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Benefit incidence: a practitioner's guide

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I. Introduction

The case for government subsidies for the provision of basic services is well established. This rests on both efficiency and equity grounds. Governments are often required to subsidize services that the market will not provide, or provides insufficiently. Pure *public goods*, where the marginal cost of additional consumption is zero, usually call for full state financing. Other private services may be subject to significant external benefits or costs, and thus merit some form of government intervention. For example the treatment of a communicable disease (such as tuberculosis) would not only benefit the individual concerned but also those who would otherwise contract the disease. Typically, the market would under-provide such treatment, and a government subsidy would be justified on efficiency grounds. Subsidies might also be justified because of failures in related markets, such as education subsidies arising from credit market failure, and health subsidies where there is insurance market failure. Left to themselves, markets would under-provide such services, resulting in sub-optimal resource allocations. Governments are, therefore, called upon to subsidize some services for efficiency reasons. But equity is another fundamental rationale for government subsidies. The fact that the poor are disadvantaged in gaining access to important services which would help them escape from poverty, suggests that the state should seek to target the provision of these services to such groups. This paper outlines an approach to assessing whether the poor actually benefit from state subsidies on services where equity concerns are paramount.

Public expenditures affect the population in a number of ways. First, fiscal policy influences the macroeconomic balances, particularly the fiscal and trade deficits and the rate of inflation. These changes, in turn, affect living standards—directly, through influencing real incomes, and indirectly, through changing the rate of economic growth. These are the *macroeconomic effects* of public spending. Second, public spending creates incomes directly, some of which might benefit poor households. These incomes in turn create other incomes through the income-expenditure multiplier process. These are the *primary-income effects* of public spending. Finally, public expenditures generate transfers to the population. These may be either in the form of cash or monetary transfers, such as social assistance or social insurance payments, or in kind. The latter includes subsidized government services such as health, education, and infrastructure services. These in-kind transfers improve the current well-being of the beneficiaries, and also enhance their longer-run income-earning potential. They therefore involve current and capital transfers to the recipients, and can be called the *transfer effects* (or the '*benefit* incidence') of spending. Our concern in this paper is with these transfer effects. When governments subsidize health, education and infrastructure services, who benefits from the subsidy—from the in-kind transfer?

There has been a long-standing concern in the economics literature about how to measure the benefits of publicly-provided goods to individuals in society. For market-based goods and services, the prices paid by individual consumers can be taken as reflecting underlying values, so that combining prices and quantities yields measures of welfare that can be compared across individuals and over time. But unlike market-based goods, it is difficult to use prices as the basis of valuing publicly-provided goods. First, many such goods and services are pure public goods, which can be considered as freely provided and benefiting communities as a whole. But even when government spending subsidizes the provision of private goods (such as health and education services, and many infrastructure services), their supply is usually *rationed*, so that it is no longer valid to use the price paid (if any) as a measure of the underlying value of the good in question to the individual consumer. Most of the recent literature has been concerned with this fundamental problem (see van de Walle and Nead, 1995).

Much recent work stems from Aaron and McGuire (1970) who set out the basic principles to be followed in assessing how public expenditures benefit individuals. They argued that a rationed publicly-

provided good or service should be evaluated at the individual's own valuation of the good (his or her demand- or *virtual-price*). Such prices will vary from individual to individual. But the difficulties inherent in estimating these valuations (reviewed in de Wulf, 1975 and more recently by Cornes, 1995) led to less demanding approaches, in which publicly-provided goods and services are valued at their *marginal cost* (Brennan, 1976). Since then, the (welfarist) literature has been characterized by two broad approaches. The first emphasizes the need to measure *individual preferences* for the goods in question, based on refinements of the Aaron and McGuire methodology. These analyses are well founded in microeconomic theory, but are data demanding, requiring, for example, knowledge of the underlying demand functions of individuals or households. The second approach is *benefit incidence* analysis, which combines the cost of providing public services with information on their use in order to generate distributions of the benefit of government spending. This has become an established approach in developing countries since the path-breaking work by Meerman (1979) on Malaysia and Selowsky (1979) on Colombia..[1]

Analysts have, therefore, to decide whether they are to use what van de Walle (1998) terms the 'behavioral' approach to assessing the benefits of public spending (based on estimates of the underlying demand functions for the service concerned), or the approximations that are obtained through benefit incidence analysis. The former are more theoretically robust, and permit counterfactual experiments, simulating alternative outcomes based on the estimated demand functions. Benefit incidence measures, on the other hand, are far easier to calculate. They are also more comparable with measures of expenditure and income, which do not include the consumer surplus (measured in estimation-based approaches). But benefit incidence is not based on individual valuations, and does not take into account the behavioral responses of individuals and households to changes in public spending. Both approaches are partial equilibrium in nature, and both are concerned with *current* benefits (as opposed to benefits over a recipient's lifetime). The remainder of this paper is concerned with benefit incidence approaches to informing public expenditure decisions.

The next section outlines the basic methodology. This is followed by a selective review of some recent applications, highlighting different variants of the approach, and types of data manipulation which can be helpful for policy. Here we will get into some of the nuts and bolts of the analysis. Section IV then addresses how the results are to be interpreted.

II. What is Benefit Incidence?

Governments subsidize services because they want to improve certain critical outcomes among the population. Health and education subsidies, for example, can be justified if they improve living standards—preventing and curing disease, improving cognitive skills and so on. But there are many links in the chain between government spending and the outcomes that the government wishes to influence. Filmer, Hammer and Pritchett (1998) provide a helpful framework to assess these links taking the example of health spending. This is summarized in Figure 1.

[1] For an early application in the USA see Reynolds and Smolensky (1977).

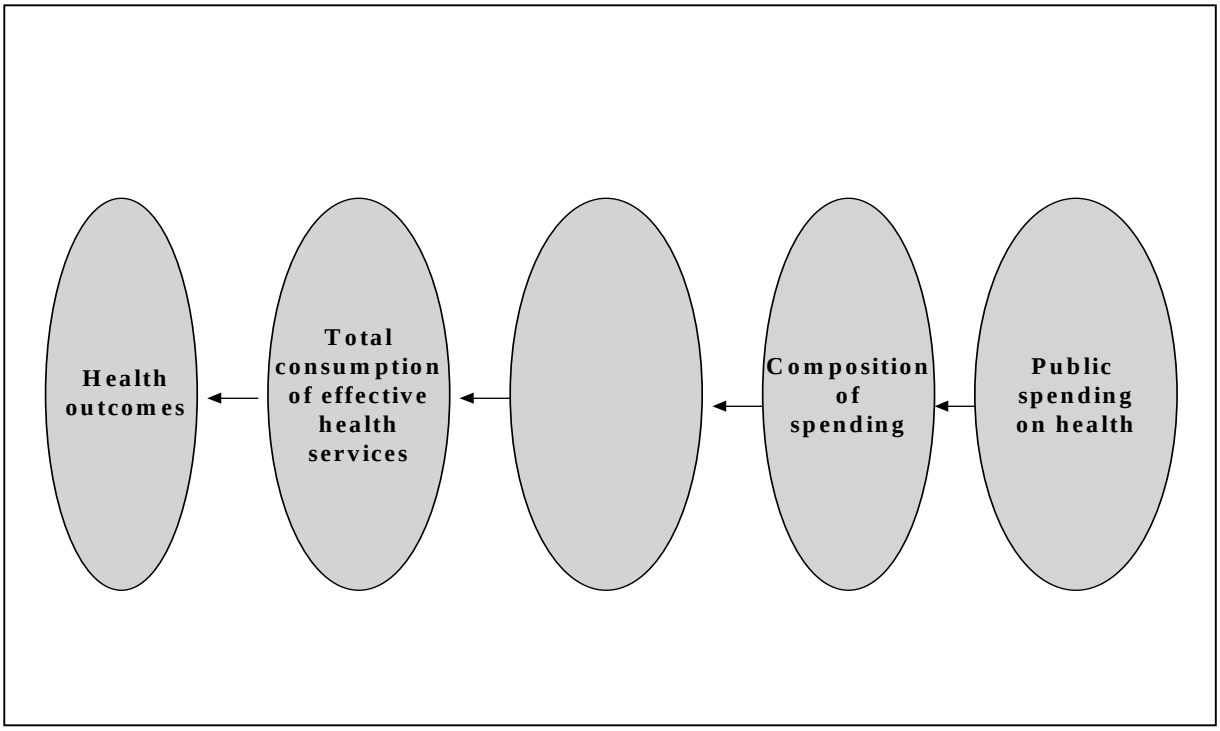


Figure 1: Public spending and outcomes: links in the chain

They distinguish four basic links. First, the link between total public spending on health and its composition. If the health budget is devoted mainly to activities which have little impact on health outcomes among the population at large, the link will be weakened. Typically spending on tertiary health facilities (teaching hospitals for example) will not benefit the population at large, as such facilities are used mostly by better-off urban residents. The second link concerns the translation of the budget into effective health services. If the sector in inefficient, the level of spending will not be a good indicator of service provision (even if the spending is on potentially relevant services). Reinikka and Ablo (1998), for example, estimated that for every dollar devoted to primary education in Uganda, only 37 cents reached the primary school. The third link establishes how the *total* provision of effective services is affected by public spending, which depends on the response of the private sector. If the provision of publicly provided services crowds out private providers, the net effect on total health care provision will be somewhat reduced. The final link is between the provision of health services (both private and public) and health outcomes at the individual level. Health services interact with many factors to generate improved health outcomes: better water, better education (especially of women), better nutrition etc., are important complementary factors leading to better health. The impact of better health services in part depends on these other influences. Benefit incidence analysis focuses mainly on the first of these links: it addresses the question, 'To what extent do governments spend on services which improve the lives of the poor?' When combined with the 'tracking' of spending to the facilities, it can also help assess the second link.

The starting point is the reported use of government services by households. By combining this information (usually obtained from household surveys) with information on the cost of providing the service, the incidence of the benefit of government spending can be estimated across household groups. The technique involves a three-step methodology.

- First, estimates are obtained of the unit subsidy of providing a particular service. This is usually based on officially reported public spending on the service in question.

- Second, this unit subsidy is then 'imputed' to households or individuals which are identified as users of the service. Individuals which use a subsidized public service in effect gain an *in-kind* transfer. Benefit incidence analysis measures the distribution of this transfer across the population.

- The third step involves aggregating individuals (or households) into *sub-groups* of the population in order to compare how the subsidy is distributed across such groups. The most common grouping is by income, or a related measure of the welfare of the individual (such as expenditure).

Consider the benefit incidence of public spending on a particular government service—say education. The incidence to one group (the poorest income group, the urban population or the female population) depends on two factors: the use of publicly-funded services by that group, and the distribution of government spending—benefit incidence will be greater as the government spends more on the services used relatively more by the group. To show this result formally, consider the group-specific benefit incidence of government spending on education:

$$X_j \equiv \sum_{i=1}^{3} E_{ij} \frac{S_i}{E_i} \equiv \sum_{i=1}^{3} \frac{E_{ij}}{E_i} S_i \qquad (1)$$

X_j is the value of the total education subsidy imputed to group j. E_{ij} represents the number of school enrollments of group j at education level i, and E_i the total number of enrollments (across all groups) at that level. S_i is government *net* spending on education level i (with fees and other cost recovery netted out), and i (=1,..,3) denotes the level of education (primary, secondary and tertiary). Note that S_i/E_i is the unit subsidy of providing a school place at level i. Equation (1) assumes that this subsidy only varies by level of schooling and not across groups. Commonly, government subsidies for services vary significantly by region. Services typically attract higher subsidies in urban than in rural areas. And services are often better financed in the capital city than in other urban areas. These variations in unit subsidies lead to inequalities in the distribution of benefits which should be captured in the analysis. (Box 1 illustrates the importance of regional variations in unit subsidies.) Where data limitations prevent an analysis of these regional variations, equation (1) must be the basis of the analysis. But if data permit, benefit incidence involves the estimation of:

$$X_j \equiv \sum_{k=1}^{n} \sum_{i=1}^{3} \frac{E_{ijk}}{E_i} S_{ik} \qquad (1a)$$

where the k subscript denotes the region specified in the unit cost estimate, there being n regions distinguished. The *share* of the total education subsidy (S) accruing to the group is given by:

$$x_j \equiv \sum_{k=1}^{n} \sum_{i=1}^{3} \frac{E_{ijk}}{E_i} \left(\frac{S_{ik}}{S} \right) \equiv \sum_{k=1}^{n} \sum_{i=1}^{3} e_{ijk} s_{ik} \qquad (2)$$

Clearly, this share (and indeed overall inequality in benefit incidence) is determined by two factors: the share of the group in total enrollments at each level of education and in each region (e_{ijk}), and the share of each level of education and region in total education spending (s_{ik}). The *e*'s reflect household enrollment decisions, whereas the *s*'s reflect government spending allocations across regions and levels of schooling.

The *e* and *s* variables can be defined also for other sectors, so that for health, e_{ij} would represent the share of group j in the total visits to health facility i. And s_i would be the share of total government health net spending on health facility i (for example primary health clinics).

How helpful such disaggregations are in benefit incidence analysis will depend on the types of sector disaggregations that are feasible. At one extreme, it may be possible to identify services that are entirely group specific—for example, the provision of pre-natal care in the health sector would benefit only females of a certain age. The greater is the share of total health spending allocated to such services (the s_i variable) the greater will be the benefit incidence to that group (since $e_{ij} = 1$). In most cases, however, it is not possible to obtain such disaggregations, and most services defined within a sector are usually available to and used by more than one group. Usually education services are divided into primary, secondary and tertiary levels, while health services are disaggregated into health centers or clinics, outpatient hospital services, and in-patient hospital care. Such services are usually used by all groups. Nevertheless, there will be group-based differentials even at this level of aggregation. The poor are unlikely to use university schooling, so that the greater the share of government spending allocated to universities, the lower the share of education spending accruing to the poor. Similarly, if the poor are less likely to use hospital-based clinical services, they will gain little from a health budget which allocates large amounts to such services.

III. How is Benefit Incidence Calculated?

Given these principles, we now describe the practice, taking the three steps in turn.

Step 1—Estimating unit subsidies

The information basis for estimating unit subsidies is the government expenditure account. Unit subsidies must be based on *actual* expenditures by government, and not on budget allocations. Yet such information is often difficult to come by, especially in Africa. In Ghana, for example, it was necessary to conduct a special survey of health establishments to determine what was actually spent on providing health care per patient at the various levels of care (World Bank, 1995). Recent practice has been to confine the analysis to *recurrent* spending, thus avoiding the difficulties encountered in estimating the flow of services/benefits from capital expenditures. But when capital budgets are large, they can have a profound effect on the benefit incidence of public spending. For example, recurrent spending on water supply will benefit only households with access to the existing supply network. Capital spending, on the other hand, may well enlarge the network. It is quite possible that recurrent spending will be regressive while capital spending would be highly progressive (Hammer, et al 1995). Box 4 outlines appropriate procedures for dealing with capital expenditures, based on health spending estimates for Malaysia. It is important for the analyst to keep in mind that unit subsidies are *flow* variables, being defined for a finite time period, usual a year. The flow of services from capital spending should be defined for the same period.

Revenue from *cost recovery* must be netted out of government spending to derive unit subsidies for benefit incidence. How this is done depends on the use to which the cost recovery revenue is put. If the revenue returns to the national exchequer, it must be netted out of the unit subsidy, since it reduces the in-kind subsidy that households receive. But if the revenue remains within the facility providing the service (the health clinic or the primary school, for example), it should not be netted out, since it adds to the value of the service that the household obtains, over and above the government subsidy. That should be described as cost *sharing* rather than cost recovery.

Official data on service use (the denominator in unit subsidies—such as school enrollments) can be quite different from estimates derived in household surveys. In principle, the analyst should use the more reliable data source, but the choice will affect the results. If, for example, official data indicate higher enrollments than the household survey, a unit subsidy based on the official source will be lower than an estimate using survey-based enrollments. Since the household survey enrollments must of necessity be used to allocate the subsidy to individuals (in step 2), the use of the lower (official) unit subsidy will mean that not all the government expenditure will be accounted for.[2] Analysts should always compare the official with survey estimates of service use when calculating unit subsidies. When they differ significantly, the choice of which to use would depend on which is considered to be the more reliable. (The difficulties in using household surveys to identify users of the service are reviewed in step 2 below.)

Step 2—Identifying users of basic services

Assigning the unit subsidy to individuals is invariably based on information obtained through a *household survey*. Although service use data are also available from the service providers (for example, enrollment data from schools, or visits from hospital records), these are not of much use when the objective is to assess how government subsidies are distributed across different types of households or individuals—especially by income group. Such information would not be available in service providers' records, but only through a household survey. There are two main problems encountered in the identification of service users from household surveys: how to deal with biases in the data; and how to match survey data with official information.

When using household surveys as a basis for benefit incidence, analysts must be aware of potential biases in the data. These can arise for all sorts of reasons, depending on the design of the survey—the sample design, the structure of the questionnaire, the wording used, and so on. Here we highlight two common problems facing benefit incidence analysts. The first concerns the use of health services. The use of curative health care provided by the government is conditional on an illness or injury occurring in the household. In many household surveys (especially following the design of the Living Standards Measurement Study of the World Bank) illness and injury are self reported. This feature can cause biases if poorer respondents fail to report those illnesses which are considered commonplace and part of normal life, and which are reported by the better-off. If this bias in the incidence of illness across education (and income) groups affects estimates of the use of health services, it will cause biases in measured benefit incidence—the poor would appear to make less use of services relative to the rich simply because they were less able to identify such use.

A second example of data biases arises from the limits of the sample that is selected for the survey. This is not usually designed to estimate such rare events as university enrollments or in-patient health visits. And when the sample is disaggregated into groups (by quintile for example), the sample becomes a very unreliable tool for analyzing the use of such services. In the whole rural household sample for Ghana in 1992, for example, only one in-patient visit to a hospital was recorded. Even the urban sample seriously underestimated in-patient visits.[3] Nationally representative samples are simply not designed to obtain robust estimates of such rare events. And there can be other reasons why service use is not estimated accurately by a household survey. For instance, university enrollments are usually

[2] In terms of the algebra, equation (1) assumes that $\sum_j E_{ij} = E_i$. If the latter (used to estimate unit subsidy) is different from the former (used to allocate spending to the group), equation (2) will not strictly follow.

[3] According to Ministry of Health data, there were 73,800 in-patient visits in Greater Accra in 1992. But the household survey yielded an estimate of just over 8,500 visits—only 12 percent of the official estimate (World Bank, 1995).

seriously underestimated because students are often living in institutions not covered by the sampling frame.

Since the analyst must combine unit subsidy estimates derived from official data sources with service use information from household surveys, there is a need to *match* the two data sets. Often the disaggregations of official expenditure data are different from those in a household survey, and analysts must use their ingenuity to perform a match. For example, health spending data for Côte d'Ivoire were available at the primary level (preventive and basic curative care), secondary level (first-level referral hospitals), and tertiary level (higher-level referral and specialist hospitals), whereas the Côte d'Ivoire Priority Survey for 1995 reported health visits to dispensaries, pharmacies, primary health centers, maternity clinics and hospitals. Estimating benefit incidence involved matching these two sets of classifications, based on knowledge of health institutions in the country (Demery, Dayton and Mehra, 1996). Similarly, in estimating the benefit incidence of health spending in Indonesia, van de Walle (1995) was obliged to ignore differences in the unit subsidy across different categories of hospital care simply because the household data she used to allocate the subsidy did not distinguish between the different types of hospital.

Step 3—Aggregating individuals into groups

The main classifier used to group households is either income or total household expenditure. This is selected as a measure of the welfare of the household and its members. The distribution of this measure is also generally taken as the 'pre-fisc counterfactual' in benefit incidence analysis—this being the distribution of the welfare indicator that would apply in the absence of the in-kind transfer embodied in the government subsidy. Ranking individuals by this welfare indicator is important for benefit incidence, since it indicates whether government spending is well targeted to those that need it most—the poorest in society. The procedure requires that the household survey from which estimates of the use of public services are derived also contains information on the welfare measure—usually taken to be total household expenditure normalized for household size and composition.[4] Computing the welfare indicator is itself a major undertaking—defining what commodities are to be included in total household expenditure, dealing in an appropriate manner with spending on consumer durables, imputing own-produced consumption of food and receipts of income in kind, accounting for variations in prices both across regions and over time, and making allowance for the different expenditure needs of household members. Ravallion (1994) reviews the issues that need to be resolved in selecting and calculating the welfare indicator.

Individuals are then ranked according to the welfare measure. By aggregating individuals ranked in this way into groups of equal size, the analyst can define quantiles of the population. Grouping individuals by *decile* involves dividing individuals ranked by total household expenditure per capita into ten groups of equal size. The bottom decile thus represents the poorest 10 percent of the population. And the top decile would be the richest 10 percent. Dividing individuals into five equal groups ranked by the welfare indicator would yield *quintiles* of the population. Note that the ranking and division into groups of equal size is defined over individuals. An alternative often found in the literature is to define deciles (or quintiles) of *households*—ranking all households by the welfare indicator, and dividing the ranked distribution into groups containing the same number of households (Hammer, et al 1995, is one such

[4] The problem here is that income and expenditure information on individuals is not usually available from household surveys. The usual procedure is to assign to each individual the per capita income or expenditure of the household to which she or he belongs. Computationally, this involves weighting households by household size before ranking. This can be misleading when there are large intra-household inequalities (Haddad and Kanbur, 1990).

example). Should benefit incidence analysis be conducted using quintiles defined over individuals or over households? When dealing mainly with services which are provided to individuals (for example, most education and health services), population quintiles (or deciles) should be used. Defining quintiles over households could give a misleadingly pro-poor impression of the subsidy, simply because poorer household quintiles tend to have more individuals than richer quintiles. The reverse applies to services that are used at the household level (drinking water services). On balance, our preference is to base benefit incidence on population quintiles. Whatever is decided, the analyst must make clear how the ranking is performed, and how the quintiles are defined.

The quintile problem arises because the needs of the quintiles vary—the poorest quintiles of households tend to have more individuals in them, and so their need for such services as health care are so much greater. But even using population quintiles does not entirely resolve the problem of differing needs across the quintile groups. For example, the poorest population quintiles tend to have more children of primary school age, especially when the welfare indicator is defined as total household expenditure *per capita* (Lanjouw and Ravallion, 1994). Thus the *needs* of the quintiles may well vary with respect to the service being investigated. Education needs, for example, can be proxied by the quintile shares of the school-aged population. And the analyst may wish to normalize the education subsidy going to the quintile by the school-aged population of the quintile. For health and other services, defining the needs of the quintile can be more difficult. But even here, there are possibilities for the analyst to become aware of such needs. For example, the health-care needs of females are different from those of males, especially in certain age categories (notably the child-bearing ages of 15-45 years).

An alternative to quintiles would be to divide the distribution of individuals into poor and non-poor categories, based on some poverty line or benchmark measured in the same dimension as the welfare indicator (again, see Ravallion, 1994, for further guidance on how this should be done). And although the most common grouping is by income/expenditure class, many other disaggregations are possible—regional groupings (such as rural and urban populations), ethnic groups, and gender.[5] These grouping are conventionally (though not necessarily) applied along with income- or expenditure-based groupings. The gender dimension is especially relevant for poverty assessment, since the weak targeting of government spending to the poor is closely related to gender biases in the use of government services (Demery, 1996).

Accounting for household spending—step 4?

To the three main steps of benefit incidence analysis we might add a fourth—taking into account the *household* spending that is needed to obtain the service. Households must incur out-of-pocket expenditures to gain access to subsidized government services (even those that are 'free'). And such spending extends beyond the cost-recovery contributions which were netted out in the unit subsidy discussed above. There are two main reasons why this spending should be factored in. First, it provides a complete accounting of benefit incidence. Experience has shown that households contribute substantially to service provision despite the large government subsidies involved, and that this contribution varies by income group. Typically, individuals in better-off households benefit from significantly higher spending than their poorer counterparts. These inequalities can dominate the incidence of the public subsidy. Second, the burden of these costs (especially to low-income households) can discourage the use of the services, and lead to poor targeting of the government subsidy.

[5] In their review, Selden and Wasylenko (1992) list various ways benefit incidence may be disaggregated (such as race, age, religion), but failed to mention gender.

IV. Examples of Benefit Incidence

To get a more hands-on view of benefit incidence, we now provide concrete examples of the approach. There exists a vast literature reporting results of benefit incidence studies. But even recent reviews (such as Selden and Wasylenko, 1992) have become somewhat dated, with a surge of studies in Africa.[6] To provide a flavor of the range of empirical issues which crop up in benefit incidence analysis, we review a *selection* of applications covering four main sectors: education, health, water/sanitation, and other infrastructure. The majority of studies focused only on these key sectors.[7] And there is good reason for this limited coverage. First, not all government spending is relevant to our present concern with equity and poverty reduction. Second, many items of government spending, though of some significance for the poor, are pure public goods (for example, spending on law and order), which are non-rival in nature. It is impossible to assign consumption levels of such services to sub-groups of the population. Finally, there are serious data problems, given the limited coverage of household surveys, and indeed problems with official expenditure data. These factors combine to restrict the number of sectors that can be (and should be) covered by a benefit incidence study.

IV.1 Education Subsidies

There are four reasons to begin with education. First and foremost, it is one of the most important services the poor need to escape from poverty. Whatever the level of analysis (micro or macro), education is found to be vital for poverty reduction. Second, education spending, especially at the primary level, is considered to be subject to high levels of external benefits, and so a strong case can be made for the continued involvement of the state in its funding. Third, governments generally devote a significant proportion of their budgets to education. Finally, data on the use of education services (school enrollments) are commonly found in household surveys, so that education spending lends itself to benefit incidence analysis. We shall select just three examples—Colombia, Côte d'Ivoire and Indonesia.

Estimating unit subsidies

We begin with the estimation of unit subsidies. It is important to make it explicitly clear how these are estimated—what data are used and what assumptions are made.[8] Even if much of the information is sidelined to an annex, readers must be able to follow just how the calculations were made. For Indonesia and Côte d'Ivoire, unit subsidies were obtained as national averages, ignoring regional variations. The only variations allowed for were by level of education, and for Côte d'Ivoire, subsidies through public and private schools were distinguished. In the case of Colombia, subsidies were also distinguished by four main geographical areas (large cities, intermediate cities, small urban areas, and rural areas). For all three countries unit subsidies at the tertiary level were multiples of those at the primary level (Table 1). Households that managed to enroll children in higher education (say in a

[6] Benefit incidence studies have recently been undertaken in (among others) Bulgaria, Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Kenya, the Philippines, PDR Lao, Madagascar, Malawi, South Africa, Tunisia, Tanzania, Uganda, Vietnam and Zambia, none of which were available to the above mentioned reviews.

[7] Coverage is generally a function of data availability—especially official expenditure data. In countries with a tradition of keeping and publishing expenditure accounts, greater coverage is obtained. Thus coverage has generally be wider in countries of Latin America (see World Bank 1988 for Brazil, World Bank 1993b for Uruguay, World Bank 1994a for Argentina and World Bank 1994b for Colombia) and Asia (World Bank, 1993c for Indonesia, and World Bank, 1993a for the Philippines), and narrower in Africa, where official data are highly restricting.

[8] In some studies (such as World Bank, 1993), it is difficult for the reader to follow exactly how unit subsidies were estimated.

university) generally gained significant in-kind transfers from the state—much greater than they derived from a primary enrollment for example.

These estimates also illustrate different treatments of cost recovery. For Colombia, no mention is made of revenue from cost recovery, and no adjustments were made in the unit subsidy estimates. For Côte d'Ivoire, Demery, Dayton and Mehra (1996) argue that most cost recovery stays either at the education facility or at least within the education service. They therefore argue that it is invalid to net out such revenues from the gross subsidy. Finally, in Indonesia, cost recovery revenue is netted out, though no discussion is reported about how the revenue is used—whether it is typically returned to the treasury or retained at the institution. Again, transparency is important, so that the reader is aware how the analyst has treated this issue. The Indonesian unit subsidy estimates were the most aggregative—simply one subsidy for the country as a whole for each of four levels of schooling. For Côte d'Ivoire, it was important to distinguish direct subsidies through the public school system, and indirect subsidies through private schooling (some of the education budget was allocated to finance places in private schools due to capacity limits being reached in state schools). And five levels of schooling were distinguished, yielding altogether eight unit subsidies. The most disaggregated unit subsidies were used for Colombia (reported in Table 2). These are specified for four geographical areas and three education levels, yielding twelve unit subsidies in all. There is some variation across regions in the subsidies at each level of schooling, which provides an additional source of inequality in the benefit incidence distribution. Intermediate and small cities enjoyed higher subsidies than large cities and rural areas. Box 1 illustrates what a difference disaggregating unit subsidies can make to benefit incidence results.

Are such regional disaggregations meaningful for benefit incidence estimates? The answer depend on two factors. First, the variations in unit subsidies must reflect variations in the benefit households derive from the service (for example, through better student/teacher ratios, or availability of school supplies). Second, regional unit subsidies only make sense if they can be matched to households resident in the same region. While this might generally be true for primary and secondary schooling (assuming that there is no boarding), it is less likely at the tertiary level. Households frequently send children to university away from the area of residence. The use of the regionally disaggregated unit subsidy, therefore, can be justified if it can be shown that households tend to enroll children within the region of residence.

Table 1: Education Unit Subsidies, Colombia, Côte d'Ivoire and Indonesia

		Education unit subsidies (per student)		
		Gross	Cost recovery	Net
Colombia:	(1992 - pesos)			
Primary		86,649	-	86,649
Secondary		170,916	-	170,916
Tertiary		1,010,954	-	1,010,954
Côte d'Ivoire	(1995 - CFAF)			
Primary:				
Public		64,840	-	64,840
Private		8,490	-	8,490
Secondary:				
General				
Public		117,462	-	117,462
Private		31,694	-	31,694
Technical				
Public		754,221	-	754,221
Private		8,663	-	8,663
Tertiary:				
General		348,453	-	348,453
Technical		1,878,089	-	1,878,089
Indonesia	(1989 - rupiah)			
Primary		71,583	-	71,583
Secondary				
Junior		135,819	17,705	118,114
Senior		188,480	26,907	161,573
Tertiary		715,070	127,755	587,315

Source: Demery, Dayton and Mehra (1996), World Bank, (1993c, 1994b).

Table 2: Colombia: Education Unit Subsidies by Region, 1992

	Education unit subsidies (per student)		
	Primary	Secondary	Tertiary
		(1992 pesos)	
Large cities	75,177	149,441	1,107,081
Intermediate cities	102,779	204,218	1,021,835
Small cities	111,639	186,294	860,277
Rural areas	78,784	168,259	1,010,954
National average (gross)	86,649	170,916	1,010,954

Source: World Bank (1994b)

Benefit incidence estimates

What do these unit subsidies imply for the in-kind transfers households gain from education spending? This clearly depends on their decisions to send children to school. Households with children enrolled in state-subsidized schools are allocated the subsidy, depending on the type of school and (in the case of Colombia) their place of residence. Table 3 provides a *basic format* of how the benefit incidence results can be arranged—say in a spreadsheet. Subsidies are distributed to expenditure quintiles (in terms of equation 1, j = 1,....,5). For Côte d'Ivoire and Indonesia, quintiles were defined across *individuals*, on the basis of the per capita total expenditure of the household to which they belong. But for Colombia, analysts computed *household* quintiles. In Indonesia benefits were expressed on a monthly basis, while for Colombia and Côte d'Ivoire annual estimates were reported. The basic format presents the total subsidy imputed to each quintile in various ways. It expresses it in per capita terms, as a share of the total subsidy, and as a proportion of the total expenditure of the households in each quintile. It also highlights the roles of the *s* and *e* variables.

We begin by observing that the poorest quintile gained just 15 percent of the total education subsidy in Indonesia, only 13 percent in Côte d'Ivoire, and 23 percent in Colombia. Three factors determine these shares. The first is the allocation of the education subsidy across the various levels of schooling (the *s*'s of equation 2). These are given as the shaded values in the final row of figures (the memorandum item) for each country. In Indonesia, the government allocated 62 percent of total education subsidies to primary education, while in Côte d'Ivoire the share was just under 50 percent. The Ivorian government spent relatively more on tertiary schooling (18 percent) compared with just 9 percent in Indonesia. Colombia's allocations were quite different, with a much *lower* share being allocated to primary schooling (just 41 percent) and a much higher share to tertiary education (26 percent). To what extent do these row shares explain the benefit incidence of overall education spending? They are clearly reflected in the results for Côte d'Ivoire and Indonesia—the smaller share of the total subsidy going to the poorer quintiles in Côte d'Ivoire is due to the lower allocation of spending to primary schooling (and higher allocations to tertiary education). But surprisingly, the low allocation of the education subsidy to primary schooling in Colombia does not seem to have led to a lower share going to the poorer quintiles. Why is this? The answer lies in the main with the second set of factors determining benefit incidence—household behavior.

Differences in household behavior—the *e*'s of equation 2—are reflected in the *quintile shares* of the subsidy at each level of education (the shaded columns in Table 3). Primary enrollments (and therefore the primary subsidy) in the poorest quintile represented 22 percent of total primary enrollments (subsidy) in Indonesia, just 19 percent in Côte d'Ivoire, and 39 percent in Colombia. In contrast, the richest quintiles in these countries gained (respectively) 14 percent, 14 percent and 4 percent. It is the *combined* influence of these enrollment shares and the allocation of government subsidies across the levels of education that yields the overall benefit incidence from education spending accruing to each of the quintiles. So whereas the Colombian government spent proportionately less on primary education than the other two countries, the behavior of Colombian households meant that the poor gained a greater share of the total education budget than in the other countries. Richer households in Colombia simply did not use public schooling as much as in Indonesia and Côte d'Ivoire. A third factor explaining the differences in benefit incidence is the way the quintiles were defined. For Colombian they were defined across households rather than individuals, and this makes the benefit incidence patterns not comparable with Indonesia and Côte d'Ivoire. With total household expenditure *per capita* as the welfare measure, poorer households will generally be larger (Lanjouw and Ravallion,1994). This means that when quintiles are defined for households, there will usually be more individuals in the poorer quintiles

Table 3 Benefit Incidence of Public Spending on Education, by Quintile and Level, in Colombia (1992), Cote d'Ivoire (1995) and Indonesia (1989)

	Primary subsidy		*Secondary subsidy:* (a)		*Secondary subsidy:* (b)		*Tertiary subsidy*		*All education* Subsidy		*All education* Share of:	
	Per capita	Share of total subsidy (e_{ij})	Per capita	Share of total subsidy (e_{ij})	Per capita	Share of total subsidy (e_{ij})	Per Capita	Share of total subsidy (e_{ij})	Total	Per capita	Household Expenditure	Total subsidy
Indonesia (per month)												
Population quintile	(Rps)	(%)	(Rp.)	(%)	(Rp.)	(%)	(Rp.)	(%)	(m Rp.)	(Rp.)	(%)	
1	2,179	**22**	179	**7**	56	**3**	0	**0**	74,301	2,414	15	**12**
2	2,111	**22**	354	**14**	107	**6**	1	**0**	82,215	2,573	17	**9**
3	2,094	**22**	508	**19**	210	**11**	17	**1**	87,283	2,830	18	**8**
4	1,828	**20**	684	**26**	424	**24**	88	**7**	96,998	3,025	20	**6**
5	1,285	**14**	867	**34**	956	**56**	1,168	**92**	140,967	4,274	29	**5**
Indonesia	1,892	100	523	100	358	100	264	100	481,763	3,037	100	**7**
Memorandum: Government spending*:*												
(m Rp)	300,124		83,017		56,738		41,885		481,763			
% share (s_i)	**62**		**17**		**12**		9		**100**			
Côte d'Ivoire (per annum)												
Population quintile	(CFAF)	%	(CFAF)	%		(CFAF)	(CFAF)	%	(m CFAF)	(CFAF)	(%)	
1	6,908	**19**	1,459	**7**	0	**0**	1,633	**12**	28,477	10,000	13	**13**
2	7,562	**21**	5,028	**23**	5	**0**	300	**2**	36,794	12,895	17	**11**
3	8,676	**24**	3,724	**17**	14	**0**	389	**3**	36,231	12,802	17	**7**
4	7,922	**22**	3,245	**15**	23	**1**	1,528	**12**	36,499	12,718	17	**5**
5	5,015	**14**	7,977	**37**	3,405	**99**	9,407	**71**	73,589	25,803	35	**5**
Cote d'Ivoire	7,215	100	4287	100	690	100	2,653	100	211,591	14845	100	**6**
Memorandum: Government spending*:*												
(m CFAF)	102,840		61,104		9,830		37,817		211,591			
% share (s_i)	**49**		**29**		**5**		**18**		**100**			
Colombia (per annum)												
Household quintile	(Pesos)	%	(Pesos)	%			(Pesos)	%	(m Pesos)	(Pesos)	(%)	
1	16,853 (91,461)	**39**	9,523 (51,683)	**21**	-	-	1,646 (8,932)	**5**	191,619	28,022 (152,076)	23	n.a
2	11,188 (60,909)	**26**	12,360 (67,293)	**27**	-	-	3,019 (16,434)	**9**	174,441	26,566 (144,636)	22	n.a
3	9,535 (45,026)	**19**	13,480 (63,655)	**25**	-	-	6,902 (32,593)	**19**	167,480	29,917 (141,274)	21	n.a
4	6,114 (25,137)	**11**	10,838 (44,560)	**18**	-	-	14,152 (58,186)	**33**	149,649	31,104 (127,883)	19	n.a
5	2,719 (9,912)	**4**	6,640 (24,210)	**10**	-	-	16,299 (59,428)	**34**	108,540	25,658 (93,550)	14	n.a
Colombia	11,733 (53,558)	100	9,671 (44,146)	100	-	-	7,486 (34,172)	100	791,202	28,891 (131,877)	100	n.a
Memorandum: Government spending*:*												
(m Pesos)	321,325		264,857				205,019		791,202			
% share (s_i)	**41**		**33**				**26**		**100**			

Notes:
Secondary (a) denotes junior secondary for Indonesia, general secondary for Cote d'Ivoire, all secondary for Colombia.
Secondary (b) denotes senior secondary for Indonesia and technical secondary for Cote d'Ivoire.
Share of total household expenditure for Indonesia derived as means of relevant decile shares.
Figures in parenthesis indicate per *household* subsidy for Colombia; 'na' signifies not available.

Sources: World Bank (1993c, 1994b); Demery, Dayton and Mehra (1996)

Box 1: Aggregating unit subsidies may mask inequality

In the examples of Indonesia and Côte d'Ivoire, unit subsidies for each level of education were defined as means for the country as a whole. Where spending is very unevenly distributed geographically (or in other ways) the use of such aggregate unit subsidies can mask inequality in public spending. But it need not. Two examples are given here which illustrate this point. In both South Africa and Madagascar, it was possible to disaggregate unit subsidies on education. In South Africa, Castro-Leal (1996) obtained five levels of unit subsidy based on the budgets of the different 'Houses' of government, which were divided along racial grounds. Unit subsidies varied enormously. The primary education subsidy varied from just R.708 for Homeland Africans to R.3,298 for whites. Despite these differences, enrollment rates were high, even among the poorest groups receiving the lowest subsidy. The net primary enrollment rate among Homeland Africans in the poorest household quintile was 85 percent in 1994 (compared with 90 percent for whites). In Madagascar, it was possible to distinguish unit subsidies in the six main regions of the country. The primary unit subsidy varied from FMG 34 to FMG 71 (World Bank, 1996b). Enrollment rates were low for the poor. The net primary enrollment rate in the poorest population quintile was just 27 percent compared with 72 percent for the richest quintile. This might be considered a result of the lower unit subsidies in some regions. So in contrast to South Africa, unit subsidies did not vary as much in Madagascar, but enrollment rates declined sharply at low income levels.

Two estimates of the benefit incidence of education spending are reported in the box table. One is based on the disaggregated unit subsidies, while the other is computed using an average unit subsidy at each education level. In South Africa, the aggregation of unit subsidies makes a significant difference to benefit incidence. Whereas the poorest quintile are shown to gain just 19 percent of primary spending in 1994 using race-specific unit subsidies, the share increases to 26 percent if the unit subsidy is averaged across races. The share going to the richest quintile is halved when aggregate unit subsidies are employed. For education spending as a whole, the use of mean subsidies makes it appear as though each quintile received roughly its proportionate share of the education budget. But in actual fact, the poorest quintile gained only 14 percent and the richest 35 percent of total education spending when unit cost variations between the races were taken into account.

But the Madagascar estimates tell a quite different story. Here, the use of national average unit subsidies (at each level of schooling) changes the benefit incidence estimates only marginally compared with the use of region-specific unit subsidies. The differences are literally matters of decimal points. Why the difference with South Africa? There are three factors which explain this different outcome. First, the unit subsidies were far more variable in the case of South Africa, reflecting as they did, the years of the apartheid regime. Although significant, the variations in unit subsidies in Madagascar were modest in comparison. Second, the population within the quintiles was distributed across regions in Madagascar, so that there was some variability in the unit subsidies within quintiles. In South Africa, the population in the poorest quintile was almost entirely black, so that only the lowest unit subsidy applied. Third, enrollment rates were uniformly high in South Africa, whereas in Madagascar, there were significant variations across income groups. It is likely that the lower enrollment rates among the poorer groups in Madagascar were due to the lower unit subsidies allocated to them. Thus when national average unit subsidies are used, although the unit subsidy variations are missed, their effects on the enrollment patterns across income are captured, and reflected to some extent in the benefit incidence estimates (through the *e* variables).

Box Table : Benefit Incidence of Education Spending in South Africa and Madagascar.

	Share of primary subsidy		*Share of secondary subsidy*		*Share of tertiary subsidy*		*Share of education subsidy*	
Population quintile	Disaggregated Unit subsidies	Mean unit subsidy	Disaggregated unit subsidies	Mean unit subsidy	Disaggregated unit subsidies	Mean unit Subsidy	Disaggregated unit subsidies	Mean unit subsidy
				South Africa (1994)				
1	18.9	25.8	11.5	18.8	6.1	6.1	14.1	19.9
2	17.7	23.3	15.0	22.6	9.9	10.0	15.4	20.7
3	16.5	19.7	16.3	22.7	14.0	14.3	16.0	19.7
4	19.1	17.8	18.6	19.4	22.9	22.5	19.6	19.1
5	27.8	13.5	38.6	16.6	47.2	47.1	34.9	20.3
				Madagascar (1993)				
1	16.8	17.2	1.9	2.0	0.0	0.0	8.2	8.3
2	24.6	24.7	12.3	12.3	1.6	1.6	15.1	15.2
3	21.3	21.0	14.8	15.3	0.6	0.6	14.3	14.0
4	23.0	23.1	29.2	28.9	9.2	9.2	21.3	21.4
5	14.4	14.0	41.8	41.5	88.6	88.6	41.2	41.0

Source: Castro-Leal (1996); World Bank (1996b)

than the richer ones. And this can distort benefit incidence results, making it appear that the poorer quintiles gain more, relative to the rich. In Colombia, for example, the mean household size of the poorest quintile was 5.4 persons, in contrast to 3.6 persons in the richest quintile. This difference means that the share of any subsidy based on *individual claims* (such as enrollments) will tend to be higher for poorer quintiles defined on households than on individuals. A way of correcting for this is to normalize subsidies on individuals rather than households. Consider the per household education subsidy accruing to the bottom and top quintiles in Colombia. In *per household* terms there is a significant difference in the subsidy received (152,076 Pesos per household going to quintile 1 and 93,550 Pesos to quintile 5). But in *per capita* terms, there is little between the subsidies (28,022 Pesos for quintile 1 and 25,658 Pesos for Quintile 5). The progressive pattern of education spending in Colombia is due, to some extent at least, to the fact that quintiles were inappropriately defined over households. The choice about how to compute quintiles depends on the questions the analyst is addressing. Box 2 provides an illustration of the difference between using households and individuals in the quintile ranking for Côte d'Ivoire.

Expressing the education subsidy as a percentage of household income or expenditure[9] reveals how *progressive* it is. In both Côte d'Ivoire and Indonesia, the education subsidy imputed to the poorest quintile amounted to about 12 percent of total household expenditure, which contrasts with just under 5 percent for the richest quintile (Table 3). Although the subsidy was not well targeted to the poorest sections of the population (the poorest quintiles gaining significantly less than their share in the total population), it is was progressively distributed-in relation to their income/expenditure, the poor received more than the rich.

Targeting and progressivity—using graphics

Benefit incidence results can readily be portrayed in graphic form. Tracking the cumulative distribution of total household expenditures against the cumulative population ranked by per capita expenditures gives the expenditure *Lorenz curve*. Such a curve for Indonesia is shown in Figure 2. This provides a point of comparison with which to judge the distribution of education spending in Indonesia. The distribution of education spending is shown in the *concentration curves* in the figure.[10] These graphics convey some important messages. First, compare the concentration curves with the 45^{o} diagonal. If the curve lies above the diagonal, it means that the poorest (say) quintile gains more than 20 percent of the total subsidy (and the richest quintile, less than 20 percent). Such a distribution is progressive in *absolute* terms. Second, comparisons should be made with the Lorenz curve. Concentration curves lying above the Lorenz curve (and below the 45^{o} diagonal) are progressive relative to income (or expenditure in this case). If beneficiaries were given income instead of the in-kind transfer, income distribution would become more equitable. Concentration curves lying below the Lorenz distribution indicate regressive transfers. From Figure 2 it is clear that the primary subsidy was progressive in absolute terms, the concentration curve lying above the diagonal. The senior secondary and tertiary subsidies were regressive (below the Lorenz curve). The overall education subsidy was relatively progressive (lying between the diagonal and the Lorenz curve). Box 3 reviews issues that need to be addressed when comparing the statistical significance of differences between concentration curves.

[9] That is, the same measure that was used to rank and group households.

[10] The *Lorenz* curve involved mapping the cumulative distribution of a variable (say income) against the cumulative distribution of the population ranked using the *same* variable (by income level). A *concentration* curve maps the cumulative distribution of another variable (in this education spending) against the same ranking of individuals.

Box 2: Quintile definitions make a big difference

Some benefit incidence studies, such as Hammer et al (1995) and World Bank (1994b) define quintiles over households, even when dealing with a government service that is provided to individuals (such as education). This can (and usually does) give a misleading impression of how evenly a subsidy is distributed. To illustrate the point, consider the benefit incidence of education spending in Côte d'Ivoire in 1996 (see box table). With quintiles defined over the population, education spending appears to be poorly targeted to the poor—the poorest quintile of individuals gaining just 13 percent of the total subsidy. But if the quintiles are defined for households, the picture changes. Now the poorest quintile (of households) is shown to gain 19 percent of the total education subsidy (with the richest quintile receiving just 21 percent). And for primary education the contrast is even greater. The poorest quintile of households gained 29 percent of the total primary subsidy, while the poorest quintile of individuals just 19 percent.

The reason for such differences is clearly the variations in the numbers of individuals occupying each quintile cell. When quintiles are defined over the population, the population size of each quintile is defined to be equal. But the population size of each household quintile will vary, depending on the household size characteristics of the quintile. Typically, the welfare measure used to rank households is per capita total household expenditure or income. Households with lower values of this welfare measure will typically be larger in size. This then 'distorts' benefit incidence based on household quintiles, making it appear that the distribution of spending is more progressive than it actually is..

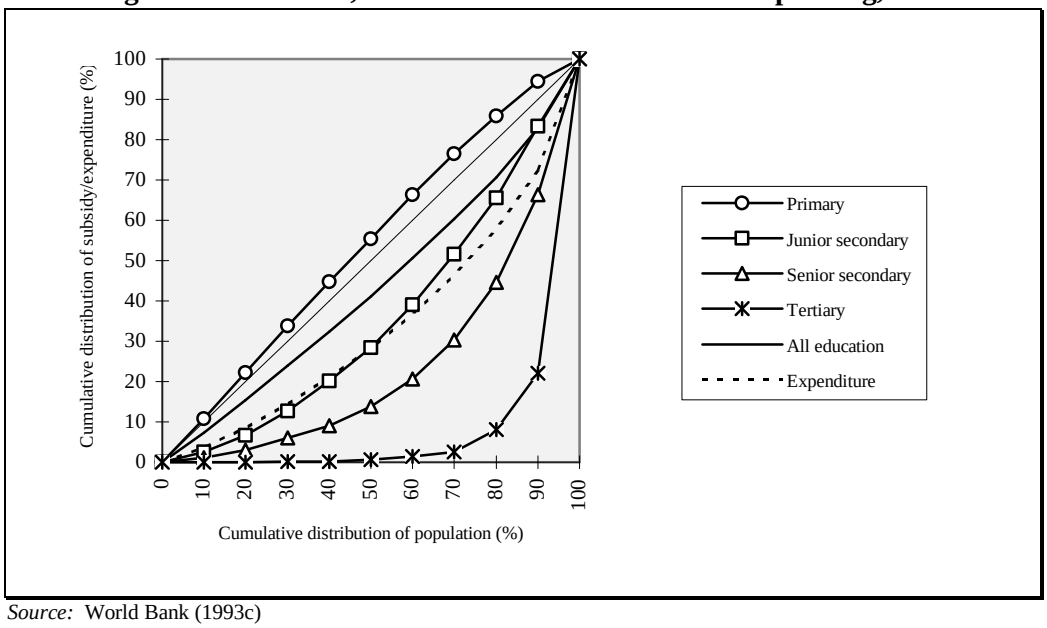
Box Table: Côte d'Ivoire, Education Spending Incidence under Alternative Quintile Definitions, 1995

	Household quintiles			Population quintiles		
	Subsidy CFAF m	Per capita CFAF	Column share %	Subsidy CFAF m	Per capita CFAF	Column share %
Quintile			*Primary*			
1	29,575	7,466	28.8	19,672	6,908	19.1
2	23,410	7,375	22.8	21,578	7,562	21.0
3	26,107	8,324	25.4	24,553	8,676	23.9
4	18,878	7,757	18.4	22,736	7,922	22.1
5	4,870	3,147	4.7	14,301	5,015	13.9
Côte d'Ivoire	102,840	7,215	100.0	102,840	7,215	100.0
			Secondary			
1	6,823	1,722	11.2	4,155	1,459	6.8
2	16,706	5,263	27.3	14,347	5,028	23.5
3	11,044	3,521	18.1	10,539	3,724	17.2
4	15,927	6,545	26.1	9,312	3,245	15.2
5	10,603	6,852	17.4	22,750	7,977	37.2
Côte d'Ivoire	61,104	4,287	100.0	61,104	4,287	100.0
			All education			
1	41,048	10,362	19.4	28,477	10,000	13.5
2	40,986	12,912	19.4	36,794	12,895	17.4
3	39,005	12,436	18.4	36,231	12,802	17.1
4	46,848	19,251	22.1	36,499	12,718	17.2
5	43,703	28,240	20.7	73,589	25,803	34.8
Côte d'Ivoire	211,591	14,845	100.0	211,591	14,845	100.0

Source: Côte d'Ivoire Priority Survey, 1995

The position of the junior secondary concentration curve raises an interesting problem, because the concentration curve crosses the (expenditure) Lorenz curve. Is the subsidy progressive? The answer depends on how important the analyst or policy maker considers each individual to be in the social welfare function. One could compare areas under the curves—for example by simply comparing the Gini ratios[11] of the two distributions (if the secondary subsidy Gini ratio is less than the expenditure Gini ratio, the subsidy might be considered progressive). But this assumes an implicit social welfare function, weighting each household according to the Gini formula. Yitzhaki (1983) has proposed an *extended Gini* which makes these weights explicit. His *v* parameter reflects this weighting.[12] Values of 2 yield the orthodox Gini ratio, and higher values give greater weight to poorer households. Analysts might apply such weights to check whether any given concentration curve implies greater or less inequality than another concentration curve (or the Lorenz curve for that matter). In the case of the junior secondary subsidy in Indonesia, it is likely that *v* values higher than 2 would imply a regressive pattern, since the concentration curve lies below the Lorenz curve for the poorest five deciles.

Figure 2: Indonesia, Benefit Incidence of Education Spending, 1989



Source: World Bank (1993c)

[11] The gini ratio is simply the area between the concentration (or Lorenz) curve and the diagonal divided by the area under the diagonal. It ranges from 0 (the case of perfect equality when the curve lies along the diagonal) to 1 (representing perfect inequality, when only one person receives the income or subsidy).

[12] The gini coefficient is defined as: $G(v) = -v * Cov\{e, [1-F(y)](v-1)\}/\mu_i \quad v>1$

where e is the transfer benefit to the individual, F(y) is the cumulative density function of the welfare ordering, μ_i is the mean level of the benefit received by individuals, and v is the weighting factor (=2 in the normal case).

Box 4: Significance tests for differences between concentration curves

Judging whether or not one subsidy is more equally distributed than another involves comparing two concentration curves. Such curves are usually based on sample data, and are subject to sampling errors. To decide on whether any one concentration curve dominates another (that is lies above it at every point), there has to be a *statistically significant* difference between the curves. Davidson and Duclos (1996) derives the standard errors needed for such an assessment. The more common approach would be to reject the null hypothesis of non-dominance if the difference between any one pair of ordinates is statistically significant and none of the other pairs of ordinates is statistically significant in the opposite direction. How many ordinates should be selected in such a choice—should these ordinates be defined for every decile or quintile? Taking wide quantiles (say quintiles) makes the test less demanding. Finer disaggregation (say percentiles) cannot be taken too far because of the problem of small samples within each quantile. There is also the problem that differences between ordinates at the extremes of the distribution are rarely statistically different, which has led Howes (1996) to exclude the extremes in the dominance test. In his comparisons of concentration curves, Younger (1999) excludes the top and bottom five percentiles of the distributions, and compares 20 equally spaced ordinates from the 5^{th} and 95^{th} percentiles.

Quintile needs and demographic effects

Before we can draw policy recommendations from the data in Table 3, some assessment must be made of variations in the education *needs* of the quintiles. One of the reasons why we distrusted the high share of the education subsidy going to the poorest quintile of households in Colombia was that the quintile contained more individuals than other quintiles, and that concerned us simply because it suggested that the education needs of the quintile were greater than others. We can take this a stage further by recognizing differences in the number of school-aged children in each of the quintiles—this is a much more meaningful indicator of quintile needs. Compare, for example, the shares of the education subsidy in Côte d'Ivoire by quintile with the shares of the school-aged population (Table 4). While the poorest quintile appears to be doing reasonably well in gaining 19 percent of the total primary education subsidy, compared with its 24 percent share of primary school-age children it does not seem so well placed. So whereas the poorest quintile receives a larger *per capita* primary subsidy than the richest quintile, when it is expressed in terms of per primary school-aged child, its receives considerably less. The contrast is even more striking with secondary schooling, with the bottom quintile having 21 percent of the children at this age, but receiving only 7 percent of the total secondary subsidy.

These demographic differences across the quintiles arise in part because of the selection of *per capita* total household expenditures as the welfare indicator. If the assignment of individuals to quintiles were based on other welfare measures (such as *per adult equivalent* expenditures) these demographic differences may decrease, or disappear altogether (Lanjouw and Ravallion, 1994). How sensitive are our estimates of the incidence of public education spending to the welfare indicator selected in distributing individuals across the quintiles? To answer this question in the context of Ghana, Demery et al (1995) normalized household expenditures on both household size and adult equivalence, the latter based on the scale proposed in Deaton and Muellbauer (1986). Rather than giving every household member the same weight (which is the case when per capita measures are used), children are given lower weights than adults when the adult equivalence scale is used. Primary education spending becomes significantly less targeted to the poorest groups under the revised welfare measure (Table 5). Using per adult equivalent expenditures, the poorest quintile gained just 17 percent of the primary subsidy (in contrast to the 22 percent allocation estimated using per capita expenditures). And the richest quintile was seen to gain much more from the subsidy under the alternative welfare measure. The opposite revisions apply to secondary subsidies—the share to the poorest increases and to the richest decreases. The distribution of the tertiary subsidy became markedly more equitable (though remaining highly unequal). The exercise confirms that public spending incidence estimates are indeed sensitive to the definition of welfare. In the

case of Ghana in 1992, using per adult equivalence instead of per capita normalization, made primary subsidies significantly less targeted to the poor, and secondary and tertiary subsidies better targeted. These compensating changes happened to leave the overall education spending incidence unchanged.[13]

Table 4: Côte d'Ivoire, Benefit Incidence and Education Needs, 1995

	Subsidy		Share of subsidy	Share of school-age population
	Per capita	Per school-age child		
	CFAF	CFAF	%	%
Quintile/region				
	Primary			
1	6,908	31,970	19.1	23.8
2	7,562	37,998	21.0	22.0
3	8,676	42,544	23.9	22.4
4	7,922	48,027	22.1	18.3
5	5,015	41,171	13.9	13.5
All Côte d'Ivoire	7,215	39,843	100.0	100.0
Rural	6,848	37,176	55.3	59.3
Urban	7,728	43,723	44.7	40.7
	Secondary			
1	1,459	8,971	6.8	20.9
2	5,028	30,017	23.5	20.7
3	3,724	23,701	17.2	19.3
4	3,245	21,088	15.2	19.1
5	7,977	47,144	37.2	20.9
All Côte d'Ivoire	4,287	26,452	100.0	100.0
Rural	2,076	13,622	28.2	54.8
Urban	7,373	42,002	71.8	45.2

Source: Demery, Dayton and Mehra (1996)

Marginal versus average benefit

Interpreting the pattern of benefit incidence tells us very little about what would happen if governments increase spending on certain categories. The analyst might simply take existing use patterns as given and generate a simple counterfactual analysis, but this analysis rests on the assumption that the use pattern does not change significantly (and that the observed incidence of current spending would hold also for any additional spending). The *marginal* gains, however, may be distributed quite differently from the average incidence, even within a category (such as primary education spending). Lanjouw and Ravallion (1999) use cross section data to assess the extent to which the marginal benefit incidence of primary school spending differs from average incidence. They regress the 'odds of enrollment' (defined as the ratio of the quintile specific enrollment rate to that of the population as a whole) against the instrumented mean enrollment ratio (the instrument being the average enrollment rate without the quintile in question). The estimated coefficient indicates the extent to which there is early capture by the rich of primary school places. Under that circumstance, any increase in the average enrollment rate is likely to come from proportionately greater increases in enrollment among the poorer quintiles. That would lead to higher marginal gains to the poor from additional primary school spending than the gains indicated by

[13] For other examples of the sensitivity of benefit incidence to the choice of welfare measure see van de Walle, Ravallion and Gautam (1994), Jarvis and Mickelwright (1995), and Milanovic (1995?).

the existing enrollments across the quintiles. Their results are reported in Table 6. These indicate that whereas the poorest quintile gains just 14 percent of the existing primary education subsidy in rural India, they would most likely receive 22 percent of any additional spending. This result suggests that caution is needed in drawing policy conclusions from average benefit incidence results.

Table 5: Ghana, Benefit Incidence of Education Subsidy Under Alternative Welfare Measures, 1992

Welfare Measure:	**Adult equivalent expenditures**		**Per capita expenditures**	
Quintile	**Per capita subsidy *(Cedis)***	**Share of subsidy *(%)***	**Per capita subsidy *(Cedis)***	**Share of subsidy *(%)***
		Primary		
1	3,847	17.4	4,815	21.8
2	4,680	21.2	5,219	23.6
3	4,607	20.9	4,797	21.7
4	4,601	20.8	4,147	18.8
5	4,343	19.7	3,100	14.0
All Ghana	4,416	100.0	4,416	100.0
		Secondary		
1	4,269	18.6	3,431	14.9
2	4,865	21.1	5,026	21.8
3	5,284	23.0	4,849	21.1
4	4,768	20.7	5,412	23.5
5	3,818	16.6	4,285	18.6
All Ghana	4,601	100.0	4,601	100.0
		Tertiary		
1	775	9.5	485	6.0
2	1,260	15.5	775	9.5
3	1,841	22.6	1,551	19.0
4	1,841	22.6	1,648	20.2
5	2,423	29.8	3,683	45.2
All Ghana	1,628	100.0	1,628	100.0
		All education		
1	8891	16.7	8731	16.4
2	10805	20.3	11021	20.7
3	11732	22.0	11196	21.0
4	11210	21.1	11207	21.1
5	10584	19.9	11067	20.8
All Ghana	10644	100.0	10644	100.0

Source: Demery et al (1995)

Not every country will have the cross section data that Lanjouw and Ravallion were privileged to have for India. An alternative would be to compare *changes* in benefit incidence over time, which arise from changes in public spending. In all three countries selected in this section, benefit incidence estimates were available for two points in time. Studies in which over time changes have been feasible (such as World Bank 1994b, van de Walle, 1992, Demery et al, 1995, Hammer, et al, 1995) show that recent changes imply either no change in the targeting of education spending, or (in the cases of Colombia and Malaysia), some improvement.

Table 6: Average versus marginal gains from primary school enrollments in Rural India

:	*Enrollment rate*	*Odds of enrollment*		*Percentage share of subsidy*	
		Average	*Marginal*	*Average*	*Marginal*
Quintile					
1	**37.2**	**0.71**	**1.10**	**14.2**	**22.0**
2	**48.6**	**0.90**	**0.97**	**18.0**	**19.4**
3	**55.8**	**1.08**	**0.87**	**21.6**	**17.4**
4	**62.6**	**1.21**	**0.67**	**24.2**	**13.4**
5	**67.7**	**1.31**	**0.67**	**26.2**	**13.4**

Source: Lanjouw and Ravallion (1999)

Changes in benefit incidence are not necessarily a result of changes in public spending. There was a marked improvement in the targeting of education spending in Côte d'Ivoire (between 1986 and 1995), despite a *reduction* in overall real spending on education (Table 7). Changes in both the s_j and e_{ij} variables were responsible. The government increased its spending on primary education relative to other levels (see the row shares in Table 7). And there was a marked increase in the share of primary enrollments of the poorest quintile (from 15 percent in 1986 to 19 percent in 1995—the column shares in Table 7).

Table 7: Côte d'Ivoire, Benefit Incidence of Education Spending by Level and Quintile, 1986 and 1995

	1986				1995			
Quintile:	Primary	Secondary	Tertiary	All education	Primary	Secondary	Tertiary	All education
1	15.0	6.2	6.3	10.7	19.1	6.8	19.2	15.1
2	20.8	12.8	6.9	16.1	21.0	23.5	3.5	19.5
3	20.2	15.3	4.4	16.3	23.9	17.2	4.5	19.2
4	21.4	25.0	10.5	21.0	22.1	15.2	18.1	19.4
5	22.6	40.7	72.0	35.9	13.9	37.2	54.6	26.7
Row share	51.5	33.9	14.5	100.0	54.7	32.5	12.9	100.0

Source: Demery, Dayton and Mehra (1996)

The increase in the share of enrollments among the poorest quintiles might be due to early capture of primary school places by the non poor, so that as primary enrollments expanded, an increasing share accrued to the poorer quintiles (along the lines of the Lanjouw and Ravallion analysis). But it might also be due to demographic changes in the composition of the quintiles. It is possible decompose the change in the share of the education subsidy accruing to a quintile into its demographic and behavioral components.[14] Table 8 reports the results of such an exercise. The two effects generally worked in the same direction—for example, both had the effect of increasing the share of the poorest quintile and reducing that of the richest quintile for primary education. As would be expected, the behavioral effects

[14] To obtain the demographic effect the 1986 enrollment rates are applied to the 1995 school-aged population. The behavioral effect involves keeping the school-aged population unchanged over time, and allowing only enrollment rates to change. The procedure adopted ensures an exact decomposition with no residual term.

were the stronger of the two, but demographic effects were nevertheless important. The latter were particularly significant in explaining the reduction in the benefit incidence of primary education spending to the top quintile and the increase in the share of the secondary subsidy to the poorest quintile. But even when enrollment behavior effects dominated, demographic change played a part in changing the benefit incidence.

Table 8: Effect of Changes in Enrollment Behavior and Demographic Structure on Benefit Incidence in Côte d'Ivoire, 1986-95

Quintile	Actual change 1986-95 (% points)	Change due to: Demographic Effects (% points)	Demographic Effects (% of total change)	Behavioral effects (% points)	Behavioral effects (% of total change)
			Primary		
1	4.1	1.1	26.6	3.0	73.4
2	0.2	0.0	15.1	0.1	84.9
3	3.6	2.0	53.8	1.7	46.2
4	0.7	1.1	146.1	-0.3	-46.1
5	-8.7	-4.1	47.8	-4.5	52.2
			Secondary		
1	0.6	1.0	159.5	-0.4	-59.5
2	10.7	1.3	12.1	9.4	87.9
3	1.9	1.5	78.1	0.4	21.9
4	-9.7	-2.2	22.7	-7.5	77.3
5	-3.5	-1.6	44.5	-1.9	55.5

Source: Demery, Dayton and Mehra (1996)

Gender disaggregation

Income- or expenditure-based disaggregations are not the only groupings for benefit incidence. Others are not only possible, but desirable from a policy perspective. Regional groupings, between rural and urban areas for example, can be useful. An especially interesting disaggregation of education benefit incidence is gender (Demery, 1996).

Household behavior has led to marked gender differences in the incidence of education spending in Côte d'Ivoire. For the population as a whole, the average male gained CFAF 18,245 in 1995 through use of publicly subsidized education institutions (Table 9). This represented just under two thirds of total spending, leaving only just over a third of the subsidy for females. Females gained just CFAF 11,304 per capita from education subsidies. The relative disadvantage of females was least at the primary level, where they obtained 42 percent of the total primary subsidy. And it was greatest at the tertiary level, at just 29 percent of the total subsidy for the sub-sector. It is also interesting to note that the relative disadvantage of females was greater in poor households. Females in the poorest quintile gained only a quarter of the total education subsidy going to the quintile, in contrast to the 40 percent share gained by their counterparts in the richest quintile. These row shares show clearly the disadvantage of females in gaining access to public funding of education.

Table 9: Côte d'Ivoire, Benefit Incidence of Education Spending by Gender, Region and Quintile, 1995

Female	Male	Total

Quintile/ region	Subsidy	Per capita	Row share	Column share	Subsidy	Per capita	Row share	Column share	Subsidy	Per capita	Column share
	M CFAF	CFAF	%	%	M CFAF	CFAF	%	%	M CFAF	CFAF	%
						Primary					
1	5,993	4,564	30.5	14.0	13,679	8,912	69.5	22.8	19,672	6,908	19.1
2	10,135	6,900	47.0	23.7	11,443	8,265	53.0	19.1	21,578	7,562	21.0
3	10,391	7,162	42.3	24.3	14,162	10,267	57.7	23.6	24,553	8,676	23.9
4	9,018	6,414	39.7	21.1	13,718	9,371	60.3	22.9	22,736	7,922	22.1
5	7,294	5,433	51.0	17.0	7,008	4,643	49.0	11.7	14,301	5,015	13.9
Côte d'Ivoire	42,831	6,135	41.6	100.0	60,009	8,252	58.4	100.0	102,840	7,215	100.0
Rural	21,801	5,591	38.3	50.9	35,061	7,960	61.7	58.4	56,862	6,848	55.3
Urban	21,029	6,824	45.7	49.1	24,948	8,701	54.3	41.6	45,977	7,728	44.7
						Secondary (including technical)					
1	1,044	795	30.4	4.2	3,112	2,028	90.6	6.8	3,433	1,206	5.2
2	4,609	3,138	33.2	18.4	9,751	7,043	70.2	21.2	13,882	4,865	20.9
3	3,656	2,520	35.8	14.6	6,923	5,019	67.7	15.1	10,224	3,613	15.4
4	3,127	2,224	36.5	12.5	6,252	4,271	72.9	13.6	8,572	2,987	12.9
5	12,565	9,359	41.6	50.3	19,896	13,181	65.8	43.3	30,227	10,599	45.6
Côte d'Ivoire	25,001	3,581	37.7	100.0	45,933	6,317	69.2	100.0	66,335	4,654	100.0
Rural	3,146	807	19.0	12.6	14,095	3,200	85.0	30.7	16,578	1,996	25.0
Urban	21,855	7,092	43.9	87.4	31,838	11,103	64.0	69.3	49,759	8,364	75.0
						Tertiary (including technical)					
1	0	0	0.0	0.0	4,650	3,030	100.0	17.4	4,650	1,633	12.3
2	0	0	0.0	0.0	856	618	100.0	3.2	856	300	2.3
3	550	379	50.0	5.0	550	399	50.0	2.1	1,100	389	2.9
4	877	624	20.0	7.9	3,506	2,542	80.0	13.1	4,384	1,528	11.6
5	9,658	7,194	36.0	87.1	17,169	11,375	64.0	64.2	26,827	9,407	70.9
Côte d'Ivoire	11,085	1,588	29.3	100.0	26,732	3,676	70.7	100.0	37,817	2,653	100.0
Rural	0	0	0.0	0.0	8,151	1,851	100.0	30.5	8,151	982	21.6
Urban	11,085	3,597	37.4	100.0	18,581	6,480	62.6	69.5	29,666	4,987	78.4
						All education					
1	7,037	5,359	24.7	8.9	21,440	13,970	75.3	16.2	28,477	10,000	13.5
2	14,745	10,038	40.1	18.7	22,050	15,927	59.9	16.6	36,794	12,895	17.4
3	14,596	10,062	40.3	18.5	21,635	15,685	59.7	16.3	36,231	12,802	17.1
4	13,023	9,262	35.7	16.5	23,477	16,957	64.3	17.7	36,499	12,718	17.2
5	29,517	21,985	40.1	37.4	44,072	29,199	59.9	33.2	73,589	25,803	34.8
Côte d'Ivoire	78,917	11,304	37.3	100.0	132,674	18,245	62.7	100.0	211,591	14,845	100.0
Rural	24,947	6,398	30.3	31.6	57,307	13,011	69.7	43.2	82,254	9,906	38.9
Urban	53,970	17,513	41.7	68.4	75,367	26,284	58.3	56.8	129,337	21,740	61.1

Source: Demery (1996)

It is clear from Table 9 that the reason why the poorest quintile gained just 14 percent from education spending is to be found in part in the gender enrollment bias among poorest sections of Ivoirian society. Males in the poorest quintile gained 16 percent of the education subsidy accruing to the their gender group, but females only received 9 percent of theirs. And the richest female group appropriated 37 percent of the education subsidy received by the female population. Gender inequality, therefore, was a critical component of overall inequality in the benefit incidence of education spending in Côte d'Ivoire .

These results show powerfully how public spending on education benefited males more than females in Côte d'Ivoire in 1995, and how this influenced the overall inequality of education spending in the country. It did so for a combination of two reasons. First, households chose to enroll males more than females at all levels of schooling. So however the government allocated its spending, a gender bias would be present in the benefit incidence of such spending. Second, a sufficiently large proportion of the government budget was devoted to schooling services which females tended not to use—tertiary

education. A shift of spending towards primary and secondary schooling would lead to an improvement in the share of the total budget going to females (as well as to poorer groups in the community). But such decisions should not rest on benefit incidence estimates alone. They should also be based on a sound understanding of how household behavior would be affected by such expenditure switches.

Household spending on education

To complete this review of the benefit incidence of government spending on education, it is important to include *household* spending on publicly-provided education. Although many education services provided by the state are highly subsidized, and in many instances provided 'free' to households, to enroll children in school households themselves must incur certain costs. It is important to obtain a complete accounting of the financing of spending on education, covering not just the government subsidy but also the contributions from household themselves. What is the sharing of the burden of education costs between households and government, and does this vary by groups? Some of these expenditure items can be considered as *transactions costs*. They offer no additional benefit to the household (additional to the state subsidized service that is), but are incurred simply to gain access to the service. These include transportation and the opportunity costs of the time involved in getting the service. It is important to gain some understanding of how these transactions costs may vary across the groups distinguished in the benefit incidence analysis. But not all education spending can be considered as transactions costs. Some household spending adds to the benefit that is obtained (on school supplies, books, uniforms, and even additional tuition for the children). Combined, these costs can represent a serious burden to the households, which can adversely affect the ability of households to enroll children and lay claim to the in-kind state subsidy.

Table 10 sets out the basic data needed to review household spending on education, drawing on the Indonesian experience (van de Walle, 1992)[15]. Begin by noting that household spending *per capita* is decomposed into two components—household spending *per student*, and students per capita. This reveals that the main reason why the higher quintiles spend more per capita on education lies not in the fact that they have significantly more children in school, but in the amount spent on each student. Spending per student in the top quintile was almost ten times what was spent by households in the poorest quintile. Because of this, these private expenditures dominated spending among the top quintile, and exceeded the government subsidy. But for all other quintiles, the government subsidy is by far the most important source of financing, rising to over 90 percent of the total cost of education financing among the poorest quintile.

Table 10: Indonesia, Household and Government Spending on Publicly-Subsidized Schooling, 1987

Quintile/ Region	Household spending	Students per capita	Per Capita Spending				
			Household Spending		Government spending		Total
	Rp. per student	Percent	Rp. per capita	Percent share	Rp. per capita	Percent share	Rp. per capita
1	584	25.1	146	8.4	1,602	91.6	1,749
2	984	25.9	255	12.6	1,762	87.4	2,017
3	1,398	26.8	374	23.4	1,227	76.6	1,601
4	2,196	27.1	594	32.0	1,260	68.0	1,854
5	5,619	29.1	1,632	52.6	1,471	47.4	3,104

[15] Note, this analysis is for 1987 (and not 1989 as in the case of Table 3)

All Indonesia	2,147	26.8	600	29.1	1,465	70.9	2,065
Urban	4,180	30.6	1,288	42.0	1,781	58.0	3,069
Rural	1,348	25.3	342	20.3	1,346	79.7	1,688

Source: van de Walle (1992)

Care is needed, however, in interpreting this large contribution by the state to spending on education among the poorer quintiles. Students in these households received very little financing compared with those in higher quintiles, suggesting wide *quality* differences in the schooling obtained. To complement the data of Table 10, therefore, information is needed on the *content* of such spending (see Table 11). Two key points emerge. First, by far the most important single item of expenditure required of households with public school enrollments is spending on school fees and PTA dues.[16] These amounted to around two thirds of total spending (though the share was slightly less for the lower quintiles). Second, the better-off Indonesian households spend significantly more per student than poorer counterparts on all items. This suggests that the *quality* of the schooling of children in poorer households is certain to be far below that received by their fellow students from richer homes, even though they all attend publicly-funded schools. Much of the spending by poorer quintiles is needed to purchase stationery and textbooks, yet they cannot approach the level of spending on such critical items as achieved by the richer groups. This type of analysis suggests that conclusions drawn about the targeting of education subsidies (from the data in Table 3 for example) should be qualified by assessing the quality of such education.

Education costs borne by households can be a critical cause of non-enrollments and drop-outs, especially among the poorer quintiles. Some assessment should be made, therefore, of the *burden* of such costs to households, by relating them to household income or total expenditure. There are two broad sets of issues facing the analyst. The first concerns the choice of normalization. Care should be taken to avoid simply taking per capita values of education spending and total household expenditures. These can be misleading since some groups (notably the poorest groups) will have very low levels of education spending *per capita* because of low enrollments. And these, in turn, may well be a result of the heavy financial burden of education. If low income groups cannot sustain the needed spending to keep children in school, enrollment rates will be low, which will reduce per capita spending on education. Normalizing by group population would give a misleading impression that the burden is not very large, even though the exact opposite might be true. The solution to this is to compare *per student* spending with per capita household expenditures.

Table 11: Indonesia, Composition of Household Spending on Publicly-Provided Education, 1987

	Non formal Education	Stationery	Textbooks	Other school contributions	School fees PTA dues	School construction contributions	Total per student	Total per capita per month
Quintile	*Rp. per student per month*							
1	1	108	64	70	331	11	584	146
2	7	147	111	89	595	36	984	255
3	14	186	144	110	900	45	1,398	374
4	28	250	203	147	1,525	59	2,213	594
5	237	467	525	444	3,789	157	5,619	1,632

[16] Note these data aggregate across the levels of schooling. Thus one reason for the very spending on fees etc. reported by richer groups arises from the larger proportions of students enrolled in senior secondary and tertiary education, which attract very high fee requirements from households.

Source: van de Walle (1992).

The second issue concerns how many expenditure items to include in such comparisons. Some items (such as fees, transport costs), as we have noted, are essential or non-discretionary items, and must be incurred regardless of the quality of the education provided. Other items, such as food and lodging, are highly discretionary,. In between there is a range of items which are to varying degrees discretionary, yet influence the quality of education (spending on books, stationery, extra tuition, and so on). World Bank (1993c) suggests that two estimates of burden be provided—one based on key items such as school fees (fee to income ratio); and another based on a wider selection of items (cost to income ratio).

Table 12 reports estimates of the cost to income ratio of primary and secondary schooling in Indonesia in 1989. The burden of schooling costs was clearly a much greater problem for the poorest groups in Indonesia that the better off, even at the primary level. Average costs of primary schooling per student among the poorest decile amounted to just over one third of average income per capita. This compares with just 17 percent for the richest decile. The costs of lower and upper secondary schooling were even more burdensome for poorer Indonesians. Affordability ratios for the poorest decile are four to five times those of the richest decile. These data reveal to policy makers how difficult it would be to raise enrollment rates among the poorer sections of the community without targeted subsidies to reduce the burden of the costs involved in sending children to school—even state subsidized schools.

Table 12: Indonesia, Education Affordability Ratios by Level and Decile, 1989

	Ratio of mean per student cost and income per capita		
Decile	**Primary**	**Lower secondary**	**Upper secondary**
1	0.34	1.30	1.94
2	0.27	1.01	1.49
3	0.26	0.92	1.36
4	0.24	0.80	1.22
5	0.23	0.75	1.15
6	0.23	0.68	1.11
7	0.23	0.60	0.97
8	0.22	0.55	0.87
9	0.22	0.50	0.76
10	0.17	0.37	0.55

Source: SUSENAS, 1989 (as used in World Bank, 1993c)

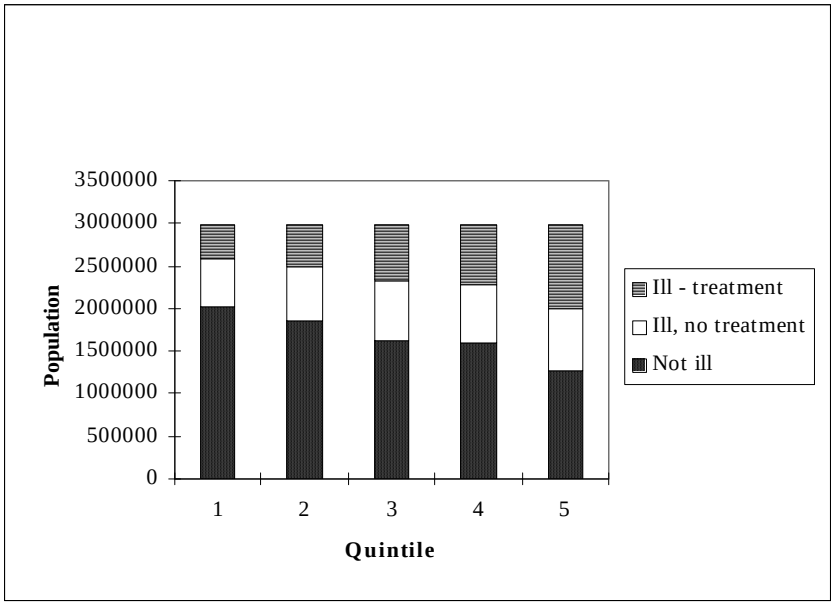
IV.2 Health Spending

The four reasons for highlighting the incidence of education spending also apply to health. Improving the health status of the poor makes a significant contribution to the escape from poverty, health spending is subject to important external benefits, it represents a major component of government budgets, and surveys often contain information on the use by households of government-subsidized health services. Many of the principles and problems encountered in estimating the benefit incidence of education spending apply in similar fashion to health. Unit subsidies are allocated to households which report visiting a publicly-subsidized health facility in much the same manner as education subsidies were paid to households reporting enrollments. But some issues arise which are health specific, and which merit rehearsing how the approach is applied to health. Again, we shall illustrate these by selecting three country applications—Bulgaria, Ghana and Vietnam—highlighting different approaches and results.

Two important issues immediately confront the analyst seeking to assign benefit incidence of government health spending to individuals or households. First, on the government side, much spending is directed at pure public goods which are neither rival nor excludable—the two most common examples are disease-bearing insect vector control and improvement of the ambient environment (reduced air- and water-pollution, and reduced radiation). The benefits of such spending simply cannot be allocated to individuals, although there is the presumption that the poor will benefit disproportionately. However, a significant portion of the health budget (including spending on preventive services which are rival in nature, such as vaccination programs, and clinical curative services) is imputable to individual users, and is amenable to benefit incidence assessment.

The second issue concerns the difficulties faced in defining health *needs*. With education spending, it was meaningful to define the needs in terms of a group's school-age population. But for health, no such neat proxies are available. The health needs of some groups (for example women) are likely to be different from others (men). This ambiguity is aggravated by the information typically available on the *use* of health services by households. This is obtained from household surveys. And in such surveys, illness and injury are often self reported. This can (and usually does) lead to biases in the data which the analyst should be aware of. Take, for example, the pattern of illness and injury reported by Ghanaians in the 1992 Ghana Living Standards Survey (Figure 3). Just over 22 percent of the sample reported being ill or injured during the two-week period before the GLSS interview. But only 16 percent of those in the poorest quintile reported an illness or injury, which compared with 29 percent for the richest quintile. These patterns almost certainly reflect non-sampling errors in the survey, with the poorer and less educated respondents being less inclined to observe and recall an illness occurrence in the household. Since benefit incidence estimates are based on the use of public health facilities, much of which is conditional on a reported illness or injury, this bias in the data may have important implications for the results. If the problem arises mainly in identifying illness (or injury) occurrences which are self-treated, rather than occurrences involving some external consultation (to a private or public practitioner), benefit incidence results would not be influenced very much. Self treatment does not enter into such estimates. But if poorer respondents have difficulty in recalling health care consultations (that is, actual use of health services), then the bias would filter into incidence estimates—essentially underestimating the use of health facilities by poorer groups relative to the better off. The analyst must make some judgment about this, and make clear to the reader what the likely biases might be.

Figure 3: Ghana, Reported Illness and Response by Quintile, 1992



Source: Demery, et al, 1995

Health facility use pattern

Before estimating benefit incidence, it is useful to review the relative importance of the public and private sectors in the provision of clinical services. In Vietnam, for example, 18 percent of those reporting ill visited a modern private practitioner, while only 15 percent sought a public-sector consultation (Table 13). This applied across the quintiles. In Ghana, while individuals seeking modern care tended to consult mostly with public providers, a significant proportion (19 percent) visited a modern private provider. In both Ghana and Vietnam, traditional providers were not particularly important, even for the poorer groups. Two striking variations across the expenditure quintiles are noteworthy. First, self treatment was much more common among the poorer groups.[17] In Vietnam, 74 percent of individuals in the poorest quintile (and just 55 percent in the richest quintile) reporting an illness either self treated or did not need treatment. In Bulgaria, the poor were also far more likely to self treat than the rich. In Ghana the differences are less striking, but clear none the less. Second, there were quite different patterns of facility use across the quintiles. In all countries the rich were far more likely to use hospital services than the poor. In Bulgaria, they were also more likely when ill to visit a clinic or health center. The better-off in Vietnam were less likely than the poor to go to a communal clinic (and in Ghana there was little variation across the quintiles). These behavioral differences have profound implications for benefit incidence estimates, since hospital-based services usually cost significantly more than those offered through primary health facilities and communal clinics.

[17] Note that data bias would suggest that this is an underestimate of self treatment by the poor.

Table 13: Health Service Visits by Provider, Quintile and Region, Bulgaria Ghana and Vietnam

Quintile/region:	1	2	3	4	5	All country	Urban	Rural
Bulgaria (1995):	*Percent of persons reported ill or injured last 4 weeks*							
Public providers	**43.1**	**53.6**	**59.5**	**57.5**	**63.5**	**56.1**	**59.5**	**51.4**
Hospital	8.8	8.6	12.2	12.4	21.2	12.7	13.8	11.2
Clinics/health centers	34.3	45.0	47.3	45.1	42.3	43.4	45.7	40.2
Private providers	**2.3**	**3.7**	**4.1**	**6.6**	**9.9**	**4.4**	**5.4**	**3.1**
Hospital	0.0	0.0	0.0	0.0	0.7	0.1	0.2	0.0
Clinic	4.9	3.3	2.7	5.2	5.8	4.3	5.2	3.1
Self-treatment/no treatment	**52.0**	**43.1**	**37.8**	**37.3**	**29.9**	**39.4**	**35.1**	**45.5**
Ghana (1992):	*Percent of persons reported ill or injured last 2 weeks*							
Public providers	**22.8**	**24.5**	**24.5**	**23.6**	**27.9**	**25.0**	**30.5**	**22.3**
Hospital								
Inpatient	0.7	0.9	0.6	1.0	1.1	0.9	1.0	0.8
Outpatient	12.0	12.2	12.6	12.8	15.9	13.4	18.7	10.8
Clinics/health centers	10.1	11.4	11.4	9.8	10.9	10.8	10.9	10.6
Private providers	**18.7**	**20.9**	**21.9**	**27.2**	**28.7**	**24.2**	**26.9**	**22.9**
Modern	14.3	15.6	17.4	20.6	23.9	19.0	22.0	17.6
Traditional	4.4	5.5	4.5	6.6	4.8	5.2	4.9	5.3
Self-treatment/no treatment	**58.5**	**54.5**	**53.6**	**49.1**	**43.3**	**50.8**	**42.6**	**54.8**
Vietnam (1993):	*Percent of persons reported ill or injured last month*							
Public providers	**11.5**	**14.3**	**15.5**	**15.9**	**19.5**	**15.4**	**18.8**	**14.5**
Hospital								
Inpatient	2.1	2.3	3.7	3.1	3.4	2.9	3.1	2.9
Outpatient	3.3	4.2	5.1	7.1	12.1	6.4	11.7	5.0
Clinics/health centers	6.2	7.9	6.7	5.7	4.0	6.1	4.1	6.6
Private providers	**14.5**	**17.0**	**20.5**	**17.5**	**25.0**	**19.0**	**22.0**	**18.2**
Modern	14.0	15.8	19.7	16.8	24.2	18.2	20.7	17.5
Traditional	0.5	1.1	0.8	0.8	0.9	0.8	1.3	0.7
Self-treatment/no treatment	**74.0**	**68.7**	**64.1**	**66.6**	**55.4**	**65.6**	**59.2**	**67.3**

Sources: Demery et al (1995), Demery et al, (1996), World Bank, 1995a

Estimating unit subsidies

All three applications confine the analysis to recurrent government spending on health (see Box 4 for an example of how to deal with capital expenditures in the health sector). But our applications differ in other ways, and illustrate different approaches to estimating unit subsidies. In Ghana, official data on actual health spending and visits were largely unavailable. The approach taken was to field a 'mini public expenditure review' of the health sector. Five regions (Greater Accra and four other regions) were selected for the review, which collected information on actual spending on health services by facility—hospitals, health centers and clinics—as well as data on cost recovery and health visits. Information on the breakdown between in-patient and out-patient costs was obtained from a separate study, and applied to the hospital cost data. Care was taken only to net out that portion of cost recovery which was not retained by the facility itself. In Vietnam, public expenditure data were available by facility type (hospital care and commune health centers) and by different levels of the hospital system (central, provincial, district and branch hospitals). In Bulgaria, analysts were well served with official data. Government spending (from both municipal and central budgets) was available for each of the nine regions in the

country.[18] So while we only report the country averages in Table 14, nine unit subsidies were employed for each of two levels of care (hospitals and primary health facilities) in the benefit incidence analysis for Bulgaria. Because the variations in these unit subsidies did not match other indicators of the quality of care (such as medical personnel per patient), the analysts in this case reported the results using national average subsidies as well as those at the regional level (Demery et al, 1996).

Table 14: Government Unit Health-Care Subsidies, Bulgaria, Ghana and Vietnam

	Hospital:		Primary health
	Inpatient	**Outpatient**	**facilities**
		Bulgaria (1995)	
Total Expenditure (m leva)		14,660.7 *	7,166.7
Cost Recovery		-	-
Net Expenditure (m leva))		14,660.7 *	7,166.7
Visits ('000)		6,655.7	18,164.2
Subsidy per visit (leva)		2,203	395
		Ghana (1992)	
		Eastern, Volta, Ashanti, Western regions	
Total Expenditure ('000 Cedis)	4,613,785	1,718,861	1,306,392
Cost Recovery ('000 Cedis)	66,344	733,799	479,149
Net Expenditure ('000 Cedis)	4,547,441	985,063	827,243
Visits ('000)	319.8	1,347.7	1,156.9
Subsidy per visit (cedis)	**14,427**	**1,275**	**1,129**
		Greater Accra region	
Total Expenditure ('000 Cedis)	3,657,479	1,362,590	937,148
Cost Recovery ('000 Cedis)	4,696	256,182	69,347
Net Expenditure ('000 Cedis)	3,652,783	1,106,408	867,800
Visits ('000)	73.8	337.0	144.4
Subsidy per visit (cedis)	**49,553**	**4,044**	**6,489**
		Vietnam (1993)	
Health Costs (b dong)	999	575	165
Fees (cost recovery) (b dong)	190	72	(check) 2
Net subsidy (b dong)	809	504	(check) 31
Visits (millions)	6.874	15.039	11.887
Subsidy per visit ('000 dong)	118	33	3

Sources: Demery et al (1995); World Bank (1995a)

[18] In fact the data were available at the *municipality* level, but because the household survey data were not sustainable at that level, the public expenditure data were aggregated up to the region.

Box 4: Dealing with Capital Expenditures on Health in Malaysia

Meerman (1976) argues that ignoring capital expenditure can lead to misleading results when such expenditures are significant in total spending in the sector, and when the distribution of capital spending across sub-sectors is different from that of recurrent spending. If spending on the capital account is allocated differently from recurrent spending (as for example when a government invests heavily in primary health facilities), benefit incidence estimates based on recurrent spending alone may imply a less equitable pattern of spending than is in fact the case. Capital account or development spending, however, cannot be treated in the same way as recurrent spending. Investments in any one year will yield capital services into the future, and so it is not valid to assign to any one year the total development spending on a sector. What is needed is an estimate of the capital stock in the sector for the year in which the analysis is conducted (which depends on past investments) and the *user cost* of capital. This would then yield an estimate of the services generated from the capital stock during the year.

To obtain an estimate of the capital stock in the health sector in Malaysia in 1984, Hammer, et al (1995) use investment data covering the period 1979-1984. Two types of health investments are distinguished, in-patient and out-patient care. By combining an assumed initial level of the capital stock in each sub-sector at the beginning of the period with subsequent annual development spending, they were able to construct for each year an estimate of the capital stock in the sector. The capital stock in 1984 is therefore obtained from an assumed capital stock in 1979 and information on annual investment spending in each subsequent year (that is, between 1979 and 1984). The basic formula they used to obtain the capital stock estimate is:

$$K_t = \Sigma_\tau \delta^\tau I_{t-\tau} + \delta^\tau K_T$$

K_t is the estimated capital stock in year t (in this case 1989) I_t is the annual capital spending during year t in the health sub-sector, T is the earliest year of the capital series, K_T is the assumed level of capital stock in that year (1979 in this case), and δ is one minus the depreciation rate of capital. In effect this formula smoothes the time profile of the capital stock estimate. It prevent discontinuous jumps in the series caused by heavy investment spending in any one year.

The services from this capital stock are then simply given by rK_t, where r is the user cost of capital (t=1984). The r variable was defined as the sum of the real interest rate on government bonds and δ (the depreciation rate assumed in the calculation of the capital stock). Hammer et al (1995) experimented with alternative values of K_T and δ, and found that the results were surprisingly robust to these assumptions. For health they found that the estimated flow of services from the capital stock amount to around 10-12 percent of recurrent spending on health in 1984, depending on the values selected for these two parameters.

The health sectors in all countries exhibit very steeply rising cost schedules. The unit subsidy required for a hospital visit in Bulgaria was five times that needed to service a visit to a primary health care center or polyclinic in 1995. In four regions of Ghana, a visit to a health center or clinic implied a subsidy of just 1,129 Cedis, while an inpatient hospital visit required 14,427 Cedis. Visits to health facilities in Accra attracted significantly larger subsidies. Similarly, in Vietnam, the subsidy per visit to a commune health center entailed a subsidy of just 3 thousand dong, compared with 33 thousand dong for a hospital outpatient visit, and 118 thousand dong for an inpatient visit. The Vietnam study illustrates the difficulties of matching the official information with household survey data. Official data were available for the four levels of hospital care (central, provincial, district and branch hospitals), and these revealed a steeply rising cost pattern. However, since the household survey did not distinguish between visits to these different levels of care, the mean subsidy for hospital inpatient and outpatient care had to be used for the benefit incidence estimates. Thus, because of limitations in the data, the study could not take into account an important source of variation in the *s* variable (differences across levels of hospital services)

Benefit incidence of health spending

Table 15, which summarizes the benefit incidence of health spending in the three countries, follows the same basic format as used for education subsidies. The shaded column shares indicate for each type of health facility how the subsidy was distributed across the quintiles (reflecting the e_{ij} 's), and the highlighted row shares under the memorandum item indicate government allocations across facility types (the s_i's). The shares accruing to the poorest quintiles in these three countries are remarkably similar (at around 12 percent) despite the differences in the health care systems. But the proximate factors behind these shares are quite different. In Vietnam, the main cause of the inequality is to be found in the very high allocation of the public subsidy to hospital-based care, which the poor are less likely to have access to.[19] So while the poor use commune health centers more than the rich, such facilities attract very little funding from the state.

The pattern of government spending in Bulgaria and Ghana are very similar—about one third of total health spending in both countries is devoted to primary-level facilities. But there are differences in household behavior. Compared with Ghana, the poor in Bulgaria make more use (relative to the better-off) of primary facilities and less use of hospital services. These differences cancel out, leaving the overall benefit incidence to the poorest quintile very similar. These two countries also differ in the extent to which the rich siphon off the transfers. In Ghana the dominance in the use of all facilities by the richest quintile is more marked. It should be clear from these examples that the influence of the s and e_{ij} variables on benefit incidence are quite different across these country applications.

As a share of household expenditures, health spending is more significant in Bulgaria, and least important in Vietnam. In all countries, the incidence is progressive—relative to income/expenditure, the subsidy decreases with the welfare measure. In all countries, expressed as a share of household spending, the subsidy received by the poorest quintile is about twice that imputed to the richest quintile. In all countries, expressed as a share of household spending, the subsidy received by the poorest quintile is about twice that imputed to the richest quintile.

Two useful disaggregations—gender and ethnicity

A major source of the inequality in the benefit incidence of health spending in Ghana was clearly the gender dimension. Overall, females gained more of the health subsidy than males (56 percent of overall health spending in 1992—see the row shares of Table 16). Women gained an in-kind transfer of Cedis 4,321 per capita compared with Cedis 3,576 for men. But because health needs differ between the sexes, there may still be a bias again females in the provision of health services. One indication that such a bias exists can be found in the gender pattern across quintiles. While females gained more than males from hospital-based services overall, this only applied to the top two quintiles. For the remaining population, there is a clear bias against females. For inpatient services, for example, females gained only one third of the subsidy accruing to the quintile.

[19] And even the low share of total hospital visits coming from the poor quintiles in Vietnam is overestimated, given that they probably use the less-subsidized district hospitals.

Table 15: Benefit Incidence of Public Spending on Health, by Quintile and Level, in Bulgaria, Ghana and Vietnam.

	Primary facilities		Hospital outpatient		Hospital Inpatient		*All health*			
	Per capita subsidy	Share of total subsidy (e_{ij})	Per capita subsidy	Share of total subsidy (e_{ij})	Per capita subsidy	Share of total subsidy (e_{ij})	Subsidy		Share of:	
							Total	Per capita	Household expenditure	Total subsidy
Bulgaria (1995)										
Population quintiles	(leva)	(%)	(leva)	(%)			(000 leva)	(leva)	(%)	
1	673	**16**	940	**11**			2,738,974	1,613	7.0	**13**
2	734	**17**	1,359	**16**			3,554,135	2,093	5.7	**16**
3	892	**21**	1,752	**20**			4,490,581	2,645	5.6	**21**
4	1,036	**25**	2,254	**26**			5,586,000	3,290	5.5	**26**
5	886	**21**	2,330	**27**			5,459,183	3,215	3.4	**25**
All Bulgaria	844	100	1,727	100			21,828,873	2,571	4.9	**100**
Memorandum: Government spending:										
(000 leva)	7,167,142		14,661,731				21,828,873			
% share (s_i)	**33**		**67**				**100**			
Ghana (1992)										
Population quintiles	(Cedis)	(%)	(Cedis)	(%)	(Cedis)	(%)	(000 Cedis)	(Cedis)	(%)	
1	661	**10**	1,079	**13**	555	**11**	6,840,892	2,296	3.5	**12**
2	1,082	**17**	1,242	**15**	741	**14**	9,133,250	3,065	3.1	**15**
3	1,202	**19**	1,432	**17**	1,058	**20**	11,003,645	3,692	2.8	**19**
4	1,460	**23**	1,564	**19**	1,203	**23**	12,599,421	4,228	2.3	**21**
5	1,966	**31**	2,883	**35**	1,666	**32**	19,414,622	6,515	1.8	**33**
All Ghana	1,274	100	1,640	100	1,045	100	58,991,829	3959	2.4	**100**
Memorandum: Government spending:										
(000 cedis)	18,987,228		24,437,014		15,567,587		58,991,829			
% share (s_i)	**32**		**41**		**26**		**100**			
Vietnam (1993)										
Population quintiles	(000 dong)	(%)	(000 dong)	%	(000 dong)	(%)	(m dong)	(000 dong)	(%)	
1	0.4	**20**	3.3	**9**	7.4	**13**	158,928	11.2	2.1	**12**
2	0.6	**29**	4.9	**14**	9.5	**17**	213,000	15.0	1.9	**16**
3	0.5	**22**	5.5	**15**	14.0	**24**	282,182	19.9	1.9	**21**
4	0.4	**18**	8.0	**23**	12.5	**22**	296,989	20.9	1.4	**22**
5	0.2	**10**	13.8	**39**	13.6	**24**	391,920	27.6	0.9	**29**
All Vietnam	0.4	100	7.1	100	11.4	100	1,343,019	18.9	1.3	**100**
Memorandum: Government spending:										
(m dong)	29,810		504,037		809,171		1,343,019			
% share (s_i)	**2**		**38**		**60**		**100**			

* Hospital subsidies include both in-patient and out-patient care in Bulgaria.
** Vietnam subsidy numbers were estimated from World Bank (1995a)--rounding errors are likely.

Sources: World Bank (1995a); Demery, et al (1995), Demery, et al (1996).

Table 16: Ghana, Distribution of Health Subsidies by Facility, Gender and Quintile, 1992

	Male			Female			Total		
Quintile	Mean subsidy (cedis)	Column share (percent)	Row share	Mean Subsidy (cedis)	Column share (percent)	Row share	Total Subsidy (000 Cedis)	Mean Subsidy (cedis)	Column share (percent)
				Hospital outpatient					
1	1,262	17	58	901	10	42	3,216,703	1,079	13
2	1,122	15	44	1,357	16	56	3,702,412	1,242	15
3	1,548	19	50	1,332	16	50	4,265,993	1,432	17
4	1,415	18	43	1,702	20	57	4,661,559	1,564	19
5	2,343	31	40	3,418	38	60	8,590,347	2,883	35
Ghana	1,541	100	46	1,734	100	54	24,437,014	1,640	100
				Hospital inpatient					
1	748	19	67	367	6	33	1,655,107	555	11
2	757	19	50	725	11	50	2,206,809	741	14
3	1,491	35	65	688	11	35	3,154,286	1,058	20
4	578	14	23	1,781	29	77	3,586,065	1,203	23
5	558	14	17	2,765	43	83	4,965,320	1,666	32
Ghana	819	100	38	1,258	100	62	15,567,587	1,045	100
				Health center/clinic, etc.					
1	573	10	43	747	11	57	1,969,082	661	10
2	1,098	18	50	1,066	16	50	3,224,029	1,082	17
3	1,366	21	52	1,063	17	48	3,583,365	1,202	19
4	1,378	22	45	1,536	23	55	4,351,797	1,460	23
5	1,680	28	43	2,250	33	57	5,858,955	1,966	31
Ghana	1,217	100	46	1,329	100	54	18,987,228	1,274	100
				Total health					
1	2,583	15	56	2,014	9	44	6,840,892	2,296	12
2	2,977	17	48	3,149	14	52	9,133,250	3,065	15
3	4,405	23	55	3,082	15	45	11,003,645	3,692	19
4	3,372	19	38	5,019	23	62	12,599,421	4,228	21
5	4,581	26	35	8,433	38	65	19,414,622	6,515	33
Ghana	3,576	100	44	4,321	100	56	58,991,829	3,959	100

Source: Demery et al (1995)

The column shares indicate that gender biases are an important explanation of the poor targeting of health spending to the poor. The low shares of the poorest quintile in the hospital-based subsidy (13 percent for outpatient and 11 percent for inpatient care) are due mainly to the poor access of females to these services.[20] Clearly, the low share of the poorest quintile in total health spending is due in large part to the low share of hospital-based health services going to poor females. For example, of the outpatient subsidy received by males, 17 percent went to males in the poorest quintile. Their female counterparts, on the other hand, gained just 10 percent. And since females in the higher incomes groups use such services significantly more than males, biases are suggested, preventing females in low income groups from gaining in-kind health transfers, despite their need for such services. It is therefore impossible to understand the unequal benefit incidence of health spending in Ghana in 1992 without reference to these critical gender differences.

[20] Females in all quintiles generally gained more than males from basic health-care services.

Bulgaria offers an interesting example of how disaggregating by ethnic group offers useful policy insights into benefit incidence findings (see also the discussion in Meerman, 1979 of the Malaysian case). Bulgarian Turks and Gypsies are two minority groups in the country, representing about 13 percent of the total population. These groups, however, comprise 25 percent of the poorest quintile and very few are to found among the better off (only 3 percent in the richest quintile—Table 17). The wide disparity in racial access to health care is illustrated from the fact that on average, each Bulgarian Turk gained just 1,001 leva from the health subsidy, and each Bulgarian Gypsy, 1,446 leva. This compares with 2,802 leva received by the main Bulgarian ethnic group. So whereas Turks and Gypsies represent 13 percent of the population, they received only 6 percent of the health subsidy. And the Turks appear to be the most disadvantaged. Targeting health services to the poor is therefore in part an ethnic issue. Improving targeting will require a better understanding of why poor Gypsies and (especially) Turks do not use publicly funded health facilities (especially hospitals).

Household spending on health

As with education, the benefit incidence of health spending must be interpreted in the light of the contributions made by households towards the services obtained, in part to complete the health sector accounts, but also to get some preliminary indication of the burden of the costs of health care the households face. We take the Ghana example (Demery et al, 1995). The format of Table 18 should now be familiar—it decomposes household spending into unit spending and units per capita, in this case the units being the number of visits to a publicly-subsidized health facility. For the population as a whole, most visits are to hospital outpatient departments, despite the fact that each visit is significantly more costly than a visit to a health center. This suggests that the quality of care received through primary health facilities is inadequate, at least compared with outpatient care. As to be expected, there are very few inpatient visits, and these involve a significant commitment of out-of-pocket expenses for the household. Per visit spending in connection with treatment at primary health facilities and outpatient departments does not vary greatly across the quintiles. But the fact that richer households are far more inclined to seek care means that per capita spending by the richer quintiles is much higher. Compared with the poorest quintile, the population of the richest quintile is more than twice as likely to seek care at outpatient departments and primary health facilities. Variations in per capita spending on inpatient care are due to higher spending per visit and visits per capita by the richer quintiles.

Table 17: Bulgaria, Benefit Incidence of Health Spending by Level, Ethnic Group, and for Poorest and Richest Quintiles, 1995

	PHC/Polyclinics				Hospital facilities				All Health				
	Total	Per capita	Share of subsidy: total	quintile	Total	Per capita	Share of subsidy: total	quintile	Total	Per capita	Share of subsidy: total	quintile	Share of pop.
	(000 leva)	(Leva)	(%)		(000 leva)	(Leva)	(%)		(000 leva)	(Leva)	(%)		
Quintile 1													
Total	1,142,813	673	15.9	100.0	1,596,160	940	11	100	2,738,974	1,613	13	100	100
Bulgarian	778,311	728	10.9	68.1	1,186,761	1,110	8	74	1,965,072	1,838	9	72	63
Turk	86,521	347	1.2	7.6	142,864	573	1	9	229,385	920	1	8	15
Gypsy	261,002	780	3.6	22.8	266,535	797	2	17	527,537	1,577	2	19	20
Other	16,979	377	0.2	1.5	0	0	0	0	16,979	377	0	1	3
Quintile 5													
Total	1,503,932	886	21.0	100.0	3,955,250	2,330	27	100	5,459,183	3,220	25	100	100
Bulgarian	1,465,912	900	20.5	97.5	3,939,078	2,417	27	100	5,404,990	3,317	25	99	96
Turk	7,098	154	0.1	0.5	16,172	350	0	0	23,270	504	0	0	3
Gypsy	0	0	0.0	0.0	0	0	0	0	0	0	0	0	0
Other	30,922	2,312	0.4	2.1	0	0	0	0	30,922	2,312	0	1	1
All Bulgaria													
Total	7,167,142	844	100.0		14,661,731	1,727	100		21,828,873	2,573	100		100
Bulgarian	6,485,169	892	90.5		13,885,412	1,910	95		20,370,581	2,802	93		86
Turk	288,462	431	4.0		382,208	570	3		670,670	1,001	3		8
Gypsy	306,579	727	4.3		303,670	720	2		610,249	1,446	3		5
Other	86,932	722	1.2		90,442	751	1		177,374	1,473	1		1

Source: Demery et al (1996)

Table 18: Ghana, Annual Health Visits and Spending by Households, by Level and Quintile, 1992

Quintile/ region	Visits per capita			Spending per visit			Spending per capita			
	Hospital		Health	Hospital		Health	Hospital		Health	Total
	Outpatient	Inpatient	centers	Outpatient	Inpatient (Cedis)	centers etc.	Outpatient	Inpatient (Cedis)	centers	
1	0.67	0.04	0.57	1,508	10,161	1,042	1,014	391	593	1,998
2	0.81	0.06	0.76	1,698	8,912	856	1,379	515	654	2,548
3	1.04	0.05	0.94	1,721	7,313	912	1,793	375	858	3,026
4	1.03	0.08	0.78	2,042	15,388	1,338	2,100	1,284	1,047	4,431
5	1.70	0.12	1.17	1,950	22,050	1,048	3,322	2,547	1,230	7,099
Ghana	1.05	0.07	0.85	1,827	14,752	1,036	1,922	1,022	877	3,821
Urban	1.42	0.07	0.83	2,086	12,734	1,218	2,969	937	1,012	4,918
Rural	0.87	0.07	0.85	1,617	15,848	948	1,403	1,065	810	3,278

Source: Ghana Living Standards Survey, 1992

Table 19: Ghana, Composition of Household Spending on Publicly-Provided Health Services by Level and Quintile, 1992 (Cedis per visit)

Quintile	Consultation fees		Transport costs		Medicines		Total (Cedis)
	Cedis	Percent of total	Cedis	Percent of total	Cedis	Percent of total	
	Clinics/health centers						
1	418	40	53	5	571	55	1,042
2	304	36	60	7	492	57	856
3	226	25	69	8	617	68	912
4	177	13	86	6	1,076	80	1,338
5	227	22	107	10	714	68	1,048
Ghana	257	25	79	8	700	68	1,036
Urban	188	15	51	4	979	80	1,218
Rural	291	31	92	10	565	60	948
	Hospital outpatient						
1	438	29	156	10	914	61	1,508
2	436	26	246	15	1,016	60	1,698
3	298	17	211	12	1,212	70	1,721
4	375	18	278	14	1,390	68	2,042
5	301	15	206	11	1,442	74	1,950
Ghana	353	19	221	12	1,253	69	1,827
Urban	349	17	170	8	1,567	75	2,086
Rural	357	22	262	16	998	62	1,617
	Hospital inpatient						
1	5,872	58	408	4	3,881	38	10,161
2	5,081	57	1,166	13	2,665	30	8,912
3	3,209	44	537	7	3,567	49	7,313
4	8,549	56	1,153	7	5,686	37	15,388
5	4,983	23	1,216	6	15,850	72	22,050
Ghana	5,694	39	1,002	7	8,056	55	14,752
Urban	2,568	20	1,136	9	9,030	71	12,734
Rural	7,391	47	929	6	7,527	47	15,848

Source: Demery et al (1995)

The composition of household spending per visit is as important for health as for education services. In the case of Ghana, the poorest quintile reported significantly higher consultation fees than the better off (Table 19). Even though the poor spent about the same as the rich for each visit to a primary facility or outpatient department, they tended to spend much more on consultation fees and much less on transport and medicines. These findings were supported by a participatory poverty assessment, which confirmed the concern of the poor over the high consultation fees being charged (Norton et al, 1995). This analysis does not explain why such high charges were imposed on the poor, but it does highlight that there is a very real problem here in need of government attention.

Given these variations in the unit spending and number of visits undertaken to health facilities, a complete set of accounts for publicly provided health services can be established. These show that for the sector as a whole, households contributed just about a half of total spending on publicly-provided health care in 1992, up from 44 percent in 1989 (Table 20). Their contribution was slightly greater for outpatient care, and less for primary health care. There was little variation across the expenditure quintiles, with the poorest quintile contributing 47 percent in 1992 compared with 52 percent by the richest quintile. The only exception was inpatient care in 1992—the top quintile made a larger contribution than poorer groups (60 percent compared with 41 percent in 1992). The rural population as a whole contributed 52 percent to the costs of publicly-provided health care, whereas their urban counterparts were required to pay only 46 percent of the total cost. And this difference cannot be explained by higher transportation spending by households. Overall then, the picture emerging from the combined effects of government health subsidies and household out-of-pocket spending is one for serious policy concern. There appears to be little attempt to implement a scale of health charges to provide maximum relief to the poor.

Finally, it remains to be seen what these charges imply for affordability of health care. Again, we compare household spending per unit with mean expenditures of the household. In our Ghana illustration, the former is simply total household spending on fees and medications for each visit to a publicly subsidized facility, and the latter is taken to be per capita *non-food* expenditure (Table 21). Clearly, the burden of health care is significantly greater for the poor than for the better-off in Ghana. Out-of-pocket expenses for even an outpatient visit amount to over 5 percent of non-food household spending per capita. Based on its review of several estimates of price elasticities of demand for health by income, Gertler and Van der Gaag (1990) suggest that any ratio higher than 5 percent would imply too heavy a burden, since typically the price elasticity of demand exceeds unity at prices above this level. This would suggest that hospital-based care is likely to be particularly burdensome for the poorest quintile in Ghana.

Table 20: Ghana, Spending on Publicly-Provided Health by Households and Government, 1989 and 1992, (Cedis per capita)

	Government health spending		Household health spending		Total health spending		Household spending as % of total	
	1989	1992	1989	1992	1989	1992	1989	1992
Quintile:			*Health centers, clinics, etc.*					
1	420	661	259	593	679	1,254	**38**	**47**
2	611	1,082	438	654	1,049	1,736	**42**	**38**
3	674	1,202	396	858	1,070	2,060	**37**	**42**
4	1,056	1,460	606	1,047	1,662	2,507	**36**	**42**
5	1,191	1,966	659	1,230	1,850	3,196	**36**	**38**
Ghana	790	1,274	472	877	1,262	2,151	**37**	**41**
Urban	957	1,903	356	1,012	1,313	2,915	**27**	**35**
Rural	712	962	526	810	1,238	1,772	**43**	**46**
			Hospital outpatient					
1	318	1,079	296	1,014	614	2,093	**48**	**48**
2	349	1,242	406	1,379	755	2,621	**54**	**53**
3	480	1,432	616	1,793	1,096	3,225	**56**	**56**
4	563	1,564	672	2,100	1,235	3,664	**54**	**57**
5	969	2,883	1,195	3,322	2,164	6,205	**55**	**54**
Ghana	536	1,640	637	1,922	1,173	3,562	**54**	**54**
Urban	842	2,711	890	2,969	1,732	5,681	**51**	**52**
Rural	391	1,107	517	1,402	908	2,509	**57**	**56**
			Hospital inpatient					
1	311	555	170	391	482	947	**35**	**41**
2	173	741	117	515	290	1,256	**40**	**41**
3	311	1,058	224	375	535	1,433	**42**	**26**
4	664	1,203	410	1,284	1,074	2,487	**38**	**52**
5	450	1,666	230	2,547	679	4,213	**34**	**60**
Ghana	382	1,045	230	1,022	612	2,067	**38**	**49**
Urban	434	1,194	277	937	711	2,131	**39**	**44**
Rural	357	970	208	1,065	565	2,035	**37**	**52**
			All health					
1	1,049	2,296	725	1,998	1,774	4,294	**41**	**47**
2	1,133	3,065	960	2,548	2,093	5,613	**46**	**45**
3	1,466	3,692	1,236	3,026	2,702	6,718	**46**	**45**
4	2,283	4,228	1,688	4,430	3,971	8,658	**43**	**51**
5	2,609	6,515	2,084	7,099	4,693	13,614	**44**	**52**
Ghana	1,708	3,959	1,339	3,820	3,047	7,779	**44**	**49**
Urban	2,233	5,808	1,523	4,917	3,756	10,725	**41**	**46**
Rural	1,459	3,039	1,251	3,276	2,710	6,315	**46**	**52**

Source: Demery et al (1995)

Table 21: Ghana, Affordability Ratios for Publicly-Provided Health Care, 1992

Quintile/ region	Household spending per visit*			Percent of non-food expenditure		
	Hospital		Clinics	Hospital		Clinics
	Outpatient	Inpatient (Cedis)		Outpatient	Inpatient	
1	1,352	9,753	989	5.4	38.8	3.9
2	1,452	7,746	796	3.5	18.7	1.9
3	1,510	6,776	843	2.7	12.2	1.5
4	1,764	14,235	1,252	2.3	18.3	1.6
5	1,744	20,834	941	1.0	12.4	0.6
Ghana	1,606	13,750	957	2.2	18.6	1.3
Urban	1,916	11,598	1,167	1.7	10.2	1.0
Rural	1,355	14,919	856	2.5	27.7	1.6

* Includes fees and medication costs only.

Source: Ghana Living Standards Survey, 1992

IV.3 Spending on Water Supply and Sanitation

We now turn to benefit incidence estimates of spending on economic infrastructure, beginning with water and sanitation services. There are at least three reasons why we should feature this sector. First, water is a critical input into the welfare of the poor. As part of his seminal work on benefit incidence in Malaysia, Meerman (1979) asked respondents which service they needed most. Rural Malaysians placed clean water high on their list of important services, even though they were expecting to pay the full cost of its provision. Participatory poverty assessments in Africa have found water to be an overwhelming priority among the rural poor, especially in the drier savanna regions (Norton et al 1995). A second reason to focus on water and sanitation services is that they complement health services in improving the health status of the poor. Hammer, et al (1995) found that water supply was a critical variable in explaining regional variations in infant mortality rates (immunization rates were also important). Third, water supply is vital for the well-being of poor women. On average, a Ghanaian in rural Savannah was obliged to spend 48 minutes each day in fetching water in 1992. Female Ghanaians in the same region devoted 70 minutes in each day to this duty. And most of them assigned to this task were under 14 years of age (World Bank, 1995b).

Examples of benefit incidence of government spending on water and sanitation are less common than education and health. In part this is because of the inherent difficulties faced in assigning consumption of the service to individuals and households (discussed below), but even when this is possible, there are usually other problems which make benefit incidence a challenging undertaking. Three deserve particular mention. First, government subsidies to infrastructure (including water, sanitation, electricity) are often channeled through public enterprises, often through more than one enterprise. More than one thousand companies serve the water needs of the Colombian population, for example, further complicating the task of estimating the subsidy embodied in the service (World Bank, 1994b).

Second, water is supplied through a variety of conduits, each having quite different subsidy profiles—with different capital and recurrent budget implications. The contrast between large-scale piped systems and simple hand-pump systems—the former requiring large investments and continuing operation and maintenance commitments, the latter requiring minimal capital outlay and almost zero recurrent costs—makes it difficult to generate meaningful unit

subsidies and benefit incidence estimates for the water sector as a whole. Some countries rely heavily on large-scale piped systems, while others, especially those with sparsely populated rural areas, combine urban piped-based systems with alternative systems for rural areas. In countries where piped systems predominate, government subsidies in these sectors are devoted to enlarging the infrastructure network itself (that is, capital expenditures). And given the limited access to the network by the poor, the role of such development expenditures becomes all the more critical. Hammer et al (1995) provide an illustration of this key point based on inter-state variations of water supply in Malaysia. Because the richer states have almost universal access to water, current spending will not benefit the poor very much. But capital spending to enlarge the network is likely to be highly progressive. In countries where non-piped systems of delivery predominate, the major cost involved is the capital expenditure involved in the purchase of equipment (the tube-well or the hand pump). Care is needed to ensure that such spending is not treated as a current expenditure item, since the equipment will generate a flow of service for some time in the future.

Finally, water-supply enterprises often charge users cost-based tariffs, which means that the overall current subsidy from the government is insignificant (Meerman, 1979). It also means that care must be taken in estimating just how much the delivery of the service is subsidized by the public sector.

For these, and possibly other reasons, benefit incidence assessments of infrastructure spending (including water) are uncommon. We take two illustrative applications: one where water delivery is primarily through a pipe network system (the case of Colombia); and a second, and more complex application, where water services involve a variety of delivery systems (Tanzania). The Tanzania example also illustrates how analysts may incorporate donor funding in benefit incidence estimates.

The importance of network expansion

In order to benefit from current spending on water and sanitation in piped-based systems, users must have access to the network. In 1992, 65 percent of Colombian households in the poorest income quintile[21] were linked to the national water supply network, and just 37 percent to the sewerage system (World Bank, 1994b). To highlight the need to distinguish recurrent subsidies from government spending to expand the network, World Bank (1994b) computed how additional connections to the system would have to be distributed if every income group were to be brought up to a coverage ratio of 98 percent. Of the 0.9 million or so additional connections needed to raise the coverage of the water system, almost a half would need to be targeted to the poorest quintile, and three quarters to the poorest 40 percent (Table 22). Similar orders of magnitude apply to sanitation. This illustrates the point made earlier, that expanding coverage is likely to be far more progressive than recurrent spending on an existing system.

[21] The quintiles were defined across households, which is more appropriate when applied to household-based services.

Table 22: Colombia, Coverage of Water and Sanitation System, 1992

	Existing coverage		Additional connections needed to achieve 96% coverage			
			Water		Sewerage	
Income quintile	Water (percent)	Sewerage (percent)	(000)	(percent)	(000)	(percent)
1	64.6	37.1	447	49.1	783	43.5
2	78.5	56.8	248	27.2	500	27.8
3	85.5	68.6	147	16.2	331	18.4
4	91.0	79.6	68	7.5	173	9.6
5	95.8	91.7	0	0.0	13	0.7
Colombia	83.1	66.8	910	100.0	1,800	100.0

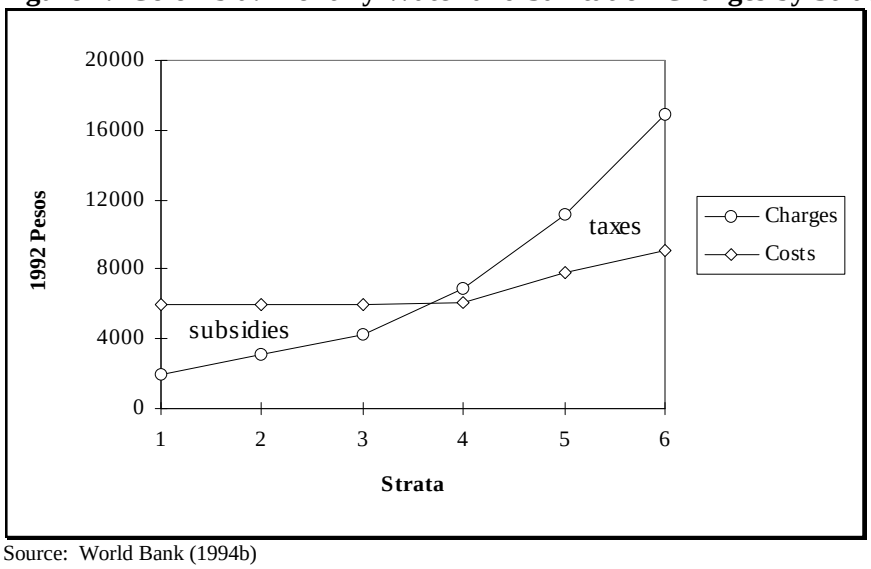
Source: World Bank (1994b)

Benefit incidence through a piped system

The complications caused by the fact that government subsidies are channeled through public enterprises are clearly illustrated in the case of water and sanitation services in Colombia. Tariffs were generally low for water and sanitation, but were scaled according to which of six strata the household is placed. These strata were based on the socio-economic characteristics of households, but were not closely correlated with household income. The schedule of charges and costs were such that households in the first two strata were subsidized in their use of water, while those in the top two strata were taxed (Figure 4). Applying these subsidies to households based on their use of water and sanitation services leads to quite surprising benefit incidence findings (Table 23). First, the survey found quite a high incidence of illegal connections to the water and sanitation network, representing over one fifth of total usage (and these connections were more important for the poor). In effect, illegal connections meant that households received as a subsidy the full cost of the service. The second surprise was how untargeted the subsidy was to the lower income groups, despite the tariff schedule of Figure 4 (and the incidence of illegal connections). While the top quintile gained nothing from the public subsidy (and the top decile in fact paid a tax for the service), there was little to chose between the subsidy gained by the first three quintiles (Table 23).

Why is this? Clearly, the criteria used in placing households in strata are not effective in targeting the government subsidy to the poorest groups. World Bank (1994b) compared household rankings with strata rankings, and concluded that there was little correlation between the two. Moreover, Type II errors were the most common—many high-income households were falsely placed in lower strata. The result of this mismatch between income and strata was that much of the water and sanitation subsidy was siphoned off by the middle to upper income groups. Clearly, the government needed to revise its strata criteria in order to target the subsidy element more effectively to the poor.

Figure 4: Colombia: Monthly Water and Sanitation Charges by Strata



Source: World Bank (1994b)

Table 23: Colombia, Benefit Incidence of Water and Sanitation Subsidies, 1992

Income quintile	Legal	Illegal	Total	Column share (percent)
	(million 1992 Pesos)			
1	25,479	6,737	32,216	25.8
2	26,686	6,942	33,628	27.0
3	26,517	5,264	31,781	25.5
4	20,768	5,032	25,800	20.7
5	-1,743	3,091	1,348	1.1
(10th decile)	-5,593	1,447	-4,146	-3.3
Colombia	97,706	27,066	124,772	100.0

Source: World Bank (1994b)

Benefit incidence in mixed delivery systems

The Colombian application has only limited relevance to most of the developing world where piped networks only serve a (mainly urban) minority of the population. And in such countries, governments often seek to subsidize other water supply services. The Tanzanian application is typical of the problems faced in estimating which groups benefit from government water-supply and sanitation subsidies. First, two quite separate systems are in operation in the country—an urban system run by the National Urban Water Authority and a quite different system for the rural population. Urban services are meant to operate under full cost recovery, though in practice non-payment of charges has meant that urban dwellers receive a highly subsidized water supply. Rural services are designed to involve cost-sharing with an emphasis on community participation in the various water delivery schemes. In such a mixed system. with intended cost recovery in urban areas frustrated by non-payment of tariffs, and uncertain outcomes in rural systems, analysts faced a difficult challenge in estimating the unit subsidies of service delivery. A distinction was made between three types of water source: private connections of the public water system; users of non-exclusive water sources (such as public stand-pipes, wells with pumps); and other natural-based sources (rivers, rainwater and so on) requiring no government subsidy. It was estimated that on average, households using private

connections to the public pipe network paid about $1 per month for a service which cost around $6 per month to deliver. This implies an annual subsidy to each user of $60. Non-exclusive public water sources were estimated to require a subsidy of $25 per year per household. Both estimates incorporated donor financing.[22] And they also incorporated capital expenditures in these unit subsidies. The study went to some length to include the contributions by donors in these subsidy estimates, which are usually off budget, and can distort the composition of government spending in a sector.

Combining this information with the findings of a Human Resources Development Survey (1993/94), estimates were obtained of the benefit incidence of government water subsidies (Table 24). The format of this table should by now be familiar. The two key components of benefit incidence are the column shares for each component of spending and the row shares indicating how the government subsidy is allocated across components (highlighted by shading). The two categories of water delivery involve quite different distributions across the quintiles. The poorest group gains just 2 percent of spending on private (mainly piped) connections (in contrast to the 60 percent going to the richest quintile). Subsidies allocated through non-exclusive sources are far more evenly distributed. Overall, the poorest quintile is estimated to have gained about one tenth of water subsidies in Tanzania in 1992, which contrasts starkly with the two fifths share gained by the richest 20 percent.

Some interesting points emerge from this exercise. First, it is important to be careful in interpreting the column shares because quintiles are defined over individuals, but the service is provided at the *household* level. This is the reverse of the problem encountered in allocating the benefit of Colombian education services (used by individuals) to quintiles defined on households. There are far fewer households in the poorest Tanzanian quintile (just 16 percent of the total), which makes the poorest quintile look more disadvantaged than it really was. In *per household* terms, the inequality is still in evidence (see the penultimate column of Table 24), but the relative disadvantage of the poorest quintile is somewhat exaggerated by the column shares. Second, the row shares may not reflect the actual subsidy allocations across the two categories, simply because of the somewhat approximate methods used to derive unit subsidies. They should rather be interpreted as giving an order of magnitude of the water budget in Tanzania, just over two fifths of which goes to maintaining piped-based supplies. And this share factors in the contribution of donors.

Finally, the subsidy assumed for piped-based delivery arises from predominantly recurrent spending. Subsidies allocated to other water-supply modes, however, are predominantly capital expenditures (purchase and installation of hand pumps and so on). Although these capital expenditures were handled properly in deriving the current unit subsidy of $25, the subsidy is paid to *existing* users of the service and not the new users being served by the capital outlays. It is difficult to judge what difference this would make to the benefit incidence estimates had the analysis managed to identify these new beneficiaries.

[22] One weakness of the analysis was that it failed to incorporate regional variations in the unit subsidies, even though these were recognized.

Table 24: Tanzania, Benefit Incidence of Government Spending on Water Supply, 1992

Individual quintile	Private connections					Non exclusive sources					Unsubsidized	Total				
	Households	Subsidy		Shares		Households	Subsidy		Shares		Households	Households		Subsidy		
		Total	per HH	Column	Row		Total	per HH	Column	Row		Number	Share	Total	per HH	Column
		(US $)		(percent)			(US $)		(percent)				(percent)	(US $)		share (percent)
1	10,420	625,200	0.91	**2.1**	8.8	257,827	6,445,675	9.35	**17.0**	91.2	421,026	689,273	16.5	7,070,875	10.26	10.6
2	24,948	1,496,880	1.93	**5.1**	19.6	246,167	6,154,175	7.92	**16.3**	80.4	506,396	777,511	18.6	7,651,055	9.84	11.4
3	49,869	2,992,140	3.74	**10.3**	29.8	281,567	7,039,175	8.79	**18.6**	70.2	469,543	800,979	19.2	10,031,315	12.52	15.0
4	108,169	6,490,140	7.33	**22.3**	42.8	347,475	8,686,875	9.81	**23.0**	57.2	430,107	885,751	21.2	15,177,015	17.13	22.7
5	291,575	17,494,500	17.18	**60.1**	64.9	379,223	9,480,575	9.31	**25.1**	35.1	347,303	1,018,101	24.4	26,975,075	26.50	40.3
Tanzania	484981	29,098,860	6.98	100	**43.5**	1,512,259	37,806,475	9.06	100.0	**56.5**	2,174,375	4,171,615	100.0	66,905,335	16.04	100.0

Source: Grosh and Forgy (1996)

IV.4 Spending on other infrastructure

Beyond water and sanitation, there are very few applications of the benefit incidence approach to infrastructural services. The Colombian poverty assessment estimated benefit incidence of subsidies on electricity and other sources of power, but this is an exception. Either such subsidies are counted as not quantitatively important (Meerman, 1979), or the services generated through the public subsidy are not assignable to individuals or households. What analysis can be done with such spending depends on the specifics of the country being reviewed. Where public subsidies are available by region, it is possible to provide some crude estimate of benefit incidence by assuming that each individual or household within the region benefits equally from the subsidy. But ad hoc assumptions of this sort can be difficult to interpret, and often misleading. Take for example, an attempt to estimate the benefit incidence of infrastructure spending in the Philippines (World Bank, 1993a, and Devarajan and Hossain, 1995). Analysts were fortunate in having information on government infrastructure spending on fourteen regions. How should these regional expenditures be imputed to households ranked by income decile? Two procedures were adopted. First, each household in a region was allocated the per household infrastructure spending in the region of residence. This will inevitably be pro-poor, since the absolute subsidy will be the same for all households, and will inevitably be higher as a share of income for lower quintile orders. An alternative would be to assign the subsidy in equal percentages, each household receiving a share in proportion to its income share. These alternatives produced quite different estimates of benefit incidence, the one being highly progressive, and the other distributionally neutral. Yet the policy maker has little reason to chose between them.

IV.5 Are Comprehensive Approaches Feasible or Desirable?

Using ad hoc or arbitrary assignment rules such as this should be avoided as much as possible. They can only be justified (as in the Philippines case) when analysts wish to get as complete a picture of net fiscal incidence as possible. The decision of how comprehensive a benefit incidence study should be clearly depends on the objectives of the analysis and on the available data. The earlier work by Meerman and Selowsky sought to be as comprehensive as possible, and yet was finally restricted by the data and the time constraints of the study. Meerman (1979) distinguished between public expenditure items which were, as he put it, potentially 'chargeable' to households. He reviewed the full spectrum of public spending and classified it into items which were not imputable in principle (defense, administration, debt service, etc.), those in imputable principle but not in practice (within the constraints of his study), and those imputable in practice and reported in his work. Items not imputable amounted to 40 percent of total government spending. Items which were imputed in the study represented one third of total government spending (or 10.6 percent of GDP). This meant that the study failed to deal with about a quarter of total spending which was imputable in principle. More recent studies have not been as comprehensive as this. Most cover the social sectors (health and education) and where relevant (especially in Eastern Europe) direct income transfers and social security benefits (see Milanovic, 1995 for a review), but few go beyond that. The recent Bank report on Colombia (1994b) is a relatively rare attempt to be comprehensive on the expenditure side, covering health, education, energy, water and sanitation, housing, and certain key rural programs.

Most studies fall short of estimating the full fiscal impact on income groups, because they do not deal with the revenue side of the account. And this can change the picture quite significantly. To conclude this section on benefit incidence methodology, two examples of full fiscal incidence are reviewed—Meerman (1979) on Malaysia and Devarajan and Hossain (1995)

on the Philippines. Meerman's coverage of the benefit incidence of government spending extended to education, health, pensions and spending on agricultural services. To complete the fiscal accounts, he was obliged to assume that all other imputable spending was distributed in proportion to income. These items he therefore prorated to the expenditure deciles. By combining prorated and imputed expenditures on the one hand, and tax incidence on the other, he was able to compare a 'pre-fisc' income distribution (proxied by the currently observed income distribution) with a 'post fisc' distribution—the latter being the pre fisc distribution plus the combined benefit incidence of prorated and imputed expenditure items minus the tax incidence. The results of the exercise reveal the highly redistributive effect of government accounts in Malaysia during the early 1970s (Table 25). Interestingly, all except the three richest population quintiles benefited in net terms from government interventions. Despite the fact that the rich benefited most (in absolute terms) from government spending, a highly progressive tax structure resulted in a very progressive net fiscal incidence.

Table 25: Malaysia, Pre- and Post Fisc Income Distribution by Decile, 1974

Population deciles	'Pre-fisc' distribution *(1)*	Taxes *(2)*	Government Expenditures: Prorated *(3)*	Government Expenditures: Imputed *(4)*	'Post fisc' distribution *(5)* *[1-2+3+4]*	Net fiscal incidence *(6)* *[5-1]*
			(Aggregate pre-fisc income = 100)			
1	17.85	2.9	1.8	9.8	26.6	8.8
2	30.35	4.9	3.1	12.6	41.2	10.8
3	39.89	6.4	4.1	13.2	50.8	10.9
4	48.24	7.7	4.9	14.2	59.6	11.4
5	57.86	12.7	5.9	14.3	65.4	7.5
6	69.9	15.4	7.1	12.7	74.3	4.4
7	85.92	18.9	8.8	12.0	87.8	1.9
8	111.61	24.6	11.4	14.3	112.8	1.2
9	154.99	34.1	15.8	13.9	150.6	-4.4
10	383.63	84.4	39.1	15.3	353.6	-30.0
Malaysia	100	21.2	10.6	13.2	102.3	2.7

Source: Meerman (1979)

A rare recent attempt to measure net fiscal incidence was made for the Philippines (World Bank, 1993a, Devarajan and Hossain, 1995). This study covered three main expenditure items which had potentially redistributive roles—education, health and infrastructure, representing 30 percent of total government spending (about the same coverage as Meerman). While spending in the social sectors was allocated according to household utilization, as discussed, the study was obliged to adopt an ad hoc allocation rule for infrastructure.

The fiscal system in the Philippines is shown to be progressive mainly because of the incidence of spending rather than taxation (Table 26). Taxation was marginally regressive, due mainly to the effect of indirect taxes. Expenditures, especially education subsidies, were very progressively distributed. Combined, the fiscal system implies net subsidies to the poorest decile and increasing rates of net taxation with higher decile orders. Exactly how progressive the system was, depends on how infrastructure spending is treated. The two (ad hoc) alternatives presented in Table 3.26 give slightly different degrees of progressivity. Under one approach (assigning the per capita spending on infrastructure in absolute amounts—the (a) column), the second decile is deemed to receive a subsidy. But the same decile is shown to be taxed under approach (b) (in which infrastructure spending is allocated in proportion to income).

Table 26: Philippines, Net Fiscal Incidence, 1988/89

Household decile:	Taxation	Government expenditure						Net fiscal incidence	
		Health	Education	Infrastructure (a)	Infrastructure (b)	Total (a)	Total (b)	(a)	(b)
	(Percentage share of gross income of decile)								
1	20.8	7.3	20.9	18.7	3.3	46.9	31.5	26.1	10.7
2	20.5	3.5	10.0	8.7	3.4	22.2	16.9	1.7	-3.6
3	20.1	2.8	7.8	6.9	3.4	17.5	14.0	-2.6	-6.1
4	20.0	2.3	6.2	5.9	3.3	14.4	11.8	-5.6	-8.2
5	19.8	2.0	5.1	5.1	3.2	12.2	10.3	-7.6	-9.5
6	19.9	1.7	4.1	4.4	3.2	10.2	9.0	-9.7	-10.9
7	20.1	1.5	3.4	3.8	3.3	8.7	8.2	-11.4	-11.9
8	19.7	1.2	2.5	3.2	3.2	6.9	6.9	-12.8	-12.8
9	19.7	0.9	1.8	2.4	3.3	5.1	6.0	-14.6	-13.7
10	19.6	0.02	0.04	0.05	3.4	0.1	3.5	-19.5	-16.1

Benefit incidence of infrastructure spending is allocated in equal absolute amounts under (a) and equal percentages under (b).

Sources: World Bank (1993a); Devarajan and Hossain (1995).

The lesson from both these attempts to complete a full accounting of fiscal incidence is that ad hoc assignment rules usually have to be applied to achieve satisfactory coverage on the expenditure side of the account. Results can be sensitive to the choice of procedure, which in turn raises doubts about how useful such exercises really are.

V Interpretations and Limitations

Having dealt with the nuts and bolts, we now come to the more challenging part—the interpretation of the results. Benefit incidence is a very powerful instrument. When presented to government officials and policy makers, it can have a profound effect on how a given country situation is perceived. Because of this, it is important that analysts take great care in drawing only valid inferences from their results. Our concern in this section is to highlight what benefit incidence analysis tells us, and what it leaves unresolved.

Limited coverage

First and foremost, analysts must be aware that benefit incidence cannot hope to be exhaustive in its coverage of public expenditure. We have reviewed two studies that sought to be comprehensive in their treatment of government accounts, but managed only to include about one third of them (Meerman, 1979, Devarajan and Husain, 1995). And as we have found, to achieve that coverage, some fairly heroic assumptions have to be made to assign expenditures to individuals. The fact that most government spending is not imputable (being non rival in nature) means that benefit incidence simply cannot be exhaustive. Meerman found that about two fifths of government spending in Malaysia was not imputable. Even within sectors, there will be items of spending that cannot be traced by benefit incidence, such as spending on population-based preventive health programs (for example, insect vector control, environmental protection, public awareness programs in family planning and AIDS prevention).

An exercise in current accounting

The observant reader would have noted that equations 1 and 2 were written as identities. This is because benefit incidence is best regarded as an exercise in *accounting*. These accounts only concern *current* flows—the long run or capital-account effects being ignored.[23] And they are based on current *costs*. They measure by how much the current income of households would have to be raised if they had to pay for the subsidized services at full cost. This limits what conclusions can be drawn from the analysis in a number of ways.

First, the analysis does not necessarily measure the benefits households and individuals receive. The reason why the approach is termed *benefit* incidence is simply to distinguish it from *expenditure* incidence. The benefit flows to *recipients* of government services are distinguished from the income flows government spending generates to the *providers* of those services and other government administrators. This should not be taken, however, to imply that benefit incidence analysis is an accurate tool for measuring benefits to service recipients. Perhaps a better term to describe the technique is *beneficiary* incidence since this avoids the suggestion that true benefits are measured, but simply conveys the message that spending is imputed to the beneficiaries.

Second, since the exercise does not take into account any long-run effects of government spending on the beneficiaries, its results must be interpreted accordingly. At best, benefit incidence provides clues about which components of government spending have the greatest impact on the current income and consumption levels of households. Can income redistribution be effected through subsidized government services, rather than through direct income or consumption transfers? This was the question which Meerman (1979) and Devarajan and Husain (1995) had in mind when they gathered together all the results of their analysis across the widest range of government services to generate estimates of net fiscal incidence. It is also the rationale behind any comparison between different types of in-kind transfers, or between in-kind and cash transfers (Milanovic, 1995). So when World Bank (1993c) investigated how well targeted government spending was in Indonesia by comparing the benefit incidence of a selection of expenditure items (on health, education, and subsidies on kerosene and diesel), it is really simply asking the question: which expenditure items are most effective in transferring current income (or expenditure) to the poorest households? That spending on health centers was the most targeted expenditure item is to be judged purely from this perspective. Spending on health centers is recommended only because it is more efficient at transferring income to the poor. From the perspective of benefit incidence, health spending has no special attributes that make it more deserving than any other commodity. Thus, when analysts find that 12 or 13 percent of health spending reaches the poorest quintile in Bulgaria, Ghana or Vietnam, some may find this a remarkably high figure, since governments would be hard pressed to find another commodity where consumption by the poorest quintile approaches such a large share of total consumption.

Why then might others consider that the 13 percent share is really far too low? Clearly, such an opinion is based on health being not just another commodity, and that the government provision of such a good should be much more targeted to the poor—not simply to redistribute current consumption to such groups, but to raise health standards and help in achieving a permanent escape from poverty. Our assessment of the links in the chain between government spending on the one hand and the real outcomes in terms of human capabilities shows clearly that benefit incidence only deals with a part of the story (Figure 1). There is nothing in the technique that makes health (or education or water or any other service) different from any other subsidized commodity or other method of income transfer. To bring out the special nature of expenditures in

[23] Note, although capital *spending* by the government can be incorporated into the technique, but not the effects on the capital accounts of households (their human capital for example).

these sectors, analysts must go beyond incidence analysis. So, for example. Hammer, et al (1995), having established the benefit incidence of health spending in Malaysia, go on to show that such spending is critical to health *outcomes*, and that is what makes the targeting of such spending to the poor all the more important. Benefit incidence may give some measure of targeting efficiency, but the basis for such targeting does not go beyond the objective of current income redistribution.

Are unit costs good proxies for values?

Even within the confines of its current accounting framework, a major limitation surrounds the use of average costs or subsidies as valuation tool. Only under fairly heroic assumptions (as initially expounded by Brennan, 1976)[24] can average costs be taken as reasonable proxies for values. And even then, they can only represent the *average* values placed on services, and will ignore differences in values across households. By ignoring individual preferences, the use of costs will fail to recognize an important component of values. As Cornes (1995: 84) put it,

> 'It cannot capture the fact that a sick individual with no children may benefit from a diversion of public expenditure from education to health while a healthy family with children may lose out.'

One of the main practical problems analysts will face in using costs as proxies for values arises from the inefficiency of the public sector. The observed structure of costs may have as much or more to do with government inefficiency as with society's value orderings. The fact that unit subsidies of primary health facilities in Ghana were not that much lower than outpatient hospital departments arises predominantly from the sheer inefficiency of primary health care delivery in the country (Table 14). Comparisons between the costs of public and private providers can be informative about how misleading public-sector unit subsidies can be as weights in any valuation exercise (Jimenez, 1995).

What is the counterfactual?

Table 25 defines how far benefit incidence analysis can take you. By comparing income distributions before accounting for tax and spending incidence, an assessment can be made of the pre- and post-fisc distributions, and thereby, of the net effect of government interventions on the distribution of current incomes. But note, the pre-fisc distribution was taken as the currently observed income distribution. Is this really the appropriate counterfactual to take for assessing fiscal incidence? For this to be acceptable, it has to be shown that the observed income distribution is not affected by government spending and taxation—that relative prices and relative primary income flows are not particularly sensitive to government interventions. These assumptions will rarely if ever apply, so that the true counterfactual (what would the income distribution be in the absence of government taxation and spending) will not be observed. In terms of Table 25, the observed distribution Meerman takes as pre-fisc, was almost certainly affected by the spending and taxation actions of governments, and so the measure of the net effect of government on income distribution suggested by Meerman will be only an approximation. If, for example, governments create significant income flows for the upper middle-income groups,

[24] These require that public goods are optimally supplied so that on average marginal costs would equal the arithmetic mean of all the individual marginal valuations. And of course that marginal cost equal average cost.

the fiscal incidence measure suggested by Meerman would appear to be more progressive than it actually was.

There are many reasons why observed household income (or expenditures) will be affected by government spending. The provision of services by the state can influence household spending decisions in some cases displacing private spending and in others augmenting it (van de Walle, 1995). For instance, government spending on secondary education will have the effect of reducing private spending on such schooling, and government subsidies in health may induce households to spend on transportation to seek care. And many programs are actually designed to influence incomes, such as agricultural subsidies. Similarly, changes in private transfers between households may be induced through government subsidies. Evidence suggests that such crowding out of private transfers may be quantitatively important (Cox and Jimenez, 1992). Despite these problems with the counterfactual, most analysts are obliged to use observed per capita expenditure (or per capita income) as the pre-fisc distribution with which to compare benefit incidence, mainly because there is really very little alternative.

Long on problems short on answers

Our treatment of the *proximate* determinants of the benefit incidence of government spending to a particular group distinguished two main factors—government spending allocations (s_i) and household behavior (e_{ij}). These were combined to generate a current accounting of government spending. Yet, benefit incidence tells us little if anything about the *fundamental* determinants of these two components—especially about household behavior. Because of this, it can be said to be helpful in identifying problems, but not particularly useful in providing solutions.

Consider the gender incidence of education spending in Côte d'Ivoire (Table 9). The fact that girls gained just 30 percent of the education subsidy is due almost entirely to the decisions by households not to send their girls to school—even to primary school. Incidence analysis has traced the problem, but does not provide the answer. That must be found in an understanding of the enrollment behavior of households. It is also obvious from Table 15 that health spending was untargeted to the poorest quintile in Ghana because individuals in that quintile simply did not use publicly-subsidized health care at any level—even primary health facilities. To improve the targeting of health subsidies, there is clearly a need to encourage more use of health facilities by the poorest Ghanaians. Unfortunately, benefit incidence itself tells us very little about how this can be done. It takes existing patterns of behavior as given. While the analysis of household spending on health provided some clues (notably the high charges imposed per visit on poorer households), the question remains largely unanswered by benefit incidence. Benefit incidence has posed the problem very graphically, but has not provided the solution.[25]

This is not to suggest that there are no answers provided by benefit incidence studies. There are cases where the problem of weak targeting to the poor clearly lies in inappropriate budget allocations within a sector, such as health spending in Vietnam (Table 15). The only subsidy that appears well targeted to the poorest individuals is on commune health centers. Yet this absorbs a very small share of the total health subsidy. The policy message would be to increase health allocations to commune-based care and away from hospital services. This would

[25] When the results of the benefit incidence of health spending were presented to a meeting of policy-makers in Ghana, there was a significant shift in policy towards seeking ways to improve outcomes. Again, benefit incidence was very effective in crystallizing the nature of the problem, but not the solution.

have the effect of improving the quality of care obtainable at commune health centers. Here is a clear case where benefit incidence does provide an answer—or at least gives a clear signal about the direction in which policy should go. Finally, it is important to be aware that government spending decisions and household behavior are not independent of each other. Governments may well be responsive to behavioral changes. And certainly, a change in government subsidies will induce behavioral responses by households.

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