, particularly, the effect of complex or multistage sample designs on the variance of the estimates obtained. This so-called design effect is common to all surveys that do not use a simple random sample, such as the LSMS surveys. The design effect is one part of overall sampling error: the difference between an estimate obtained from a multistage cluster design and one that would be obtained using a simple, random sample design. In the present annex, we summarize the key issues and show the actual impact of sample design on several LSMS surveys.

B. Computation of sampling errors, design effects and related components

In a simple random sample, all sampled units have an identical and independent probability of selection. Simple random sampling is almost never used for household surveys, however, owing to logistic and cost concerns. Instead, as in the LSMS surveys, more complex, multistage sample designs are used that incorporate stratification and clustering. This affects the calculation of the variance of the estimates and the efficiency of the sample itself. To compute sampling errors for sample designs that are implemented in more than one stage, it is necessary to know the variables that identify the strata, the primary sampling units (PSUs) and the weighting procedures (if any) used in the design. Once these variables are identified, a number of statistical packages can be used to compute the needed measures.[84]

The sampling error measures reported here for selected household- and individual-level variables in LSMS surveys include the standard error (*SE*) which is computed by taking into account the complexity of the sample design, the coefficient of variation (*CV (*%)), the sample size (n), the design effect, the intra-class correlation coefficient (ρ), the lower and upper boundaries of the confidence intervals (*CI*), and the effective sample size (*EFFn*). These terms are all defined in chapters II, VI, VII and other chapters.

[83] The present annex draws heavily on previous work by Temesgen and Morganstein (2000).

[84] The statistical software WESVAR was used in the computations here. Some of the other programs that can be used to estimate sampling variances and a variety of related statistics for complex survey designs include: CENVAR, CLUSTERS, Epi-Info, PC CARP, SUDAAN, VPLX and STATA. Some of these software packages can be downloaded from the WorldWide Web for free.

C. Standard errors, design effects and intra-class correlation computed from LSMS surveys

One important aspect of calculating sampling errors for survey variables involves comparing the efficiencies (precision) of the sample designs with each other; and with the precision that would have been yielded by a hypothetical simple random sample of the same size. In addition to indicating the reliability of existing survey data, such an exercise can be equally important in helping analysts to evaluate how well a particular design has performed and in providing information for the design of future surveys The three tables set out below compare the design effects and related measures for several variables in order to show the differences that exist (a) within a country across different variables; (b) within a country over time; and (c) between countries.[85]

As shown in table AIII.1, within a country, the same survey will generate substantially different design effects for different variables. The table is based on data from the 1987 LSMS conducted in Ghana and variables constructed at the household and individual levels. As can be seen, for some variables, such as per capita total expenditure, where the intra-class correlation is low, the design effect is not high (1.9); but for variables such as access to sanitation and water, where intra-class correlations are high (infrastructure tends to be concentrated in specific spatial areas), the design effects are high (7.8 and 8.0, respectively), and are even higher for urban or rural subpopulations.

[85] For the full report, see Temesgen and Morganstein (2000).

Table AIII.1. Variation of design effects by variable, Ghana, 1987

Variable		Estimate	*SE*	*CV* (%)	*Confidence interval*		*n*	*Design effect*	*EFFn*	ρ
					Lower	Upper				
Access to electricity	Total	0.267	0.019	7.265	0.229	0.305	3 138	6.034	520	0.300
	Rural	0.078	0.022	28.744	0.034	0.121	2 023	14.063	144	0.787
	Urban	0.611	0.041	6.714	0.530	0.691	1 115	7.888	141	0.403
Household size	Total	4.940	0.083	1.682	4.777	5.103	3 136	2.089	1 501	0.065
	Rural	5.147	0.097	1.877	4.958	5.336	2 022	1.735	1 165	0.044
	Urban	4.565	0.165	3.615	4.241	4.888	1 114	3.291	339	0.134
Land ownership	Total	0.591	0.024	4.018	0.544	0.637	3 138	7.315	429	0.376
	Rural	0.747	0.033	4.393	0.683	0.811	2 023	11.520	176	0.634
	Urban	0.308	0.035	11.413	0.239	0.376	1 115	6.453	173	0.319
Per capita total expenditure	Total	82 745.2	1 902.2	2.3	79 017.1	86 473.4	3 104	1.883	1 648	0.053
	Rural	70 908.1	2 526.4	3.6	65 956.3	75 859.8	2 001	3.100	646	0.127
	Urban	104 219.5	3 702.1	3.6	96 963.6	111 475.4	1 103	1.759	627	0.044
Per capita food expenditure	Total	56 779.3	1 309.2	2.3	54 213.2	59 345.3	3 104	1.927	1 611	0.055
	Rural	52 382.3	1 777.9	3.4	48 897.6	55 867.0	2 001	2.577	776	0.095
	Urban	64 756.0	2 147.9	3.3	60 546.2	68 965.8	1 103	1.580	698	0.034
Safe garbage disposal	Total	0.019	0.003	16.647	0.013	0.026	3 135	1.724	1 818	0.043
	Rural	0.010	0.003	29.044	0.004	0.016	2 020	1.704	1 185	0.042
	Urban	0.037	0.009	23.481	0.020	0.054	1 115	2.347	475	0.079
Access to safe toilet	Total	0.590	0.025	4.159	0.542	0.638	3 135	7.808	401	0.405
	Rural	0.659	0.034	5.091	0.593	0.725	2 020	10.114	200	0.549
	Urban	0.465	0.038	8.092	0.392	0.539	1 115	6.357	175	0.313
Access to safe water	Total	0.395	0.025	6.251	0.347	0.443	3 135	7.994	392	0.416
	Rural	0.224	0.031	13.818	0.164	0.285	2 020	11.150	181	0.611
	Urban	0.704	0.046	6.482	0.615	0.793	1 115	11.144	100	0.593

Source: Temesgen and Morganstein (2000).
Note: For descriptions of the variables used, see tables AIII.4 and AIII.5 below.

Table AIII.2, also based on data from Ghana, shows that the design effects can vary over time as well as by variable. In this case, the difference between the two surveys is only one year and the basic sample design did not change, but the design effects changed: the estimate for access to health became substantially more precise (design effect fell from 5.01 to 3.64) and the design effect for unemployment also declined, although not as much. The other variable in the table, adult literacy, was measured with less precision in the second year of the survey.

Table AIII.2. Variation in design effects over time, Ghana, 1987 and 1988

Ghana, 1987

Variable		Estimate	*SE*	*CV* (%)	*Confidence interval* Lower	Upper	*n*	*Design effect*	*EFFn*	ρ
Adult literacy	Female	0.402	0.021	5.103	0.362	0.442	1 339	2.342	572	0.080
	Male	0.613	0.018	2.953	0.578	0.649	1 381	1.910	723	0.054
	Total	0.509	0.016	3.192	0.477	0.541	2 720	2.875	946	0.112
Access to health services	Female	0.443	0.016	3.625	0.411	0.474	2 756	2.876	958	0.112
	Male	0.423	0.017	4.017	0.390	0.457	2 542	3.011	844	0.120
	Total	0.433	0.015	3.517	0.403	0.463	5 298	5.013	1 057	0.239
Unemployment	Female	0.039	0.004	10.063	0.031	0.047	4 011	1.655	2 424	0.039
	Male	0.047	0.004	9.136	0.038	0.055	3 543	1.454	2 437	0.027
	Total	0.043	0.003	7.666	0.036	0.049	7 554	1.983	3 810	0.059

Ghana, 1988

Variable		Estimate	*SE*	*CV* (%)	*Confidence interval* Lower	Upper	*n*	*Design effect*	*EFFn*	ρ
Adult literacy	Female	0.390	0.022	5.526	0.348	0.432	1 289	2.519	512	0.090
	Male	0.587	0.020	3.397	0.548	0.626	1 226	2.013	609	0.060
	Total	0.486	0.018	3.654	0.451	0.521	2 515	3.179	791	0.130
Access to health services	Female	0.375	0.013	3.558	0.348	0.401	2 921	2.215	1 319	0.072
	Male	0.365	0.015	4.118	0.335	0.394	2 606	2.539	1 026	0.092
	Total	0.370	0.012	3.346	0.346	0.394	5 527	3.635	1 521	0.157
Unemployment	Female	0.036	0.003	9.593	0.029	0.042	3 852	1.307	2 946	0.018
	Male	0.034	0.003	9.885	0.027	0.041	3 260	1.123	2 904	0.007
	Total	0.035	0.003	7.306	0.030	0.040	7 112	1.372	5 185	0.022

Source: Temesgen and Morganstein (2000).
Note: For descriptions of the variables used, see tables AIII.4 and AIII.5 below.

Finally, as expected, design effects across countries can vary significantly. Table AIII.3 shows how surveys in Côte d'Ivoire and Pakistan produced quite different design effects for the same variables. This result was a function both of the differing sample designs used in the countries and of the different characteristics of these countries.

Table AIII.3. Variation in design effects across countries

Côte d'Ivoire, 1988

Variable		Estimate	*SE*	*CV* (%)	*Confidence interval* Lower	Upper	*n*	*Design effect*	*EFFn*	ρ
Adult literacy	Total	0.567	0.031	5.538	0.506	0.629	1 660	6.676	249	0.378
	Rural	0.411	0.042	10.212	0.329	0.493	745	5.415	138	0.294
	Urban	0.738	0.024	3.217	0.691	0.784	915	2.661	344	0.111
Access to health services	Total	0.417	0.029	6.883	0.361	0.473	1 849	6.260	295	0.351
	Rural	0.303	0.034	11.174	0.236	0.369	1 051	5.693	185	0.313
	Urban	0.622	0.025	4.078	0.572	0.671	798	2.181	366	0.079
Unemployment	Total	0.038	0.007	18.837	0.024	0.052	4 979	6.991	712	0.399
	Rural	0.007	0.003	50.457	0.000	0.013	2 529	4.357	580	0.224
	Urban	0.081	0.013	16.218	0.055	0.107	2 450	5.679	431	0.312

Pakistan, 1991

Variable		Estimate	*SE*	*CV* (%)	*Confidence interval* Lower	Upper	*n*	*Design effect*	*EFFn*	ρ
Adult literacy	Total	0.5	0.013	2.5	0.48	0.53	6 834	4.335	1 577	0.222
	Rural	0.42	0.017	3.95	0.39	0.45	3 249	3.669	885	0.178
	Urban	0.68	0.018	2.616	0.64	0.71	3 585	5.156	695	0.277
Access to health services	Total	0.5	0.012	2.329	0.48	0.52	9 238	5.02	1 840	0.268
	Rural	0.46	0.015	3.177	0.43	0.49	4 752	4.048	1 174	0.203
	Urban	0.61	0.017	2.74	0.57	0.64	4 486	5.185	865	0.279
Unemployment	Total	0.03	0.003	9.735	0.02	0.03	18 232	4.633	3 935	0.242
	Rural	0.02	0.003	14.955	0.02	0.03	8 934	4.706	1 898	0.247
	Urban	0.03	0.003	8.956	0.03	0.04	9 298	2.539	3 662	0.103

Source: Temesgen and Morganstein (2000).
Note: For descriptions of the variables used, see tables AIII.4 and AIII.5 below.

In summary, the small sample sizes used in LSMS surveys and the multistage nature of the samples do involve a trade-off in terms of the precision of sample estimates. For example, the design effect value for "adult literacy" for all the individuals in the 1988 Côte d'Ivoire data is high at 6.7. This design effect signifies that the precision of the estimate with a sample size (*n*) of 1,660 is equivalent to that obtained using a SRS sample of only 249. If we consider the "urban" individuals only, however, we see that the design effect is a bit lower (2.7), although still higher than 1, meaning that a sample size of 915 persons has the precision equivalent to one of 344 persons using a SRS. The fact that the design effect can be quite large and the variation of

such effects over variables, time and different countries makes it imperative that analysts recognize and take into account the sample design when using the data and especially when performing statistical tests of significance. This also highlights the difficulties in designing efficient samples for multi-topic household surveys. Trying to lower the design effect of one variable may very well result in a higher design effect for others. A rule of thumb here is to primarily consider the variable(s) of key importance to the survey, to the extent possible.

Table AIII.4. Description of analysis variables: individual level

Variable	Description	Population base
Unemployment	Adults currently unemployed but available for work and looking for a job.	Persons aged 15-64 years
Access to health Services	Proportion of individuals who were sick during the month prior to the interview and who visited modern health facilities such as hospitals, clinics and health centres (but not midwives, faith healers, or other traditional medical practitioners).	Persons who were sick during the previous month
Adult literacy	The proportion of adults who are literate (defined as those who could read a newspaper).	Persons aged 15-24 years

Table AIII.5. Description of analysis variables: household level

Variable	Description
Access to safe water	The proportion of households that have access to safe drinking water. At the household level, this variable takes a value of one if the household obtains its drinking water from, for example, a tap, a pipe or a well with a pump. It takes a value of zero if the source of drinking water for the household -- such as a river, canal, open well, lake or marsh -- is considered potentially risky for health.
Land ownership	The proportion of households that own land. For a household, this variable takes a value of one if the household owns land. Zero otherwise.
Access to electricity	The proportion of households that have access to electricity. For a household, this variable takes a value of one if the household uses electricity for light and/or energy. Zero otherwise.

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