

Designing Direct Subsidies for Water and Sanitation Services

Panama: A Case Study

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An alternative to traditional subsidies for water and sanitation services is direct subsidies — funds governments provide to cover part of the water bill for households that meet certain criteria. Issues associated with such a subsidy are analyzed through a case study of Panama.



Summary findings

As an alternative to traditional subsidy schemes in utility sectors, direct subsidy programs have several advantages: they are transparent, they are explicit, and they minimize distortions of the behavior of both the utility and the customers. At the same time, defining practical eligibility criteria for direct subsidy schemes is difficult and identifying eligible households may entail substantial administrative costs.

Foster, Gómez-Lobo, and Halpern, using a case study from Panama, discuss some of the issues associated with the design of direct subsidy systems for water services. They conclude that:

- There is a need to assess — rather than assume — the need for a subsidy. A key test of affordability, and thus of the need for a subsidy, is to compare the cost of the service with some measure of household willingness to pay.
- The initial assessment must consider the affordability of connection costs as well as the affordability of the service itself. Connection costs may be prohibitive for poor households with no credit, suggesting a need to focus subsidies on providing access rather than ongoing water consumption.
- A key issue in designing a direct subsidy scheme is its targeting properties. Poverty is a complex phenomenon and difficult to measure. Eligibility must therefore be based on easily measurable proxy variables, and good proxies are hard to find. In choosing eligibility criteria for a subsidy, it is essential to verify what proportion of the target group fails to meet the criteria (errors of exclusion) and what proportion of nontarget

groups is inadvertently eligible for the benefits (errors of inclusion).

- Administrative costs are roughly the same no matter what the level of individual subsidies, so a scheme that pays beneficiaries very little will tend not to be cost-effective. It is important to determine what proportion of total program costs will be absorbed by administrative expenses.
- Subsidies should not cover the full cost of the service and should be contingent on beneficiaries paying their share of the bill. Subsidies for consumption above a minimum subsistence level should be avoided. Subsidies should be provided long enough before eligibility is reassessed to avoid “poverty trap” problems.
- The utility or concessionaire can be helpful in identifying eligible candidates because of its superior information on the payment histories of customers. It will also have an incentive to do so, since it has an interest in improving poor payment records. Thought should therefore be given at the design stage to the role of the service provider in the implementation of the subsidy scheme.
- The administrative agency’s responsibilities, the sources of funding, and the general principles guiding the subsidy system should have a clear legal basis, backed by regulations governing administrative procedures.
- To reduce administrative costs and avoid duplication of effort, it would be desirable for a single set of institutional arrangements to be used to determine eligibility for all welfare and subsidy programs in a given jurisdiction, whether subnational or national.

This paper — a product of the Finance, Private Sector, and Infrastructure Sector Unit, Latin America and the Caribbean Region — is part of a larger effort in the region to evaluate and disseminate lessons of experience in designing policies to improve the quality and sustainability of infrastructure services and to enhance access of the poor to these basic services. Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Silvia Delgado, room I5-196, telephone 202-473-7840, fax 202-676-1821, email address sdelgado@worldbank.org. Policy Research Working Papers are also posted on the Web at www.worldbank.org/research/workingpapers. The authors may be contacted at vfoster@worldbank.org or jhalpern@worldbank.org. May 2000. (29 pages)

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DESIGNING DIRECT SUBSIDIES FOR WATER AND SANITATION SERVICES

PANAMA: A CASE STUDY

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EXECUTIVE SUMMARY

This paper illustrates an approach for rationalizing social policy towards the water and sanitation sector in the context of sector reform. The reform process provides an opportunity to reconsider the underlying justification for any water sector subsidy and to redesign the associated policy instruments, so as to ensure that they really do benefit the poor and avoid distorting the efficient operation of the sector.

An interesting alternative to traditional subsidy mechanisms is the direct subsidy system, whereby government funds are used to cover part of the water bill of poor households who meet certain clearly defined eligibility criteria. The main advantages of direct subsidies are that they are transparent, explicit, and minimize distortions in the behavior of water utilities and their customers. The main drawbacks of direct subsidies are the difficulty of defining suitable eligibility criteria as well as the administrative cost entailed in identifying eligible households.

Drawing upon the experience of the water sector in Panama, where a direct subsidy system formed an integral part of the reform strategy, the paper has identified and illustrated the key design questions that arise in creating a direct subsidy system. While the adoption of a direct subsidy scheme can be of interest in many circumstances, it is particularly pertinent in the context of private sector participation where there is a need to reconcile the financial sustainability of the water utility with the social impact of raising tariffs to economic levels. The main conclusions that have emerged from the discussion can be summarized as follows.

First, the need for a subsidy should be assessed rather than assumed. Water and sewerage bills are not necessarily beyond the means of poor households. A key test of affordability is to compare the cost of the service with some measure of household willingness to pay.

Second, the initial assessment should pay as much attention to the affordability of the connections as to the affordability of the service itself. Connections often entail large up-front costs, both in the form of company charges and in the need for complementary household investments in plumbing and sanitary installations. Such costs can be prohibitive for poor households who lack access to credit markets.

Third, owing to the difficulty of measuring poverty, eligibility for the subsidy often has to be based on proxy variables, and good proxies are hard to find. In designing such a scheme, it is therefore essential to verify what proportion of the target group fails to meet the eligibility criteria (Type I error), but also what proportion of the wider population is inadvertently included according to those same criteria (Type II error).

Fourth, the administrative costs of operating a direct subsidy scheme do not really vary with respect to the size of the subsidy given. Consequently, a scheme that pays out a very low sum to each beneficiary tends to perform badly in terms of cost-effectiveness, and may not be worth having at all. It is therefore important to check what proportion of the total subsidy funds is likely to be absorbed in administrative expenditures.

Fifth, in order to preserve incentives for rational economic behavior, subsidies should only cover a proportion of the total costs of the service, and should ideally be contingent on beneficiaries paying their share of the bill. No subsidy should be paid for consumption beyond the subsistence level. The subsidy should be given for a long enough period to avoid the effects of the 'poverty trap'.

Sixth, a subsidy scheme should have a clear legal basis that establishes the main lines of institutional responsibility, the sources of funding and the general principles governing the design of the scheme. This should be backed up with regulations that define the more detailed administrative procedures.

Seventh, the water utility will have a valuable role to play in identifying potential candidates and facilitating the applications process. This is because the utility enjoys continual contact with its customers and has access to the payment history of individual cases. Furthermore, the utility has the incentive to ensure that customers with a poor record of payment become beneficiaries of the scheme.

Finally, in order to economize on the administrative costs associated with implementing a scheme, it is highly desirable to integrate the selection procedures for a water subsidy program with those of other subsidy schemes that may be operating in the country. Ideally, each country should develop a single system for conducting the socio-economic assessment of households which may be used to inform the allocation of funds in a whole range of social programs. The creation of parallel bureaucracies for subsidy administration is something that should be avoided at all costs.

1. INTRODUCTION

Universal access to adequate water and sanitation services has long been recognized as a cornerstone of public health and an essential component of individual well-being. The traditional response of governments around the world has been to retain water companies under public ownership, and to keep tariffs artificially low through a range of more or less explicit subsidy measures. These have tended to include operational and investment subsidies aimed at bolstering the typically precarious financial position of publicly owned water utilities, as well as the progressive accretion of complex and frequently contradictory cross-subsidy mechanisms aimed at redistributing income between different social groups.

This conventional approach has often failed to yield positive results. Quality and coverage of water and sanitation services remain inadequate in many countries. Moreover, subsidies directed towards public water companies have often benefited the middle classes rather than the poor, who remain unconnected to the public network. Furthermore, the indiscriminating allocation of subsidy funds to public utilities has tended to produce the perverse effect of undermining incentives for the efficient management of water and sewerage companies.

In recognition of these problems, many countries around the world are in the process of reforming their water and sanitation sectors. Sectoral reform is a far-reaching process which encompasses industrial restructuring, private-sector participation and tariff adjustment, as well as the creation of new legal and regulatory frameworks. This shift towards a new paradigm in water and sanitation provision does not mean that the social dimension of these services should be downplayed or overlooked. On the contrary, it provides a golden opportunity to put social policy towards the sector on a much sounder footing; dismantling ineffectual and distortionary subsidy schemes and replacing them with programs that genuinely benefit the poor while preserving incentives for rational economic behavior.

One of the new social policy instruments that have emerged from the experience of sector reform is the direct subsidy approach. This approach involves targeting subsidy funds directly towards poor households rather than to water utilities. A key difference vis-à-vis earlier subsidy scheme is that eligibility must be determined on the basis of explicit and transparent criteria. The direct subsidy system was pioneered by the Chilean government in 1990, when it was successfully used to soften the distributional impacts of a convergence towards cost-reflective water tariffs.

The introduction of this type of subsidy scheme raises a host of complex design questions.

- Is the introduction of a direct subsidy scheme justified in any particular instance?
- Which services should be subsidized: water or sewerage, consumption or connection?
- Who should benefit from the subsidy and how will eligibility be determined?
- How large should the subsidy be and for how long should it be granted?
- What legal, institutional and administrative measures are required to support implementation?

This paper provides an illustration of the process of designing subsidy policies in the wider context of water sector reform, drawing on recent experience from Panama. In the early stages of the reform, the Panamanian government made a legal commitment to using direct subsidies as a means of achieving social objectives in the water and sanitation sector. As part of the proposed implementation, an extensive study was commissioned to put forward a detailed proposal of how such a subsidy system might function. The study undertook a systematic empirical investigation of the key design questions posed above. In the event, the implementation of the scheme was put on hold following a change of government in the early months of 1999. Notwithstanding, the lessons learned from the design exercise reveal some important empirical features of direct subsidies with important implications for the design of such schemes in other contexts.

The purpose of the paper is to illustrate the steps involved in the design of a direct subsidy scheme, drawing on concrete examples and illustrations from the Panama case. It is intended that the paper should serve as a practical guide for those interested in introducing such a scheme in other countries. A companion technical paper provides greater detail on the empirical analysis that underpins the present discussion, expanding upon the key data requirements and modelling tools.

The rest of the paper is organized as follows

- Section 2 provides the relevant background on water sector reform in Panama and the historical basis of social policy in the sector.
- Section 3 explains how the need for a direct subsidy system was assessed in the case of Panama.
- Section 4 uses Panamanian data to examine the targeting performance of alternative eligibility criteria for the subsidy.
- Section 5 presents the analysis that was used to determine the appropriate size of the subsidy for Panama.
- Section 6 describes the legal, institutional and administrative framework for the Panamanian subsidy system.
- Section 7 draws out the main lessons and conclusions from the rest of the paper.

2. THE PANAMA CASE

Background

Since 1961, water and sewerage services in the urban areas of Panama have been the responsibility of an autonomous public enterprise known as the Instituto de Acueductos y Alcantarillados Nacionales (IDAAN), which operates under the aegis of the Ministry of Planning. In the rural areas (encompassing all conurbations with fewer than 500 inhabitants), the Ministry of Health plays a leading role in the design and construction of water and sewerage infrastructure.

By 1995, IDAAN was manifesting a wide range of problems common to public-sector water companies in Latin America. The company had effectively lost much of the administrative and technical autonomy which—by law—it was supposed to enjoy, being subject to direct political involvement in its day-to-day managerial decisions. As a result, its operations had become highly inefficient and its financial situation extremely precarious. Only a substantial transfer of funds from the public purse, amounting to US\$20m in 1997, was enabling the company to stay afloat.

Prompted by a desire to overcome these problems, the government of Panama began to consider options for water sector reform, including the possibility of private-sector participation. These deliberations occurred against the background of reforms in other utilities leading to the creation of a new multi-sector regulatory agency in 1996, the Ente Regulador de Servicios Públicos (ERSP), with jurisdiction over the electricity, telecommunications and water sectors.

The first major step towards reform of the water sector was the passage of Law No. 01/97 at the beginning of 1997. The law introduced a new regulatory framework for the water and sewerage sector, and, in particular, opened up the possibility of private-sector participation in water and sewerage services under a range of alternative forms.

Later that same year, the government announced an international bidding process for a concession to supply water and sewerage services to the areas currently supplied by IDAAN. As of mid-1999 the privatization process has been stalled pending a decision by the newly elected government.

The Subsidy Study

One of the provisions of the new sector law described above related to the subsidy regime for water and sewerage services. The law allowed the government to grant subsidies to individual households for the consumption of water and sewerage services (as it had already been doing), but only under certain carefully defined conditions (which were not met by existing subsidy payments).

As part of the sector reform process, the government planned to introduce a direct subsidy scheme along the lines laid down in the new legal framework. The subsidy policy forms an

integral part of the reform strategy in that it was intended to soften the distributional impact of any tariff increases brought about as a result of the transition to the new model. In the context of the proposed private-sector participation, it was also hoped that, by reducing the bills of the lowest-income customers, the subsidy scheme might go some way towards attenuating the commercial risk faced by the future concessionaire.

A study was therefore commissioned with a view to providing detailed proposals for how such a new subsidy scheme might function.¹ The subsidy study comprised three components.

- A household survey designed to collect evidence of water consumption, willingness to pay for water and sanitation services, attitudes towards water privatization and other socio-economic parameters.
- The construction of a simulation model which would permit analysis of the financial costs and socio-economic impacts of alternative subsidy systems. The model, which drew upon the results of the household survey and a number of other data sources, would be used to inform the choice between alternative subsidy designs.
- A review of the legal and institutional framework of the water and sewerage sector in Panama. The objective of this exercise was to put forward a concrete proposal for the administration and operation of the subsidy scheme, as well as an assignment of responsibilities between the various institutions in the sector.

From this starting point, the subsequent sections explain the general methodology that was applied in order to devise a new subsidy system for Panama, illustrating each stage of the process with data collected during the course of the subsidy study.

¹ The subsidy study, entitled 'Diseño de un Sistema de Subsidios y Exenciones para el Sector de Agua y Alcantarillado' was awarded by the Ministerio de Planificación y Política Económica to a consortium headed by Oxford Economic Research Associates Ltd (UK) and comprising ESA Consultores (Honduras) and EMG Consultores (Chile).

3. ASSESSING THE NEED FOR A WATER SUBSIDY

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

The advent of a sector reform process provides the perfect opportunity to reconsider the underlying rationale for any such transfers. An important starting point is to review the nature of existing subsidy arrangements and consider to what extent they are effective in reaching the poor. As part of this process, it is helpful to collect some basic information on the incidence of poverty within the water utility's customer base.

Existing Subsidy System

An initial review of the status quo revealed that there were three different subsidy mechanisms operating in Panama. Their main features are summarized in Table 3.1 below.

- The first is direct subsidy benefiting some 20,000 residential customers in the metropolitan area, who are regarded as 'social cases' and represent about 7% of the customer base. Eligible households have their entire water bill paid directly by the Ministry of Health at a total cost to the state of US\$3m per year.
- The second is a cross-subsidy benefiting some 60% of residential customers, which takes the form of a 33% discount on the tariff paid and is worth a total of about US\$1.6m per year.
- The third is cross-subsidy benefiting pensioners, which takes the form of a 25% reduction in the tariff up to a maximum monthly expenditure of US\$10.

With the exception of the pensioner scheme, the determination of eligibility for these subsidies has been largely at the discretion of IDAAN. In making its decisions, IDAAN had traditionally relied upon information supplied by the Ministry of Housing that identified those neighborhoods with the most precarious living conditions. However, more recently, IDAAN had begun to move towards a household-level assessment of eligibility based on the outcome of an interview conducted by one of the company's social workers. With regard to the 'social cases', subsidies were often being allocated on the basis of a poor payment history.

It is evident that there are a number of problems with the subsidy system as it stands.

- Owing to the absence of clearly defined and properly justified eligibility criteria, there is no guarantee that subsidy funds are being directed to genuinely needy households.

- Related to this point, the fact that IDAAN enjoys such a high degree of discretion in determining the identity of the beneficiaries raises the risk that subsidies may be misdirected for political ends.
- The tendency to use non-payment of bills as an eligibility criterion for the subsidy scheme introduces a perverse incentive for households not to pay their bills.
- The subsidization of the full value of bills for the 'social cases' undermines any incentives for these households to make efficient use of water resources, and, moreover, means that they are losing the habit of paying for these services.

This analysis suggests that the existing subsidy apparatus could not continue in its present form.

The Incidence of Poverty

A fundamental starting point in assessing the need for a new subsidy programme is to characterize the incidence of poverty among the customers of IDAAN. In its official definitions, the government of Panama distinguishes between two levels of poverty.

- *The poverty line*—defined as the level of expenditure needed to pay for a basket of basic services comprising nutrition, housing, transport, health and education. In 1997, it was set at US\$726 per capita per year.
- *The extreme poverty line*—defined as the level of expenditure needed to pay for a basket of basic nutrition alone. In 1997, it was set at US\$470 per capita per year.

On this basis, Table 3.1 summarizes the geographical distribution of poverty in Panama using data from the national Living Standards Measurement Survey conducted in 1997. The data clearly indicate that poverty in Panama is predominantly a rural phenomenon. This is an important finding, given that IDAAN only services the urban areas of the country. Indeed, only 11% of the urban population live in conditions of poverty, while less than 5% live in conditions of extreme poverty.

Table 3.1: Distribution of poverty across rural and urban areas in Panama

	Extreme poor		Poor		Non-poor		Total	
	m	%	m	%	M	%	m	%
Rural	0.52	88.1	0.25	59.5	0.44	25.7	1.21	44.5
Urban	0.07	11.9	0.17	40.5	1.27	74.3	1.51	55.5
Total	0.59	100.0	0.42	100.0	1.71	100.0	2.72	100.0

Source: Encuesta de Nivel de Vida, Panama, 1997.

An important implication is that any subsidy programme administered via IDAAN will only reach a minority of the poor people in Panama, and a corollary is that the existing subsidy schemes administered by IDAAN are largely going to benefit people who cannot be regarded as poor. This follows from the fact that (according to the Living Standards Measurement Survey) only 16% of the IDAAN customer base lives either in poverty or extreme poverty; whereas, at least two-thirds of IDAAN's customers benefit from the subsidy programmes reviewed in the preceding section.

Thus, if it is to have any real impact on poverty, any future subsidy scheme directed towards IDAAN's customers would have to be both very small in its scope and very carefully targeted towards the small group of customers who are genuinely poor.

The Case for Use of Service Subsidies

In order to establish the affordability of IDAAN's current water bills to its poorest clients, two different methods were used.

- The first and simplest approach entailed calculating the proportion of income that poor households were actually spending on water and sewerage services. This percentage can then be compared against international benchmarks, which suggest that water bills amounting to between 3% and 5% of income are generally affordable for the poorest households. The data for Panama indicated that a household on the extreme poverty line would on average be assigning less than 3% of its budget to water charges.
- The second and more sophisticated approach entailed asking customers their willingness to pay by means of a household survey conducted as part of the subsidy study. The advantage of a survey is that it is possible to consider the affordability of tariffs above the current level that might be needed in order to finance new investments. However, the survey methodology also brings considerable methodological problems of its own. These include (among others) the possibility that respondents may overstate their willingness to pay, potential biases generated by the structure and ordering of the questionnaire, as well as the sensitivity of the resulting estimates to the statistical specifications used in the data analysis.²

The results of the survey are presented in Table 3.2 below. They indicate the proportion of respondents who were willing to pay a range of different water tariffs, *all of which lie above the current basic tariff of US\$0.80 per thousand gallons* (equivalent to US\$0.21 per cubic metre). The data refer only to households in the first three income deciles, who are therefore below the official poverty line.³ The data show that more than half of this group is willing to

² For a fuller discussion of the methodological pitfalls of the contingent valuation approach, see the accompanying technical paper.

³ To be precise, the poverty line lies in the third income decile, while the extreme poverty line lies in the second income decile.

pay tariffs as high as US\$1.88 per thousand gallons (that is, US\$0.50 per cubic metre) to purchase the average level of consumption for households living in the corresponding geographical area. From this data it is possible to establish that the mean willingness to pay for this group is in the order of US\$1.75 per thousand gallons (or US\$0.46 per cubic metre). Assuming a subsistence consumption of 6,000 gallons per household per month, these results are equivalent to 4% of expenditure for the average household in this category.

In summary, both sources of evidence indicate that water and sewerage bills in Panama are affordable to an average household beneath the poverty line. This is the case both at the current tariff level and for significantly higher levels of the tariff that might be introduced in future. Thus, to the extent that there are any genuine problems of affordability of water and sewerage services, it seems likely that these will be concentrated in households below the *extreme* poverty line. This suggests that only households in this category should be considered suitable for subsidy.

Table 3.2: Willingness to Pay for Water and Sanitation Services Among the First Three Deciles of the Income Distribution in Panama

Tarifa US\$ per '000 gallons	Response (%)	
	Yes	No
0.90	75.1	24.9
1.00	78.2	21.9
1.25	65.8	34.2
1.50	56.5	43.5
1.88	53.4	46.6
2.25	34.4	65.4
2.50	24.0	76.0
2.75	20.7	79.3

The Case for Connection Subsidies

Although the vast majority of poor households in Panama appear to be able to afford to use water and sanitation services, they may not necessarily be able to afford a connection to the water or sewerage network. The connection process often requires substantial one-off costs to be paid up front. This can create particular problems for low-income households who are unlikely to have any savings and typically lack access to credit markets. The associated costs can potentially take two forms.

- The first is the connection charges which are sometimes levied by the utility to cover the costs of infrastructure expansion. At the present time, IDAAN's tariff structure does not include a connection charge. However, it is unclear how this might change following the privatization process.
- The second is the investment in the plumbing and sanitary installations required to benefit from a water or sewerage connection within the household—local sources suggested that

these costs could amount to as much as US\$1,500, although they could be significantly reduced if the household contributed its own labor.

As indicated in Table 3.3 below, access to potable water supply in the urban areas of Panama is close to universal, even among the poor. However, sewerage coverage is much lower, reaching only about 30% of poor households. Since increasing sewerage coverage was an important objective of the reform, it was important to establish the affordability of sewerage connections.

Table 3.3: Coverage of Water and Sewerage in Urban Areas in Panama (%)

	Non-poor	Poor	Total
Water			
public utility service	96.8	87.2	100.0
community service	2.1	8.3	100.0
Sewerage			
	63.3	31.2	100.0

Source: Encuesta de Nivel de Vida, Panama, 1997.

Accordingly, the household survey conducted as part of the subsidy study also questioned households as to their willingness to pay for sewerage connections. The survey distinguished between the cost of the connection charge, which was set at an indicative level of US\$850 per household, and that of the associated plumbing and sanitary installations, estimated at around US\$1,500 per household.

Table 3.4 presents the results obtained from the poor households in the sample. It is striking that only 65% of households were willing to pay for a sewerage connection even when this was provided free of all cost. This suggests that households were concerned about the bills they would have to pay to use the sewerage service once connected. When households face positive connection costs, the proportion which are willing to pay declines dramatically.

The average willingness to pay among the poor was found to be US\$425 per connection, or about 13.5% of average income for households in this group, which is less than a third of the estimated cost of the complementary sanitation facilities required within the household to be able to benefit from a sewerage connection.

These results indicate that the case for a sewerage connection subsidy is considerably stronger than the case for a water consumption subsidy in the specific case of Panama. The reason is that—according to the willingness to pay survey—average levels of water consumption proved to be affordable for households living in poverty even at tariff significantly above current levels. On the other hand, the full costs of connecting to the sewerage network were shown to be well beyond the means of poor households. Hence, given the limited availability of subsidy funds for the water and sewerage sector it would make more sense to allocate such funds towards sewerage connections than towards water consumption.

Notwithstanding, it is important to stress that the previous comments concern only the optimal allocation of subsidy funds within the water and sewerage sector, and as such reflect

a rather narrow analytical perspective. A more fundamental question concerns the appropriate allocation of subsidy funds between water and sewerage versus other social sectors. To resolve this issue it would be necessary to quantify the wider social benefits of sewerage connections versus alternative interventions in health, education and other social fields. Unfortunately, such concrete information was not available for the case of Panama. Rather, the decision to allocate subsidy funds to the water and sewerage sector reflected the outcome of a prior political process.

Table 3.4: Willingness to Pay for Sewerage Connections Among the First Three Deciles of The Income Distribution in Panama

	Cost	Response (%)	
	US\$	Yes	No
With free connection and subsidy to cover household installations	0	65.0	35.0
With connection charge but subsidy to cover household installations	850	26.8	73.2
With free connection but no subsidy to cover household installations	1,500	38.6	61.4
With connection charge and no subsidy to cover household installations	2,350	16.9	83.1

Summary

From this preliminary assessment of the need for a subsidy to the water and sewerage sector in Panama, it is possible to extract the following conclusions.

- Poverty in Panama is primarily a rural phenomenon. Its incidence in the urban areas serviced by IDAAN is thus comparatively low accounting for only about 16% of the customer base. Hence, any general subsidies towards the clients of IDAAN will fail to benefit the vast majority of the poor.
- Existing subsidy programmes suffer from an absence of objectively defined eligibility criteria, and therefore leave too much room for discretion in the allocation of subsidy funds. Furthermore, the wide scope of these subsidies—which benefit at least two-thirds of IDAAN’s customers—indicates that the vast majority of beneficiaries cannot be genuinely poor.
- Willingness to pay for water and sanitation services among the poor appears to lie in the range 3–4% of household income. Thus, consumption of these services at, or significantly above, current tariff levels appears to be affordable to the average household below the poverty line. Only in cases of *extreme* poverty is it possible that affordability problems might arise if tariffs were to increase following privatization.
- However, the willingness of *all poor* households to pay for a connection to the sewerage network falls well short of the associated costs when the expenses of complementary household installations are taken into account.

4. DETERMINING ELIGIBILITY FOR THE SUBSIDY

The intended beneficiaries of subsidy schemes are invariably those living under the poverty line, usually expressed as an annual threshold for per-capita income or expenditure. However, 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 objectively measured and are easily observed;
- are difficult to falsify or misrepresent.

There are two basic approaches to determining eligibility for a subsidy programme, which were considered in the Panama case:

- zonal eligibility;
- individual eligibility.

Zonal Eligibility

A popular eligibility criterion for subsidy schemes is zone of residence. Under this approach, subsidies are allocated to all households living in zones that are considered to contain a relatively high concentration of poverty.

As a criterion, zone of residence carries the advantage of being easy to observe and relatively hard to falsify. Whether it is highly correlated with the underlying poverty measure of interest depends on the extent to which poverty is geographically concentrated. This, in turn, often depends on the size of the 'zones' used for targeting because the larger the zone, the greater the likelihood that it will contain households with a diversity of socio-economic circumstances. Where the correlation between geographical location and poverty is imperfect, two types of failures tend to occur.

- On the one hand, subsidies will fail to reach poor households who happen to reside outside of the eligible zones.
- On the other hand, subsidies will be misallocated to households who do not meet the poverty criteria but happen to reside in the eligible zones.

In the case of Panama, there was already considerable experience with the use of zonal subsidies. As noted above, IDAAN had traditionally used zonal criteria in determining eligibility for existing water subsidies.

More generally, the Ministry of Planning has developed a 'poverty map' intended to guide the allocation of social investments. The map is based on a combination of socio-economic data collected as part of the 1990 census and more detailed data from the 1997 Living Standards Measurement Survey. The data were used to construct a poverty index that

combines information on the satisfaction of various basic needs. The index can be produced at a number of different levels of geographical aggregation, ranging from regions and provinces down to municipalities. The smallest geographical units for which such information was available are neighborhoods (or barrios). On average, these are units of some 300–400 households.

In order to decide whether it was desirable to allocate water subsidies on a zonal basis, it was important to establish how successful a geographical criterion was likely to be at reaching the poor households in the target group. Using data from the 1997 national Living Standards Measurement Survey, a model was developed to simulate the effects of a zonal subsidy. The simulation model picked out all households residing in zones that met a particular set of socio-economic criteria and then counted how many of these households were genuinely poor.

Targeting errors can take one of two different forms. Perhaps the most serious of these are the Type I errors which arise 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 Type I error clearly fails on its own terms. Also of concern is the possibility that people outside of the target group may fortuitously comply with the eligibility criterion and consequently receive the subsidy. A high level of Type II error thus indicates leakage of funds to unintended beneficiaries, and suggests that the subsidy scheme is comparatively inefficient in reaching its target population.

Table 4.1 below presents the results of one such simulation. In this case, a subsidy was allocated to all households living in a zone where more than 50% of households were below the extreme poverty line, and where telephone coverage was below 30%⁴. The results indicate that using a zonal subsidy of this kind is a very imperfect method of targeting subsidy funds towards the poor. In the first place, the level of Type I error is extremely high at 94%; which is to say that only 6% of households in extreme poverty (1,000 out of the total 17,200) actually receive the subsidy. The level of Type II error is also substantial, with 31% of subsidies going to households above the extreme poverty line. Changing the eligibility criteria by reducing the telephone coverage limitation or the percentage of households in the zone living below the extreme poverty line did not change the general conclusions. More vulnerable households could be targeted, but more resources would at the same time be filtered to non-deserving households.

⁴ Owing to the constraints of data availability, the zones used for the simulation were not, in fact, neighbourhoods, but sampling units from the national Living Standards Measurement Survey. These sampling units were actually smaller than neighbourhoods, numbering less than 15 households. Consequently, the targeting properties for sampling units might be expected to be better than those that would have been obtained using neighbourhoods.

Table 4.1: Results for Targeting Performance of Zonal Subsidies in Panama

	Households receiving zonal subsidy		Households failing to receive zonal subsidy		Total	
	'000s	%	'000s	%	'000s	%
Below extreme poverty line	1.0	68.6	16.2	3.8	17.2	4.0
Above extreme poverty line	0.4	31.4	408.2	96.2	408.7	96.0
Total	1.5	100.0	424.3	100.0	425.9	100.0

The key explanation for these results is that the vast majority of extremely poor people in the IDAAN customer base were living in zones that were predominantly inhabited by people above the extreme poverty line. In other words, extreme poverty is comparatively diffuse in the urban areas of Panama.

This level of targeting performance was thought to be unacceptable for a water subsidy and the use of zonal subsidies was consequently ruled out in the case of Panama.

Individual Eligibility

An alternative approach is to base the eligibility for the subsidy on an assessment of individual household circumstances. 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 household income and expenditure in order to assess eligibility for individual subsidies. Consequently, it is necessary to find proxy variables which are closely associated with poverty, but which may be easier to observe and harder to falsify.

In Panama, an extensive search for proxy variables was conducted by making cross-tabulations between candidate proxies and poverty levels, using data from the national Living Standards Measurement Survey. The results for the most successful proxy variables are reported in Table 4.2. These were as follows:

- the presence in the house of poor-quality floor materials (cement, earth, bamboo);
- the absence of a connection to the telephone network;
- the head of household not educated beyond primary level;
- the toilet facilities located outdoors *and* most basic in nature (i.e., pit or latrine).

A successful proxy variable must have both a high correlation with poverty and a low correlation with not being in poverty. As the table illustrates, it is difficult to find a single variable that performs well on both these counts.

- For example, low-quality floor materials are highly correlated with poverty; 88.6% of those in extreme poverty live in houses with low-quality floor materials. However, low-quality floor materials are also quite prevalent among those who are not poor, affecting as many as 56% of this group. Hence, this variable is effective in identifying who should be

included in the subsidy programme, but not so helpful in determining who should be excluded.

- By contrast, poor-quality sanitation is not so highly correlated with poverty since only 58.9% of the poor suffer from this problem. However, it has a very low correlation with not being in poverty; only 15.7% of the non-poor suffer from low-quality sanitation. Hence, this variable is a powerful means of excluding people who are not eligible, but it is not very helpful in identifying those who should be included.

As a result of this, the most powerful eligibility criterion is that which combines information on all of these characteristics. For example, limiting eligibility to those who fulfilled two or more of the above criteria would reduce the Type I error associated with the subsidy to a mere 6%, which is to say that 94% of those in extreme poverty would be eligible to benefit from the scheme. Although this level of performance falls short of perfect targeting, it is clearly far superior to the performance of the zonal subsidy. Hence, individual level criteria are much better at identifying those in extreme poverty than were geographical criteria.

Notwithstanding the higher success rate in reaching the genuinely poor, this criterion still entails allocating a very large number of subsidies to those who fall outside the target group. That is to say, the analysis indicates that an individual subsidy based solely on the criterion of meeting two or more of the above conditions would lead to an extremely high Type II error of 93%, meaning that the vast majority of subsidy funds would be allocated to households above the extreme poverty line. This performance is substantially worse than that of the zonal subsidy.

Table 4.2: Potential Eligibility Criteria for Targeting Individual Subsidies

	Extreme poverty		Poverty		Non-poor		Total	
	'000s	%	'000s	%	'000s	%	'000s	%
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
Total	12.0	3.2	31.0	8.2	335.1	88.6	378.2	100.0
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
Total	12.0	□	31.0	□	335.1	□	□	□

However, at least with individual subsidies, there is the possibility of applying additional filters that should make it possible to eliminate a large proportion of those who do not belong to the target group. For example, it may be possible to complement the information on household's characteristics with some evidence on per capita household income.

Summary

Table 4.3 summarizes the Type I and Type II errors for zonal versus individual eligibility criteria.

- Zonal eligibility criteria were found to perform very poorly in terms of Type I error, with as much as 94% of the target population being excluded on the scheme. However, performance on Type II error (although poor in absolute terms) was comparatively good; only 31% of the subsidies would end-up going to households above the extreme poverty line.
- Targeting of the subsidy did not prove to be straightforward, even with individual eligibility criteria. The main benefit of moving from a zonal to an individual basis is a dramatic improvement in Type I error which falls from 94% to 6%. Hence, on this basis, the vast majority of the target group would collect the subsidy. This comes at the cost of much higher Type II errors, with a very high proportion of the subsidy funds (93%) leaking to households outside of the target group. However, there may be some possibility of reducing this proportion by incorporating additional income-based filters.

Table 4.3: Summary of Type I and Type II Errors for Zonal and Individual Eligibility Criteria

	Zonal eligibility criteria	Individual eligibility criteria
Type I error	94%	6%
Type II error	31%	93%

The above analysis indicates that neither of the two approaches is perfect, but that given the paramount importance of reducing Type I error, the individual eligibility criteria would probably be preferable.

5. DETERMINING THE SIZE OF THE SUBSIDY

The preceding sections served to establish the overall need for a water subsidy in Panama and to define who should be considered eligible to receive it. Another important design question concerns the size of the subsidy that should be awarded. There are two aspects to this problem:

- the value of the subsidy that should be paid out in any given period; and
- in the case of a recurring use-of-service subsidy, the period which the payment should cover.

In deciding upon this issue, the following considerations need to be taken into account.

- the affordability of current and future charges;
- the administrative costs associated with the scheme;
- the incentive properties of different payment rules.

Affordability of Charges

From an economic standpoint, the value of the subsidy should be set as the difference between the cost of purchasing a subsistence level of consumption and the household's willingness to pay for the service.

In order to determine the subsidy required on this basis, it is necessary to have information about the following issues.

- *Tariffs*—the cost of purchasing a basic level of consumption will depend on current tariff levels and any proposed changes to the current tariff structure. As noted above, IDAAN's tariffs have been frozen in nominal terms since 1982. During this period a number of different tariff studies have demonstrated the need for significant price increases to assure the financial sustainability of the company and to fund necessary investments.
- *Willingness to pay*—a number of methods for estimating the willingness to pay of households in the target group have already been presented and discussed. As well as informing the overall assessment of the need for a subsidy, this information is invaluable in determining the appropriate size of the subsidy. The results from the survey conducted in Panama, as reported above, indicate a willingness to pay equal to 4% of household income.

Using a simulation model, the willingness to pay for different income groups was compared with the corresponding water bill under alternative tariff levels. The results are reported in Table 5.1.

- The first half of the table shows that, using the reference willingness to pay of 4% of household income estimated from the survey, no subsidy is required under current tariff levels, even for the poorest households. However, as tariffs begin to rise beyond current

levels, a modest subsidy becomes necessary only for the poorest of the poorest households (those in the first quartile of extreme poverty), who represent only about 1.2% of IDAAN's customer base.

- The results reported in the second half of the table indicate that, when the willingness to pay criteria is reduced to 3% of the reference household income, a subsidy becomes necessary, even at the current tariff level. As tariffs increase, the subsidy requirement is extended to households with an income level equal to the mean for cases of extreme poverty, which still represent only about 2.4% of IDAAN's customers.

It is important to note that water bills remain perfectly affordable to the average household in poverty (as opposed to extreme poverty), even with the lower willingness to pay threshold and when tariffs increase by as much as 50%.

Table 5.1: Sensitivity Analysis for the Value of the Monthly Subsidy for Alternative Levels of Willingness to Pay a Range of Different Tariff Growth Scenarios

	Current tariff levels	25% increase in tariffs	50% increase in tariffs
Willing to pay 4% of income			
• first quartile of households in extreme poverty (i.e. an income of US\$109 per capita per year)	No subsidy required	Subsidy of US\$0.95 per month	Subsidy of US\$2.02 per month
• mean of households in extreme poverty (i.e. an income of US\$166 per capita per year)	No subsidy required	No subsidy required	No subsidy required
• mean of households in poverty (i.e. an income of US\$242 per capita per year)	No subsidy required	No subsidy required	No subsidy required
Willing to pay 3% of income			
• first quartile of households in extreme poverty (i.e. an income of US\$109 per capita per year)	Subsidy of US\$0.98 per month	Subsidy of US\$2.04 per month	Subsidy of US\$3.11 per month
• mean of households in extreme poverty (i.e. an income of US\$166 per capita per year)	No subsidy required	Subsidy of US\$0.33 per month	Subsidy of US\$1.40 per month
mean of households in poverty (i.e. an income of US\$242 per capita per year)	No subsidy required	No subsidy required	No subsidy required

The analysis suggests that, at current tariffs, the appropriate level for the use of service subsidy in Panama is equal to zero. However, if tariff levels were to rise—as they eventually must if the water utility is to recover its costs—a subsidy would become necessary, although only for those in extreme poverty. The requisite magnitude of this subsidy would lie between US\$1.00 and US\$3.00 per household per month, depending on the extent of the tariff increases. These values represent 25–50% of the corresponding monthly water bills.

Finally, as regards the possible connection subsidy, the survey revealed a mean willingness to pay of US\$269 among households in extreme poverty. Although IDAAN's current tariff structure does not incorporate a significant connection charge, this willingness to pay still lies well below the costs of providing the associated internal plumbing and sanitary installations needed to make use of a sewerage connection. These complementary costs were estimated to be of the order of US\$1,500. (Although, it would usually be possible for households to get the work done at a lower cost of say US\$1,000 by contributing their own labor.) Hence a subsidy of the order of US\$750 per household would be needed to induce households in extreme poverty to connect to the sewerage network. Whether or not such a subsidy would be justified depends on the magnitude of the wider social benefits accruing from the expansion of the sewerage network, relative to the magnitude of the benefits that might be obtained from alternative uses of the subsidy funds.

Administrative Costs

The implementation of subsidy schemes with individual eligibility criteria requires the creation of an administrative apparatus for the screening of potential candidates. Typically, a standardized household interview is conducted by a social worker in order to collect the information needed to apply the eligibility filters described above.

A significant drawback of the individual subsidy system is that this selection process can absorb a significant volume of resources. In the case of Panama, some initial estimates suggested that the interview procedure could easily cost as much as US\$10 per beneficiary household.⁵ To this must be added the fixed costs of running the subsidy programme.

Since the costs of screening and administration are not affected by the size of the subsidy granted, the proportion of funds diverted into administrative expenditures will be inversely related to the value of the subsidy. This general point was very clearly illustrated by the simulations conducted for the Panama case. For example, with a consumption subsidy of US\$1.50 per household per month, administrative costs would absorb as much as 40% of the value of the subsidy payment, falling to around 25% for a subsidy of \$3. *These percentages are so high as to question the overall case for making such small subsidy payments at all.*

Administrative costs will also be affected by the frequency with which eligibility for the subsidy must be reassessed. It is clearly important to reassess eligibility for a use-of-service subsidy on an occasional basis, since the economic circumstances of households will hopefully improve over time to the point that a subsidy may no longer be required. It is therefore necessary to strike a balance between keeping administrative costs down and ensuring that eligibility assessments are kept reasonably up to date. The estimations

⁵ This figure is based on the assumption that a social worker earns a monthly salary of about US\$700 per month and is able to conduct ten interviews per day, and that for every three interviews only two eligible beneficiaries would be identified. To these labour costs must be added the cost of transport and materials at about US\$3–4 per interview.

presented above for Panama are based on a three-year eligibility period, which is the practice currently adopted in Chile.

In the case of connections, the larger value of the subsidy payment make such schemes considerably more cost-effective. Thus, with a subsidy of US\$750 per eligible household, the administrative costs would only absorb 7% of the total expenditure.

Finally, it is important to note that the administrative burden of a water subsidy could be dramatically reduced if the scheme could be integrated with other subsidy measures operating within the same country. If eligibility criteria between subsidy schemes can be harmonized, the costs of conducting socio-economic assessments can be shared across a number of schemes. The relevance of this issue to the Panama case will be developed further in Section 6 below.

Incentive Effects

A final concern in determining the value of a subsidy payment is the avoidance of the perverse incentives that can potentially be created by subsidy systems.

First, a subsidy which covers 100% of the costs 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 in favor of schemes that cover only a proportion of the total costs. To strengthen payment incentives, the subsidy can be made contingent on the household contributing its own share of the bill. For example, in Chile, water subsidies are capped at 85% of the value of the bill and are only disbursed upon proof that the household has paid its share.

It is interesting to note that the principle of subsidizing less than the full value of the bill received widespread support from the Panamanian public when they were questioned in the survey conducted as part of the subsidy study. Table 5.2 reports answers to the question of whether subsidy beneficiaries should be required to make some financial contribution of their own towards the cost of water supply. Over 90% of those interviewed were in favor of this principle, including those who currently benefit from a subsidy payment that covers the entirety of their bill.

Table 5.2: Responses to the Question: ‘Should Those Who Receive Subsidies Themselves Be Required to Contribute a Proportion of the Total Bill?’ (%)

	Yes	No	Don't know	Total
Formal residential users:				
—with continuous service	93.4	5.2	1.4	100.0
—with intermittent service	92.3	6.9	0.7	100.0
Current subsidy beneficiaries	91.5	7.4	1.1	100.0
Informal or clandestine connections	94.3	5.1	0.6	100.0
Total	93.3	5.6	1.1	100.0

Second, a subsidy that applies to any level of consumption may encourage excessive use of the service. For example, a subsidy scheme in Argentina involving a discount on utility bills for pensioner households had to be discontinued owing to evidence of escalating consumption levels because neighbors and friends had been taking advantage of the lower cost of using utility services in pensioner household. It is therefore considered best practice to cap the subsidy at some pre-determined subsistence consumption threshold. In Panama, the subsistence consumption level was set in line with existing practice at 6,000 gallons per household per month. This is equivalent to 150 litres per person per day for the average five-person household⁶.

Finally, 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 Panama, a period of three years was recommended for the duration of the subsidy. This is in line with existing practice in Chile.

Summary

The following conclusions can be drawn from the discussion about determining the size of the subsidy for the Panama case.

- The evidence reviewed suggested that there was no real case for a consumption subsidy at current tariff levels, but that such a subsidy may be advisable if tariffs increases of 25–50% were needed to assure the financial sustainability of IDAAN. Based on narrow economic criteria, these subsidies would need to be of the order of US\$1–3 per eligible household per month, and would be confined to those in extreme poverty. A fixed cash payment of this size would have the desirable property of continuing to face households with a positive marginal price for water consumption, thereby providing an incentive for rational use. Moreover, since only a fraction of the overall bill would be covered, the household would not lose the habit of paying for the service. The major drawback with this subsidy is its poor performance in terms of cost-effectiveness, with 25–40% of the overall budget being absorbed in administrative costs. These percentages are so high as to question the overall case for making subsidy payments of such a small absolute value.
- The willingness to pay survey suggested that the private benefits of a sewerage connection fall well short of the associated cost of provision, implying that a substantial subsidy would be required if the expansion of the sewerage network is deemed to be justified by wider social benefits. The empirical analysis suggested that an appropriate level for this subsidy would be at US\$750 per new connection. Given that this subsidy would be no more complex to administrate than the consumption subsidy, while the individual payments are very much larger, it is not surprising that such a scheme

⁶ It is certainly questionable whether the basic consumption level of 150 litres per person per day adopted by IDAAN can truly be regarded as a *subsistence* consumption level. This is a parameter that should always be questioned in the light of local evidence and real needs for water use.

performs much better in terms of the proportion of funds absorbed in administrative costs.

6. IMPLEMENTING THE SUBSIDY SYSTEM

In order to implement a subsidy scheme along the lines discussed, it is necessary to establish:

- a legal basis for the subsidy scheme;
- a set of institutions charged with implementing the scheme;
- a series of administrative procedures to govern the operation of the system.

Legal and Regulatory Framework

As noted at the outset, subsidy systems have historically suffered from a lack of clarity regarding their objectives and a lack of transparency regarding their procedures. The absence of any clearly defined rules to govern the allocation of subsidies has meant that they have been managed with a high degree of discretion, primarily to further the political exigencies of the moment. While this situation is undesirable under any circumstances, it becomes particularly problematic when private sector participation is being contemplated, since there arises an immediate need to reconcile the financial sustainability of the water utility with the social impact of raising tariffs to economic levels. Potential non-payment by low income customers may also make a significant contribution to the commercial risk faced by the private operator, and to that extent direct subsidy schemes may have a role to play as a risk mitigation device.

As part of a sectoral reform process, it is therefore important that any subsidy system should be given a clear basis in law. This serves to strengthen the legitimacy of the subsidy programme and to ensure that funds are used in a socially effective manner. While it need not go into great detail, the law should at least establish the following points:

- the government institution with overall responsibility for the subsidy programme;
- the potential sources of finance for the subsidy programme;
- the basic principles that should be observed in administering subsidies.

The more detailed provisions likely to be necessary for the implementation of the system can then be developed in the regulations accompanying the main sector law. Furthermore, if the private concessionaire is to be expected to play a role in the operation of the subsidy system, it is important that these responsibilities be clearly defined in the corresponding concession contract. The allocation of different rules to different levels of the legal framework is summarized in Table 6.1.

Table 6.1: Definition of Subsidy Policies/Procedures among Legal Instruments.

Law	Institutional responsibility for subsidy system Source of finance Very general description of eligible group Very general rules to avoid creation of perverse incentives
Regulations	Detailed specification of budgeting procedures Detailed specification of selection procedures Detailed specification of payment procedures Process for regular evaluation and review of subsidy system Mechanisms to ensure coordination with tariff decisions
Contract	Role of concessionaire in administering the subsidy scheme Procedures for timely transfer of subsidy funds Procedures for billing subsidized clients Procedures for regulatory oversight of subsidy system

The Panama case provides a good illustration of how the foundation for a subsidy system can be built into a sectoral law (see Article 44 of the 1997 Water Law No.1/97). The following points emerge clearly from the legislation.

- Both central and local government are allowed to grant subsidies. However, overall responsibility for subsidy policy lies with the Ministry of Health.
- Subsidies must be funded from the public purse. They should be explicitly incorporated into the budgets of the respective institutions. Moreover, the budgeted level should ensure that the service provider is remunerated in accordance with the scheduled tariff.
- The following general principles are clearly established:
 - subsidies should be the exception rather than the rule;
 - they should only cover subsistence consumption;
 - they must correspond to a discount against the water bill for a specific customer;
 - subsidies should not be regarded as permanent being subject to periodic review; and
 - service providers are under no obligation to provide subsidies, except where these have been financed by government.

Administrative procedures

The main administrative procedures required to make the subsidy scheme operational are as follows.

- *Budgeting procedure*—this should incorporate a system for projecting the likely costs of the programme from one year to another, and should identify how any shortfall or surplus of subsidy funds should be dealt with.
- *Selection procedure*—this should establish the routes through which applications can be made, and the way in which they will be screened, as well as the process for reaching a final decision regarding eligibility for the subsidy.
- *Payment procedure*—this should clarify the way in which subsidy beneficiaries will be billed, and establish how and when funds will be transferred from the government to the concessionaire.

Budgeting

As noted above, in the Panama case, the legal framework states that the funding for the subsidy programme must be explicitly identified in the budget of the Ministry of Health. Using the simulation model developed in the subsidy study, it was possible to project the levels of expenditure associated with different subsidy design parameters.

While direct water consumption subsidies to the ‘social cases’ had historically cost the treasury some US\$3m per year. The projected financial costs of the new scheme were substantially lower. In the worst-case assumption of a US\$3 monthly subsidy to each of the 17,500 households in extreme poverty, the total annual expenditure would amount to only US\$630,000.

On the other hand, providing sewerage connection subsidies of US\$750 to all 17,500 of the poorest households would cost over US\$13m. Nevertheless, assuming that the allocation of subsidy funds to the sector remained constant at US\$3m, connections for this entire group could be funded within a six-year period.

While it is relatively straightforward to predict how many people are likely to meet the eligibility criteria, the actual demand for subsidy funds depends critically on other factors. These include the degree of public interest in applying for the scheme, as well as the extent to which non-eligible households succeed in getting through the screening process, both of which are much harder to predict.

Owing to the possibility of escalating demand, it was considered advisable to place a ceiling on the number of subsidies awarded each year in order to ensure that budgetary restrictions are met. This also provides the opportunity to review whether the screening mechanisms are functioning adequately in weeding out ineligible applicants.

Ultimately, if public funds are not adequate to cover legitimate demand for the subsidy, it may be necessary to reconsider the size and scope of the subsidy programme, or the sources of finance. For this reason, among others, it is important to build in regular reviews of the design parameters of the subsidy scheme.

Selection

As regards the selection procedure, a key concern is to contain the potentially substantial administrative costs identified in Section 5 above. In the case of Panama, there appeared to be two strategies that might potentially achieve this. The first was to try to make maximum use of the future concessionaire's knowledge of customers. The second was to try and combine efforts with an existing individual subsidy scheme which had been successfully operated for some years by the Ministry of Housing.

The participation of the concessionaire in the subsidy selection procedure can be justified on the following counts.

- *Efficiency*—the concessionaire would necessarily maintain close day-to-day contact with clients, through both the billing process and its network of local customer centres. It would therefore be relatively cost-effective to exploit these existing mechanisms for disseminating information about the subsidy scheme and collecting subsidy applications.
- *Information*—the concessionaire's direct knowledge of the payment history of its customers is an invaluable source of information when it comes to identifying households who may have difficulties in affording their bills. While eligibility for the subsidy should not under any circumstances depend on non-payment, non-payment may serve as an indicator that a fuller investigation of socio-economic circumstances is warranted.
- *Incentives*—the concessionaire clearly has a strong incentive to enroll customers with a poor payment record into the government's subsidy scheme since this could be expected to reduce its problems with bad debtors and, thereby, lower its commercial risk.

However, while the concessionaire may be able to play an important role in the identification of potential candidates, for obvious reasons the final decision about eligibility must remain with the responsible government agency.

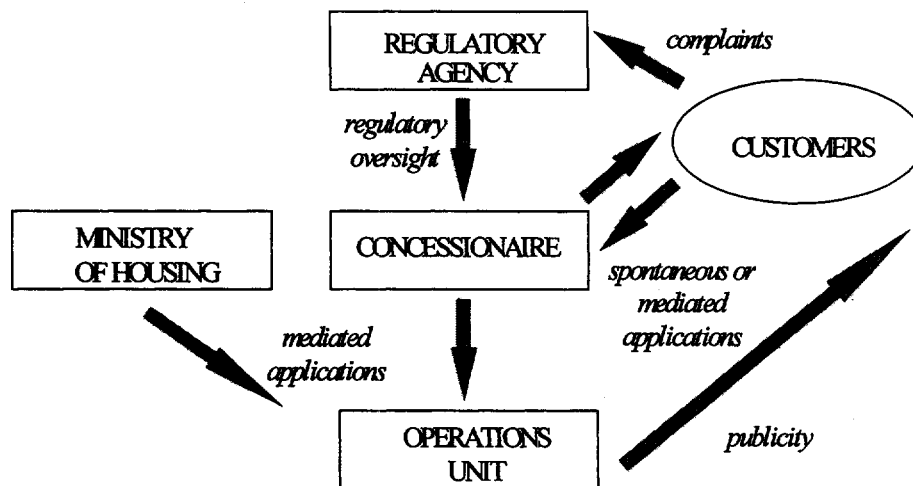
A review of existing subsidy programs in Panama revealed that there was only one operative scheme based on individual eligibility criteria. This was the PARVIS program that had been successfully administered by the Ministry of Housing since 1997. The scheme is targeted towards households with a monthly income of less than US\$300, and provides a grant of up to \$1,500 towards the purchase of construction materials for home building and improvements. This scheme shares many of the characteristics of the proposed water sector subsidy suggesting that it would be efficient to combine the operational functions of the two programmes. The synergies would appear to be particularly strong in the case of the sewerage connection subsidy, which is essentially related to home improvements. Nonetheless, the Ministry of Housing has not historically had any involvement in the water sector.

In view of these considerations, the proposed application process was along the lines illustrated in Figure 6.1

- The water utility/concessionaire is empowered to propose potential subsidy candidates on the basis of its payment records, and to facilitate the applications process from those who may wish to apply spontaneously.
- Pending a fuller integration of the schemes, the Ministry of Housing would be encouraged to supply information about the subsidy scheme to beneficiaries of the housing subsidy with whom it comes into regular contact, and to facilitate the completion of the applications of these candidates.

The Operational Unit for the subsidy scheme would then conduct a preliminary screening process based on the information provided in the application form. Those who would appear to qualify would then be visited by a social worker who would conduct an extensive household interview aimed at collecting the additional information required to apply the eligibility criteria. To avoid the falsification of information by the social worker, it was recommended that a supervisor repeat a small proportion of the interviews to ascertain whether the information supplied was correct. The social workers' reports would be submitted to an Executive Committee, where the final decision regarding eligibility would be taken. Any customers dissatisfied with their treatment at any stage in the process would have the right of appeal to the Regulatory Agency.

Figure 6.1: Alternative Routes for Subsidy Applications



Payment

Regarding the payment process, the following recommendations were made.

- The customer's monthly bill should state the total cost of the service, the amount discounted as a result of the subsidy and the remaining balance to be paid. In order to ensure that subsidy beneficiaries do not lose the habit of paying for the service, the

subsidy payment should cease if customers falls into arrears with their own portion of the bill.

- Also on a monthly basis, the concessionaire would issue a bill to the Executive of the subsidy programme for the total cost of the subsidy. The bill should provide evidence that the listed customers correspond to the list of accredited beneficiaries and that they have not fallen into arrears in the payment of their bills.

Summary

The following conclusions can be drawn from the discussion of the implementation issues raised by the Panama case.

- The Panamanian water sector law (No. 01/97) provides a particularly clear legal basis for the subsidy scheme, which was helpful in guiding the creation of the system. However, a suite of complementary regulations would also be needed to define the roles of the various participating institutions, as well as the administrative procedures to be followed. The role of the concessionaire in the administration of the subsidy would also require clarification in the concession contract.
- A set of administrative procedures was proposed covering the budgeting, selection and payment processes. A key issue was the role of the water utility/concessionaire in proposing and mediating applications on the part of subsidy candidates. Furthermore, it was proposed that the water subsidy scheme be ultimately integrated with an existing program run by the Ministry of Housing with a view to sharing administrative costs and thereby increasing the efficiency of implementation.

7. CONCLUSIONS

This paper has illustrated an approach to rationalizing social policy towards the water and sanitation sector in the context of sector reform. The reform process provides an opportunity to reconsider the underlying justification for any water sector subsidy and to redesign the associated policy instruments, so as to ensure that they really do benefit the poor and avoid distorting the efficient operation of the sector.

An interesting alternative to traditional subsidy mechanisms is the direct subsidy system, whereby government funds are used to cover part of the water bill of households who meet certain clearly defined eligibility criteria. The main advantages of direct subsidies are that they are transparent, explicit, and minimize distortions in the behavior of water utilities and their customers. The main drawbacks of direct subsidies are the difficulty of defining suitable eligibility criteria as well as the administrative cost entailed in identifying eligible households.

Drawing upon the experience of the water sector in Panama, where a direct subsidy system formed an integral part of the reform strategy, the paper has identified and illustrated the key design questions that arise in creating a direct subsidy system. The main conclusions that have emerged from the discussion can be summarized as follows.

First, the need for a subsidy should be assessed rather than assumed. Water and sewerage bills are not necessarily beyond the means of poor households. A key test of affordability is to compare the cost of the service with some measure of household willingness to pay.

Second, the initial assessment should pay as much attention to the affordability of the connections as to the affordability of the service itself. Connections often entail large up-front costs, both in the form of company charges and in the need for complementary household investments in plumbing and sanitary installations. Such costs can be prohibitive for poor households who lack access to credit markets.

Third, owing to the difficulty of measuring poverty, eligibility for the subsidy often has to be based on proxy variables; and good proxies are hard to find. In designing such a scheme, it is therefore essential to verify what proportion of the target group fails to meet the eligibility criteria (Type I error), but also what proportion of the wider population is inadvertently included according to those same criteria (Type II error).

Fourth, the administrative costs of operating a direct subsidy scheme do not really vary with respect to the size of the subsidy given. Consequently, a scheme that pays out a very low sum to each beneficiary tends to perform badly in terms of cost-effectiveness, and may not be worth having at all. It is therefore important to check what proportion of the total subsidy funds is likely to be absorbed in administrative expenditures.

Fifth, in order to preserve incentives for rational economic behavior, subsidies should only cover a proportion of the total costs of the service, and should ideally be contingent on beneficiaries paying their share of the bill. No subsidy should be paid for consumption

beyond the subsistence level. The subsidy should be given for a long enough period to avoid the effects of the 'poverty trap'.

Sixth, a subsidy scheme should have a clear legal basis that establishes the main lines of institutional responsibility, the sources of funding and the general principles governing the design of the scheme. This should be backed up with regulations that define the more detailed administrative procedures.

Seventh, the water utility/concessionaire will have a valuable role to play in identifying potential candidates and facilitating the applications process. This is because the utility enjoys continual contact with its customers and has access to the payment history of individual cases. Furthermore, the utility has the incentive to ensure that customers with a poor record of payment become beneficiaries of the scheme.

Finally, in order to economize on the administrative costs associated with implementing a scheme, it is highly desirable to integrate the selection procedures for a water subsidy program with those of other subsidy schemes that may be operating in the country. Ideally, each country should develop a single system for conducting the socio-economic assessment of households which may be used to inform the allocation of funds in a whole range of social programs. The creation of parallel bureaucracies for subsidy administration is something that should be avoided at all costs.

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