

# 21468 Viewpoint

Note No. 213

June 2000

## Better Household Surveys for Better Design of Infrastructure Subsidies

*Andrés Gómez-Lobo, Vivien Foster, and Jonathan Halpern*

**Reform of the water, electricity, and telecommunications sectors is gathering momentum in nearly all developing countries. Reform should include an assessment of whether subsidies are necessary and if so, how to design subsidies that reach their intended beneficiaries accurately and do not distort the market. A major challenge for governments is to build the capability to do this fast enough for subsidy redesign to be incorporated in sector reform. Clearly, it would save time to use existing sources of information. Potentially, one of the most useful sources is the Living Standards Measurement Study (LSMS) survey. However, the LSMS questionnaires do not generate all the information needed for subsidy design. Fortunately, with a few simple and inexpensive changes, these surveys could be made much more useful for the design of subsidies and for devising policies that would give the poor better access to infrastructure services.**

More than 20 developing countries use some form of the LSMS survey developed by the World Bank in 1980. These household surveys are a useful tool for measuring living standards and poverty, and provide crucial information for the design of government policies and evaluating social programs. As well as socioeconomic inquiries, most surveys include questions on utility services such as water, electricity and telecommunications. This makes them particularly valuable because they are potentially the only source combining information on households' usage of utility services together with socioeconomic characteristics.

Interest is growing in the rational design of subsidies for utility services as an integral part of tariff reforms. Explicit subsidies, with well-defined objectives, budgets and instruments, are intended to replace the implicit subsidy arrangements that are ubiquitous in developing countries. However, the process of designing a subsidy scheme should be supported by empirical analysis to simulate the impact of alternative

types of subsidies on the target population. An LSMS survey is an invaluable source of the information needed.

However, the use of figures from an LSMS survey for a study of the water sector in Panama revealed that, as in most countries, the data on water expenditure produced by such surveys have significant limitations. This Note describes the difficulties encountered with the Panama LSMS survey of 1997 and suggests changes that would make the survey much more useful for the formulation of water sector policy and the design of policies to promote access of the poor to infrastructure services in general.

### **The challenge**

When designing a water tariff and subsidy structure it is important to simulate the social and distributive impacts of different designs. For example, rising block tariffs might be proposed as a way to make water affordable for the poor





without impairing the economic efficiency and financial sustainability of the service provider. The unit price of water would be lower for the first units of consumption, up to the level considered sufficient for the basic needs of poor households. Water in the subsequent blocks could then be priced at the true economic cost or higher. The efficiency and effectiveness of these types of social tariffs will depend on the correlation between household water consumption and household poverty levels. To evaluate this correlation it is necessary to have a database that records for each household both socioeconomic variables—required to determine the incidence and degree of poverty—and *physical* water consumption.

Such a database would be useful in setting the correct prices and the size of the blocks. It would also help with other policy questions. For example, the targeting properties of different subsidy design options and eligibility criteria could be studied empirically to choose the most appropriate.

LSMS surveys record a large number of socioeconomic variables that can be used to ascertain the poverty level of the sampled households. For water use all surveys ask how much the household spent on water services during the last month or the last payment period. They also ask the source of water supply, the average number of hours a day in which a dwelling receives water, and whether there is a sewerage connection. They sometimes ask how far the dwelling is from the water supply source, where the tap is within the perimeter of the dwelling's premises, and other characteristics of the water and sewerage services.

Experience with the Panama LSMS survey in the design stage of a new water subsidy scheme revealed the shortcomings of such surveys for the design of sectoral policy. These relate to:

- *Sample design.* Sampling frames are not designed to answer useful policy questions at the sectoral level. Rarely will the sample be representative of specific urban localities, a level of disaggregation needed for policy analysis in

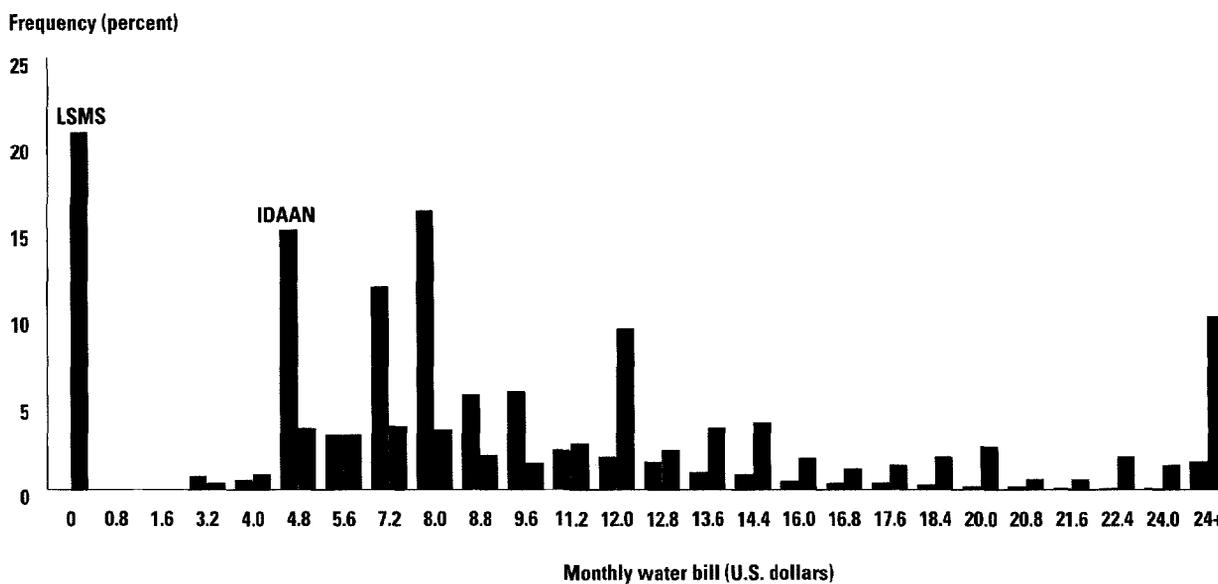
the water sector. More typical are general aggregations, such as urban or rural, which do not allow the analysis of the impact of policies based on finer geographical divisions.

- *Survey design.* The surveys ask households how much they *spend* on water, not how much water they consume. Consumption has to be inferred by applying the prevailing tariff structure to the expenditure figures. This has proven very unreliable as there are often multiple tariff structures in force and billing is often based on unmetered consumption. Consequently, there are likely to be some inaccuracies in the estimates of household consumption inferred from LSMS expenditure data.
- *Interview protocols.* Although interviewers were instructed to ask households for their last water bill, the analysis of the survey results presented below seems to suggest either that this was not done, or that households were unable to produce the bill. It appears that most responses were based on recall, not read from the bill. Besides the measuring errors introduced by poor recall, figures given from memory tend to overstate the amount charged for water, because the bills include items not related to water services (for example, refuse collection).

These shortcomings imply that information on the water sector provided by an LSMS survey may not be capable of providing adequate answers to the key questions raised by subsidy design. As there are few other data sources, the choice is either not to use these data for water policy design, or to risk poorly designed policies. Either way the result is less than optimal policies to aid the access of poorer households to basic water services.

The problem of unsuitable sample design may be expensive to overcome. Finer geographical divisions require more interviews if they are to be statistically reliable. They might also be unacceptable if they made the samples unsuitable for the other purposes of the LSMS survey. However, the survey design and interview protocols would be less difficult to adapt. This Note will recommend inexpensive changes to them

**FIGURE 1 MONTHLY WATER BILL DISTRIBUTIONS FROM DIFFERENT INFORMATION SOURCES, STANDARD RESIDENTIAL CUSTOMERS, PANAMA, 1997**



Source: Instituto de Acueductos y Alcantarillados Nacional and Encuesta de Niveles de Vida, Panama, 1997.

that would immediately make the LSMS survey more useful for water policy formulation. Before making these recommendations, the Note considers the evidence from the Panama LSMS survey that illustrates the shortcomings of such surveys for design of water sector policy.

### A case of divergent numbers

Ideally, the designers of tariff and subsidy schemes for infrastructure services should have access to a household-level data set that contains both socioeconomic data and data on physical consumption for each observation. The LSMS survey comes close to this ideal data source, because it records the amount each household spent on water. The volume consumed can be calculated using the prevailing tariff structure.

Unfortunately, a detailed analysis of the data in Panama's 1997 LSMS survey reveals some inconsistencies. There was wide divergence between

the frequency distribution of the actual water expenditure as shown in IDAAN's client data set and that reported in the LSMS survey (figure 1). Part of the explanation for the poor quality of the survey expenditure data may be that households based their answer on recall, not the actual bill. Particularly revealing was the spike in the LSMS distribution at US\$12, exactly the amount of the minimum residential bill including refuse collection charges.

Calculating the volume of water consumed introduces further error. The bills must be transformed into volumes using the tariff structure. However, multiple tariff structures are applied to residential customers and the survey contained no information on which tariff applied to which household. Nor did it indicate whether a given household had a water meter. Therefore it is impossible to know whether the expenditure transformation gives actual or imputed water consumption. This a flaw common to LSMS surveys



in most countries and it limits their usefulness as a tool for policy design.

### Better surveys and interviews

Several changes to the survey and interview protocols could be made to improve the precision of LSMS water expenditure data and facilitate the estimation of the volume consumed by each household. Although the recommendations have been derived for the water sector, many of them will be relevant to other utilities such as electricity and telecommunications. Overall these recommendations illustrate the importance of maintaining a dialogue between LSMS practitioners and downstream infrastructure analysts to ensure that the supply of information meets the policy needs of the sector.

In particular, if the interviewer is able to see the bill, it would be desirable to record the following information in addition to the amount spent on the service:

- Whether the bill was based on measured, estimated (based on past meter readings), or imputed consumption. A more ambitious strategy would be to record the customer number of the client. This variable could then be used to cross the household survey data with the water company's client data base. However, unless the statistical office did the crossing of data sets itself, before the information is made public, this alternative would probably violate the confidentiality rules that apply to such surveys.
- The tariff that applied to the household (if this information is clearly specified in the bill).
- The quantity of service consumed (if this information is recorded in the bill) as well as the amount of money charged for it.
- The identity of the service supplier. This may be important when there are alternative suppliers. Some surveys already include such a question.

The interviewer training should emphasize the importance of asking to see the bill. Although interview guidelines—at least in Panama—give clear instructions in this respect, the evidence

presented above suggests that interviewers were not following the established procedure. Better training and supervision may be required.

When the bill is not available, the interviewer should:

- Ask, based on the household's recollection, the same information as above.
- Remind the interviewee to exclude from the estimate the costs of irrelevant services such as refuse collection or other services charged on the utility bill.
- Record that the expenditure figure is based on the household's recollection, not the bill.
- Be alert to question the household if a stated expenditure figure (based on recollection) is implausible (for example, if it is below the minimum charge of the tariff structure).
- Record, particularly for water, whether the household has a meter.

These recommendations are relatively simple and would not increase the burden or costs of administering a survey. They could bring substantial benefits by providing the needed data to make informed policy choices. The marginal costs would be small compared with the potential benefits to the poor from better designed and targeted subsidy and tariff schemes for infrastructure services.

### References

- Deaton, Angus. 1997. *The Analysis of Household Surveys: A Microeconomic Approach to Development Policy*. Baltimore, Md.: Johns Hopkins University Press.
- Foster, Vivien, Andrés Gómez-Lobo, and Jonathan Halpern. Forthcoming. "Designing Direct Subsidies for Water and Sanitation Services: Lessons from Panama." Policy Research Working Paper. World Bank, Washington, D.C.
- Gómez-Lobo, Andrés, Vivien Foster, and Jonathan Halpern. Forthcoming. "Information and Modeling Issues in Designing Water and Sanitation Subsidy Schemes." Policy Research Working Paper. World Bank, Washington, D.C.

*Vivien Foster (vfoster@worldbank.org), and Jonathan Halpern (jhalpern@worldbank.org), Latin America and the Caribbean Region, and Andrés Gómez-Lobo (agomezlo@decon.facea.uchile.cl), Department of Economics, University of Chile*

Viewpoint is an open forum intended to encourage dissemination of and debate on ideas, innovations, and best practices for expanding the private sector. The views published in this series are those of the authors and should not be attributed to the World Bank or any of its affiliated organizations. Nor do any of the conclusions represent official policy of the World Bank or of its Executive Directors or the countries they represent.

To order additional copies please call 202 458 1111 or contact Suzanne Smith, editor, Room F11K-208, The World Bank, 1818 H Street, NW, Washington, D.C. 20433, or Internet address [ssmith7@worldbank.org](mailto:ssmith7@worldbank.org). The series is also available on-line ([www.worldbank.org/html/tpd/notes/](http://www.worldbank.org/html/tpd/notes/)).

♻️ Printed on recycled paper.