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## Designing Direct Subsidies for the Poor—A Water and Sanitation Case Study

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**Direct subsidies are an increasingly popular means of making infrastructure services more affordable to the poor. Under the direct subsidy approach, governments pay part of the water bill of poor households that meet certain eligibility criteria. This approach was first used in water sector reforms in Chile in the early 1990s and is an alternative to the traditional method in which governments pay subsidies directly to utilities, often allowing the price of water to fall below economic costs indiscriminately. This Note illustrates how simulation techniques can be used to inform the design of direct subsidy schemes, ensuring that they are both cost-effective and accurate in reaching the target population.**

Universal access to adequate water and sanitation services has long been recognized as essential to public health and individual welfare. In most countries government policy has traditionally been to keep water companies in public ownership, and to keep tariffs artificially low through a range of more or less explicit subsidy measures. The results have often been unsatisfactory. Service quality and coverage remain inadequate in many countries, and subsidies directed at public water companies have often benefited the middle classes rather than the poor, who remain unconnected to the public network. This has led to a search for alternative subsidies that would guarantee access to basic services for the poorest.

In the direct subsidy system introduced during the Chilean reforms in the early 1990s, prices are allowed to signal their true economic scarcity costs while subsidies are paid to consumers who cannot afford their bills rather than to water utilities. Government funds are used to cover part of the cost of subsistence consumption for households that meet certain poverty-related criteria. The main advantages of direct subsidies are that they are transparent and explicit, and mini-

mize distortions in the behavior of water utilities and their customers. The main drawbacks of direct subsidies are higher administrative costs and the difficulty of designing suitable eligibility criteria.

Despite the growing interest in direct subsidies, their administrative cost and accuracy of targeting have, as yet, been little studied. This Note attempts to fill the gap by presenting the results of a simulation performed in Panama in 1998. The simulation is based on a willingness-to-pay survey and complementary information from the 1997 Living Standards Measurement Study (LSMS) survey and the customer database for Panama's national water utility IDAAN (Instituto de Acueductos y Alcantarillados Nacional). The work was done in the context of efforts to reform IDAAN, which still operates as a traditional utility. It considers the relative merits of a water consumption subsidy versus a sewerage connection subsidy.

### Assessing need for a subsidy

As a general rule, the case for a water subsidy is something that needs to be assessed rather than





**TABLE 1 ZONAL AND INDIVIDUAL CRITERIA IN PANAMA, 1997 (percent)**

	Zonal eligibility criteria	Individual eligibility criteria
Errors of exclusion	94	6
Errors of inclusion	31	93

Source: Encuesta Nacional de Niveles de Vida, Panama, 1997.

assumed. It is not axiomatic that water services are unaffordable to low-income households, nor that subsidizing water consumption is the best way of promoting access to sanitation or improving public health among the poorest.

An important starting point is to review existing subsidy arrangements and consider how effectively they reach the poor. A review of basic data in Panama revealed a number of important points. The first was that poverty in Panama is primarily rural, but IDAAN operates almost exclusively in towns. Only 16 percent of IDAAN’s customers live below the poverty line. Nevertheless, at least two-thirds of IDAAN’s customers are subsidized. With the exception of a pensioner discount, the determination of eligibility for these subsidies has been largely at the discretion of IDAAN, and has often been based on payment history. The sheer number of beneficiaries relative to the number of poor households served by IDAAN indicates that the vast majority of subsidy beneficiaries are not poor, by the strict standard provided above.

To find out how many people are excluded from water and sewerage services because they genuinely cannot afford them, a contingent valuation survey was conducted. It sought to establish the maximum amount that households were willing to pay to consume a typical volume of piped water and to obtain a connection to the sewerage network. Willingness to pay is compared with current prices to provide an indication of affordability. The premise is that a subsidy is only justified when willingness to pay falls short of true economic cost. The results of the survey show that while the current cost for water is US\$0.21 per cubic meter, poorer con-

sumers would be willing to pay up to US\$0.46. The implication is that the price of potable water would have to rise substantially before it became unaffordable to low-income households in urban Panama. For sewerage connections the current cost is US\$1,000 (including cost of household plumbing) but willingness to pay is only US\$270. Thus sewerage connections are already well beyond the means of low-income households. Subsidies might therefore be justified to the extent that the wider social benefits of expanding the sewerage network were at least as high as the associated subsidy.

### Designing eligibility criteria

The intended beneficiaries of subsidy schemes are invariably those living below the poverty line, usually expressed as an annual threshold for per capita income or expenditure. In practice it is very difficult to measure income levels directly and, therefore, to determine whether a particular household should benefit from the subsidy. To get around this problem, it is necessary to develop eligibility criteria that show a high degree of correlation with the underlying poverty variable of interest, can be measured objectively and observed easily, and are difficult to falsify or misrepresent.

Eligibility criteria can either be zonal (based on the characteristics of the area where the household lives) or individual (based on the characteristics of the household itself). The key issue is the extent to which the criteria succeed in identifying the target group. There are two forms of targeting errors. Perhaps the most serious are errors of exclusion, when members of the target group are not captured by the eligibility criteria and hence fail to receive the subsidy. A subsidy scheme with a high exclusion error clearly fails on its own terms. Errors of inclusion occur when people outside the target group fortuitously comply with the eligibility criteria and consequently receive the subsidy. Such leakage of funds to unintended beneficiaries reduces the efficiency of the subsidy. In particular, it inflates the cost of the subsidy to taxpayers.

**TABLE 2 HOUSEHOLDS WITH PROPOSED INDIVIDUAL CRITERIA OF ELIGIBILITY FOR SUBSIDIES IN PANAMA, 1997**

Criterion	Extreme poverty		Poverty		Non-poor		Total	
	Thou-sands	Per-cent	Thou-sands	Per-cent	Thou-sands	Per-cent	Thou-sands	Per-cent
Poor-quality floor materials	10.6	88.6	24.3	78.3	187.6	56.0	222.6	58.8
Lack of telephone connection	9.6	79.8	21.7	69.8	113.2	33.8	144.4	38.2
Primary educated head of household	7.8	65.3	15.2	49.1	85.2	25.4	108.3	28.6
Toilet facilities located outside house	7.2	60.4	18.3	58.9	82.3	24.5	107.8	28.5
Lack of sanitation beyond most basic	7.1	58.9	15.0	52.7	52.7	15.7	74.8	19.8
<b>Total</b>	<b>12.0</b>	<b>3.2</b>	<b>31.0</b>	<b>8.2</b>	<b>335.1</b>	<b>88.6</b>	<b>378.2</b>	<b>100.0</b>
None of the above	0.0	0.0	1.0	3.3	98.8	29.5	99.8	26.4
One or more of the above	12.0	100.0	30.0	96.7	236.3	70.5	278.4	73.6
Two or more of the above	11.3	93.9	25.9	83.5	140.7	42.0	178.8	47.3
Three or more of the above	9.5	78.8	20.2	65.2	80.1	23.9	110.5	29.2
Four or more of the above	6.8	56.1	13.2	42.6	47.6	14.2	68.3	18.1
All five of the above	2.9	24.1	5.2	16.9	16.2	4.8	24.3	6.4

Source: Encuesta Nacional de Niveles de Vida, Panama, 1997.

As a criterion, zone of residence has the advantage of being easy to observe and relatively hard to falsify. How well it correlates with the underlying poverty measure of interest depends on the size of the zones used and the extent to which poverty is geographically concentrated. In Panama, simulations were performed using zones defined by the 1997 LSMS survey, comprising approximately 15 households each. The simulations explored the effect of giving a subsidy to all households in zones that met a particular set of socioeconomic criteria; for example, zones where more than 50 percent of households were living in extreme poverty. Such zonal eligibility criteria were found to have high errors of exclusion, with as much as 94 percent of the target population being excluded from the scheme (table 1). However, errors of inclusion were comparatively low; only 31 percent of the subsidies would go to households above the extreme poverty line.

While reliable information about poverty levels at the zonal level may be obtained based on census or survey data, it is much harder to obtain a reliable estimate of individual household income and expenditure in order to assess eligibility for individual subsidies. In Panama, an extensive search for proxy variables was conducted by making cross-tabulations between candidate

proxies and poverty levels, using data from the LSMS survey. The results for the most successful proxy variables are reported in table 2. As the table illustrates, it is difficult to find a single variable that performs well in minimizing both errors of exclusion and errors of inclusion. For example, poor quality floor materials have a very low error of exclusion, being found in 88.6 percent of extremely poor households, but a high error of inclusion, also being found in 56.0 percent of non-poor households. Clearly, the most powerful eligibility criterion is one that combines information on all of these characteristics. For the purposes of the Panama simulation, the eligibility criterion was taken to be that the household should meet two or more of the criteria identified in table 2. The main benefit of moving from zonal to individual criteria is a dramatic reduction in the errors of exclusion, which fall from 94 percent to 6 percent. This comes at the cost of much higher errors of inclusion, with a very high proportion of the subsidy funds (93 percent) leaking to households outside the target group.

### Estimating administrative costs

Using individual eligibility criteria requires an administrative apparatus for the screening of potential candidates. Typically, a standardized



household interview is conducted by a social worker to collect the information needed to apply the eligibility filters. This selection process can be expensive. In Panama, some initial estimates suggested that the interviews could cost as much as US\$10 per household. To this must be added the fixed costs of running the subsidy program.

Since administrative costs do not vary significantly with respect to the size of the subsidy given, schemes that pay out very little to each beneficiary tend to be highly inefficient from an administrative point of view. A simulation of administrative costs for different types and illustrative levels of subsidies in Panama shows that for a water consumption subsidy of US\$1.50 per month, the administration costs absorb 40 percent of the total value of the subsidy, whereas for a one-off sewerage connection subsidy of US\$750 the costs fall to 7 percent. These simulations illustrate that low value subsidies are hard to justify in administrative terms, unless the selection procedures can be shared and jointly administered across a number of subsidy schemes.

### Preserving economic incentives

It is important, in determining how high a subsidy to pay, to avoid the perverse incentives that can be created by subsidies. First, a subsidy that covers the full cost of the service will eliminate incentives for the efficient use of water, and is likely to create a non-payment habit that may be difficult to break at a later date. Therefore, full-scale subsidies should be avoided. Payment should also be encouraged by making the subsidy conditional on the household paying its own share. In Chile, water subsidies are capped at 85 percent of the bill and are only disbursed upon proof that the household has paid its share.

Second, a subsidy that applies to all levels of consumption may encourage excessive use of the service. In Argentina a subsidy of utility bills for pensioner households had to be discontinued because consumption levels rose as family, friends, and neighbors took advantage of the lower cost of using utility services in pensioner

households. The subsidy should be capped at some pre-determined subsistence consumption level.

Third, the shorter the duration of the subsidy and the higher its absolute level, the greater the probability that the potential loss of the subsidy may act as a disincentive for households to attempt to improve their economic circumstances. This effect, known as the “poverty trap,” suggests that eligibility for subsidies should not be reassessed too frequently. In Chile, for example, eligibility is reassessed every three years.

### Conclusion

The case of Panama shows how useful simulation techniques can be in informing choices between alternative policy instruments. The main lessons from the experience in Panama are:

- Before jumping to the conclusion that a subsidy is required, policymakers should examine the poverty profile of water utility customers and collect evidence on willingness to pay in relation to the true costs of service provision.
- It is extremely difficult to find sound individual or zonal eligibility criteria. However, calculating the errors of inclusion and exclusion is a helpful way of assessing the options.
- Given significant fixed administrative costs in subsidy programs, direct subsidies of relatively low value are unlikely to be cost-effective.

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