

Review article

Private health care provision in developing countries: a preliminary analysis of levels and composition

KARA HANSON¹ AND PETER BERMAN²

¹*Health Policy Unit, London School of Hygiene and Tropical Medicine, UK* and ²*Department of Population and International Health, Harvard School of Public Health, Boston, USA*

While the importance of the private sector in providing health services in developing countries is now widely acknowledged, the paucity of data on numbers and types of providers has prevented systematic cross-country comparisons. Using available published and unpublished sources, we have assembled data on the number of public and private health care providers for approximately 40 countries. This paper presents some results of the analysis of this database, looking particularly at the determinants of the size and structure of the private health sector.

We consider two different types of dependent variable: the absolute number of private providers (measured here as physicians and hospital beds), and the public–private composition of provision. We examine the relationship between these variables and income and other socioeconomic characteristics, at the national level. We find that while income level is related to the absolute size of the private sector, the public–private mix does not seem to be related to income. After controlling for income, certain socioeconomic characteristics, such as education, population density, and health status are associated with the size of the private sector, though no causal relationship is posited.

Further analysis will require more complete data about the size of the private sector, including the extent of dual practice by government-employed physicians. A richer story of the determinants of private sector growth would incorporate more information about the institutional structure of health systems, including provider payment mechanisms, the level and quality of public services, the regulatory structure, and labour and capital market characteristics. Finally, a normative analysis of the size and growth of the private sector will require a better understanding of its impact on key social welfare outcomes.

Introduction

Health care policy in most developing countries has emphasized the development of government-owned health services, largely financed by government tax revenues. Over most of the period since the Second World War, attention has focused on how to plan and develop these public investments. Following the recommendations of international agencies, such as the World Health Organization, many countries have established similar systems of peripheral clinics and health workers, integrated community health centres, and a tiered system of public hospitals. As such

systems became established, there was increasing attention given to how to obtain greater health impact from this service capacity. This concern gave rise to new strategies for health care resource allocation, such as the primary health care approach, the child survival and development revolution, and, most recently, the emphasis by the World Bank on the most cost-effective ‘essential package’ of health services (World Bank 1993). Complementary policies were also developed for financing and managing health care services (e.g. the introduction of user charges, the district health management approach).

Throughout this period, most of the attention has focused on how to make public sector health care services work better.

The intense scrutiny given to public sector health financing and provision strategies persisted despite a steady flow of evidence that private health care supply was significant and growing rapidly in many countries. Much of this evidence was indirect, emerging from household survey data on health care use and expenditure patterns. These data often showed that, despite public policies promoting universal access to subsidized public services, the majority of health care contacts were with private providers on a fee-for-service basis (see, for example, Baker and van der Gaag 1993; Berman and Rose 1996; World Bank 1995). Typically, private health providers are an important source of care for ambulatory treatment of illness, which in developing countries accounts for the largest share of total health care spending. It is usually less important for inpatient treatments and limited for preventive and public health services. Interestingly, private health care is often significant for rural as well as urban populations and for lower income groups as well.

This indirect evidence indicates that, despite decades of public investment to assure public provision for basic services, private provision is significant and often dominant for many of these services. The impression also exists in many countries that private health care is expanding rapidly. Yet this important component of the health care system has received little policy attention until recently.

A striking indicator of this lack of attention is the paucity of basic data available on private health care provision. Although the World Health Organization publishes annual figures on physicians, nurses, paramedics, hospitals, and beds for most countries of the world, there are no international figures for the public and private components of this supply. Standard definitions are lacking. There has been little or no analysis of how public policy and social and economic development affect the development of the health sector as a whole, or conversely, how the development of the less-planned and less-regulated private health care provision sector affects national health care systems or indeed health. A recent example of this is Musgrove (1996), which looks at the differential health effects of public and private health spending but mostly ignores the development of private health care provision.

This paper provides some initial data and analysis to open up this new area of enquiry. Although we are constrained by the lack of systematically collected, internationally comparable data on private provision from developing countries, with a bit of searching it has proved possible to pull together a modest data set of some international scope. It is our hope that some of the interesting findings from this preliminary effort will stimulate further enquiry. And it is our contention that the development of the private health care sector will prove to be an important factor in health care system performance in terms of cost, equity, and health impact.

Section 1 of this paper proposes a practical definition of private health care provision and discusses the limitations on measurement from existing data. In Sections 2 and 3, we analyze the levels of private health care provision, that is, the absolute numbers of providers, controlling for population size. Initially, we do this with descriptive statistics for regions of the developing world. This is followed by analysis of the determinants of private provision levels in terms of a range of socioeconomic variables available at national level. Section 4 repeats this analysis in terms of the public-private composition, or shares of total health care provision. In Section 5 we address the question of whether public and private provision tend to develop as complements to each other, or in a more competitive model as substitutes. Specifically, we examine the assumption that private health care develops to occupy market niches ignored or underdeveloped by the government. The last section of the paper uses data on the ratio of beds to physicians in the public and private sectors to explore systematic differences in structure between the two sectors, as would occur if private providers are widely dominant in ambulatory care but not in hospital provision.

1. Who are private providers and how do we measure them?

Definitions

Who are the private providers considered in this analysis? Operating definitions of both 'private' and 'provider' are needed before presenting any description or analysis of the sector.

It is conventional to define 'private' providers as those who fall outside the direct control of government (Bennett 1992). Private ownership generally includes

both for-profit and non-profit providers. For example, private ownership would include health care facilities owned by individuals who seek to earn profits, clinics and hospitals owned by private employers, and those operated by religious missions and other non-governmental organizations (NGOs).

Naturally there are a number of grey areas which are inadequately described by this definition. For instance, it is not clear where health services owned by public enterprises or parastatals (such as social security institutions, national petroleum companies or airlines) should fit into such a typology. The extent to which the behaviour of health services owned and operated by such organizations conforms more to a public or a private model will depend on the precise nature of their management and financing structures. For example, services provided in hospitals that are operated directly by social security funds, an organizational structure which is common in Latin America, are usually considered to be publicly-provided because, like taxation, the source of funding is involuntary. In some countries, NGOs receive substantial operating subsidies from government; however, who *owns* the provider is often considered to be the key characteristic implying behavioural differences. Thus, NGOs would typically belong to the private sector, while 'private' wards in public hospitals are considered to be essentially public in character/behaviour.

What do we mean by 'provider'? Providers may be individual practitioners, groups of practitioners, or facilities (e.g. clinics, hospitals, or other institutions).¹ Exactly who provides health care services will depend on the particular country, but services are usually provided by doctors, paramedical health workers (e.g. clinical officers, registered medical practitioners, physiotherapists), or nurses. Although countries differ in their training requirements for specific categories of health care provider, information on training differences is not readily available.

In constructing this database we have accepted the categorizations used in the original data sources, and have assumed that cross-country comparisons are valid. This applies also to the definition of hospitals, which are typically defined in structural terms, such as the presence of some arbitrary number of beds (e.g. 10, 20 or 50).² Significant numbers of private beds may be located in non-hospital inpatient facilities such as nursing or maternity homes. Intermediate-level facilities not officially categorized as hospitals

may provide inpatient services which do not appear in published data sources. National conventions regarding such definitions and their reporting do not typically appear in the published data sources, making it difficult to achieve consistency in cross-country comparisons.

Pharmacies often play an important role in national health care systems, as providers of over-the-counter and prescription drugs, and in giving medical advice. Both controlled and over-the-counter drugs are often sold in informal settings as well, such as markets and kiosks. There is, however, virtually no official data on provision in these settings.

Finally, a typology of health care providers should include services provided by traditional doctors or other healers. Again, information concerning the size of this sector is scanty. National associations of traditional healers exist in some countries, but their coverage of the sector is often incomplete.

Data, sources, and potential biases

For this analysis we have compiled available national-level data on the number of public and private health care providers. To our knowledge, this constitutes a unique source of information about the level and composition of the private health sector, and brings together for the first time information from diverse sources into a single database. Key sources of data include Ministry of Health reports, the World Health Organization (WHO 1988), published articles in academic journals, World Bank health sector reviews, and other 'grey' literature. A full listing of data sources by country appears in Appendix 1. Readers should note that the construction of the database is an ongoing exercise, and the authors would be pleased to receive any additional information.

The paucity of available information has caused us to restrict our analysis to numbers of physicians and of hospital beds. While other types of provider may be more accessible to the majority of the population (either in financial or geographic terms), the information presently available only permits examination of these two provider types. We know little about the relationship between the numbers of these providers and those of other types, such as pharmacies, paramedical health workers, or traditional practitioners.

The sheer lack of data has proven to be an important constraint on the analysis which could be performed

using this data. The present set of results is limited to 25–35 countries, varying with the dependent variable being considered. This contrasts with the collection of health expenditure data for the 1993 World Development Report (World Bank 1993) which covered 114 countries! One implication of this dearth of data is that opportunities for regional analysis are limited. However, recognizing that no other cross-sectional studies of this type have been undertaken, we feel there is much to be gained by proceeding with the available data, and presenting some preliminary findings, however tentative. In addition, where comparable figures are available in the World Development Report (World Bank 1993), the database we have constructed appears to be reasonably representative of all low- and middle-income countries, lending additional credibility to our sample.

An important limitation of our private sector data is the currency of the information: Appendix 1 shows the year and source of the data – most of the figures relate to the supply of private providers in the late 1980s. It also includes only those providers who are registered and reported in full-time practice in the private sector. This is clearly more of a problem for the physician measures than for the beds: although public hospitals may have a small number of ‘private-like’ beds, we would nonetheless consider these to be publicly provided. Failure to measure the extent of private practice by government-employed physicians is a more serious problem (Ellis and Chawla 1993). Data sources rarely reveal whether government employees are permitted to practice privately off-hours, and certainly any unofficial private practice would not be recorded. In addition, we are obliged to assume that all of the physicians reported in each sector are actually practicing, and that the beds are in operation. If the original source is medical registration data which is not kept up to date, these figures may over- or under-state the supply of doctors.

Another limitation of the data, arising from differences in reporting conventions and levels of disaggregation of data, lies in the potential misclassification of provider types between the public and private sectors. Often it is not clear, for instance, how facilities are classified in national statistics, and whether these classifications are consistent with those in other countries. For example, how consistently do public sector figures include facilities operated by parastatal firms?

There may also be inconsistencies in the reporting of the size of the public sector. Some categories of public

providers may be excluded from officially reported numbers of public facilities. These omitted providers often include facilities which provide services directly to the police, armed forces, and prisoners.

Bearing these data limitations in mind, in the next sections we present the results of the analysis that we have been able to undertake using the public–private provider database.

2. How big is the private sector?

Physicians

The key feature to note about the supply of health care providers in the countries represented in the database is the high level of variability which exists for all of the different measures. Table 1 presents the absolute numbers of private and total physicians (adjusting for population size), together with the public–private composition variables, represented by the percentage of all physicians that are private, for each of the countries in the sample. The number of private physicians per million population ranges from 2 (in Burundi) to 657 (in Chile). The available data confirm some well-known regional differences, with much lower numbers of both private and total physicians in Africa than in other regions. These levels can be compared with the population-weighted average of 2381 doctors per million in OECD countries (World Bank 1993). The regional variation in the private sector share of all physicians is less marked, with a sample average of 55% of all physicians working in the private sector.

Beds

Table 2 presents the same information for the supply of beds. Again, there is marked variation among countries and among regions in the absolute level of private beds. Both African and Latin American countries have substantial numbers of beds in non-profit institutions, which can be seen from the large gap between the numbers of for-profit beds and the total number of private beds. Regionally, sub-Saharan Africa and Asia have the lowest supply of beds, whether public or private. Latin American countries in the sample are well-supplied with hospital beds compared with the other three regions.

3. What factors affect the size of the private health sector?

This section of the paper explores the effect of different determinants on the levels of private provision,

Table 1. Numbers of public and private physicians

| Country | Private physicians per million pop. | Total physicians per million pop. | Private physicians as percentage of total |
|-----------------------|-------------------------------------|-----------------------------------|---|
| Morocco | 78 | 189 | 41 |
| Algeria | 86 | 361 | 24 |
| Pakistan | 107 | 338 | 32 |
| Tunisia | 153 | 428 | 36 |
| Oman | 185 | 432 | 43 |
| Turkey | 254 | 610 | 42 |
| Jordan | 661 | 955 | 69 |
| <i>MEC average</i> | <i>147</i> | <i>402</i> | <i>35</i> |
| Indonesia | 6 | 94 | 6 |
| Papua New Guinea | 16 | 62 | 25 |
| Thailand | 40 | 225 | 18 |
| Malaysia | 202 | 351 | 57 |
| India | 286 | 389 | 73 |
| S. Korea | 398 | 463 | 86 |
| <i>Asia average</i> | <i>232</i> | <i>343</i> | <i>60</i> |
| Paraguay | 28 | 569 | 5 |
| Panama | 112 | 1126 | 10 |
| Mexico | 277 | 768 | 36 |
| Jamaica | 331 | 496 | 67 |
| Chile | 657 | 1063 | 62 |
| <i>LAC average</i> | <i>332</i> | <i>824</i> | <i>46</i> |
| Burundi | 2 | 26 | 7 |
| Malawi | 4 | (16) | 25 |
| Madagascar | 4 | n/a | n/a |
| Zambia | 13 | 107 | 13 |
| Kenya | 30 | 76 | 40 |
| Senegal | 35 | 92 | 38 |
| Liberia | 35 | 86 | 41 |
| Zimbabwe | 86 | 127 | 67 |
| South Africa | 168 | 299 | 56 |
| <i>Africa average</i> | <i>92</i> | <i>200</i> | <i>46</i> |
| All average | 213 | 383 | 55 |

Note: Averages are weighted by population

MEC = Middle East Crescent; LAC = Latin America and Caribbean

that is, estimates of absolute numbers controlling for population size. Section 4 presents similar analysis for the private share in total provision.

Income

Although the relationship between income and levels and composition of health expenditure is well

established in a number of cross-sectional studies (Abel-Smith 1963, 1967; Newhouse 1976; Maxwell 1981; Getzen and Poullier 1991; Murray et al. 1994; Musgrove 1996), there is little work exploring the way in which the number of public and private health care providers varies with income. Existing conceptual frameworks which describe the growth of the

Table 2. Numbers of public and private beds

| | Private for-profit beds per million pop. | Total private beds per million pop. | Total beds per million pop. | Private for-profit beds as % of total | All private beds as % of total |
|-----------------------|--|--|--------------------------------|---|--------------------------------------|
| Turkey | 49 | 84 | 2061 | 2 | 4 |
| Pakistan | 125 | n/a | 748 | 17 | 17 |
| Jordan | 468 | 468 | 1853 | 25 | 25 |
| Egypt | n/a | 144 | 1825 | n/a | 8 |
| <i>MEC average</i> | <i>106</i> | <i>123</i> | <i>1343</i> | <i>12</i> | <i>12</i> |
| PNG | 0 | n/a | n/a | 0 | n/a |
| Nepal | 7 | 67 | 236 | 3 | 28 |
| Bangladesh | 42 | 42 | 277 | 15 | 15 |
| Indonesia | 118 | 167 | 536 | 22 | 31 |
| India | 122 | 210 | 675 | 18 | 31 |
| Thailand | 229 | 229 | n/a | 14 | 14 |
| Sri Lanka | 235 | 235 | 2574 | 3 | 3 |
| Malaysia | 305 | 305 | 2125 | 14 | 14 |
| Philippines | 624 | 624 | 1382 | 45 | 45 |
| Korea | 1393 | 1393 | 1738 | 82 | 82 |
| <i>Asia average</i> | <i>185</i> | <i>248</i> | <i>730</i> | <i>21</i> | <i>31</i> |
| Costa Rica | 51 | 51 | 2555 | 2 | 2 |
| Paraguay | 84 | 84 | 1029 | 8 | 8 |
| Jamaica | 121 | n/a | n/a | n/a | n/a |
| Bolivia | 216 | 216 | 1641 | 13 | 13 |
| Peru | 228 | 228 | 1414 | n/a | n/a |
| Colombia | 2265 | 265 | 1306 | 20 | 20 |
| Ecuador | 271 | 271 | 1539 | 18 | 18 |
| Panama | 420 | n/a | 2970 | 14 | n/a |
| Dom. Rep. | 689 | 8854 | 2007 | 34 | n/a |
| Chile | 797 | 797 | 3265 | 24 | 24 |
| Brazil | 1301 | 2504 | 3337 | 39 | n/a |
| Argentina | 1457 | 1457 | 4544 | 32 | 32 |
| <i>LAC average</i> | <i>970</i> | <i>1629</i> | <i>2906</i> | <i>29</i> | <i>21</i> |
| Malawi | 0 | 337 | 832 | 0 | 41 |
| Tanzania | 0 | 516 | 1064 | 0 | 49 |
| Madagascar | 64 | 64 | n/a | n/a | n/a |
| Senegal | 95 | 108 | 652 | 14 | 17 |
| Kenya | 108 | 335 | 1063 | 10 | 31 |
| South Africa | 702 | 702 | 2400 | 29 | 29 |
| Zimbabwe | n/a | 661 | n/a | n/a | 56 |
| CAR | n/a | 194 | 138.5 | n/a | 14 |
| <i>Africa average</i> | <i>354</i> | <i>506</i> | <i>1693</i> | <i>16</i> | <i>34</i> |
| All average | 305 | 467 | 1187 | 21 | 28 |

Note: Averages are weighted by population

Table 3. Estimated relationships between the supply of private providers and income

| Dependent variable | Estimated coefficient on ln (income) | t-statistic | 95% confidence interval | R ² |
|---|--------------------------------------|-------------|-------------------------|----------------|
| ln (private physicians per million) | 1.643 | 5.4 | 1.02–2.27 | 0.55 |
| ln (public physicians per million) | 0.876 | 3.6 | 0.37–1.38 | 0.39 |
| ln (for-profit hospital beds per million) | 1.13 | 3.7 | 0.49–1.76 | 0.34 |
| ln (total private beds per million) | 0.66 | 2.8 | 0.18–1.15 | 0.23 |
| ln (public beds per million) | 0.52 | 2.9 | 0.15–0.88 | 0.26 |

private sector (e.g. Berman 1998a; McPake 1997; Berman and Rannan-Eliya 1993) do not lead to clear predictions about the evolution of the relative shares of the public and private sectors as income increases. This is partly because the relationship between the size of the two provision sectors is likely to depend on a host of other factors such as relative quality, institutional features, payment systems, etc.

As a country's income increases, more resources are available to purchase health services of all types, including those provided in the private sector, so that we would expect to find the supply of private providers increasing with income. But will private providers increase at a higher or lower rate than the rate of increase of income? And do private providers increase at a faster rate than the supply of public providers? We have tried to answer these questions with some simple bivariate regression analyses, regressing the number of private providers on income. The results of these regressions are presented in Table 3.

The results suggest that the supply of private physicians is income elastic: a 10% increase in income is associated with a 16.4% increase in the number of private physicians per million. In contrast, the same increase in income only leads to a 9% increase in the supply of public physicians. Private physicians are a luxury good, and as income increases, a greater share seems to be spent on private physicians; the share of income spent on public physicians is about constant.

Similarly, the supply of for-profit beds increases at a faster rate than income. A 10% increase in income

leads to an 11% increase in the number of for-profit beds, although the 95% confidence interval for the income elasticity includes unity. The slower growth of non-profit beds dilutes this finding somewhat, so that total private beds increases slightly slower than income. However, public hospital beds are definitely an 'inferior' good, and a 10% increase in income leads to only a 5% increase in public hospital beds. Here the 95% confidence limit excludes unity. The growth of private insurance as income rises probably explains much of the rising share of private beds and physicians in total provision.

The estimated relationships between the numbers of private and public providers and income are plotted in Figures 1 and 2. As can be seen clearly in Figure 1, the rate of increase with income of private physicians exceeds that of public physicians, so that at levels of income above around US\$7500, private physicians actually exceed public ones. Figure 2 shows the diminishing rate of growth of public hospital beds, as well as the closing gap between for-profit and total private beds at higher levels of income.

These results can be contrasted with findings relating income and the public-private composition of health spending. Murray et al. (1994) and Musgrove (1996) report cross-sectional analyses of income and public shares in total health spending, which show an increasing public sector role in overall health care financing as income rises. This effect is largely the result of classifying social health insurance as a public sector expenditure (although there are predominantly tax-funded systems in the high income group such

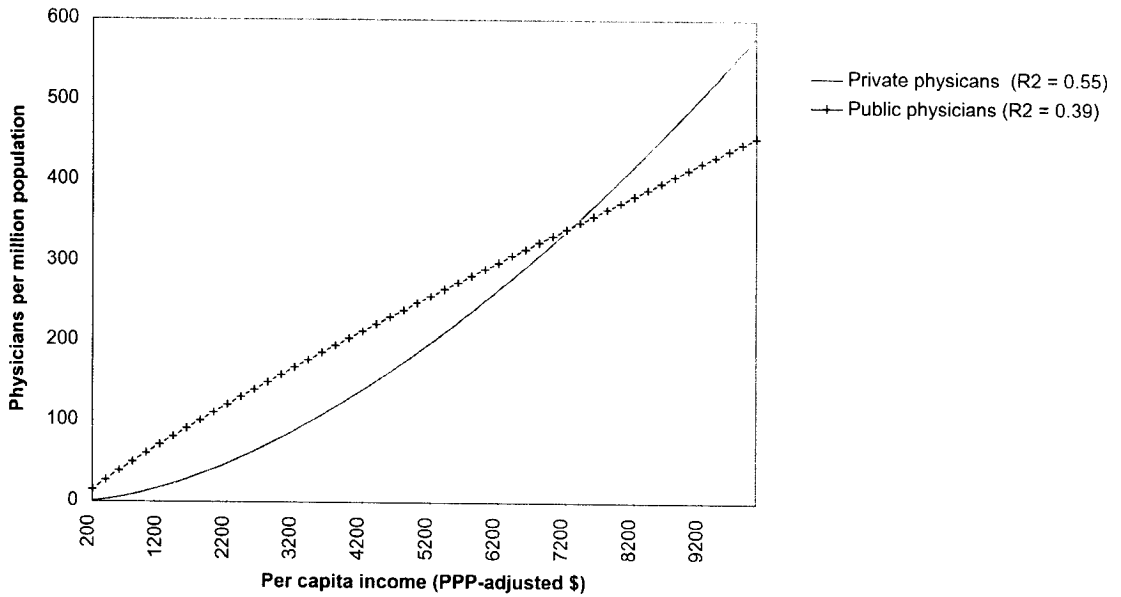


Figure 1. Physicians and income (fitted values)

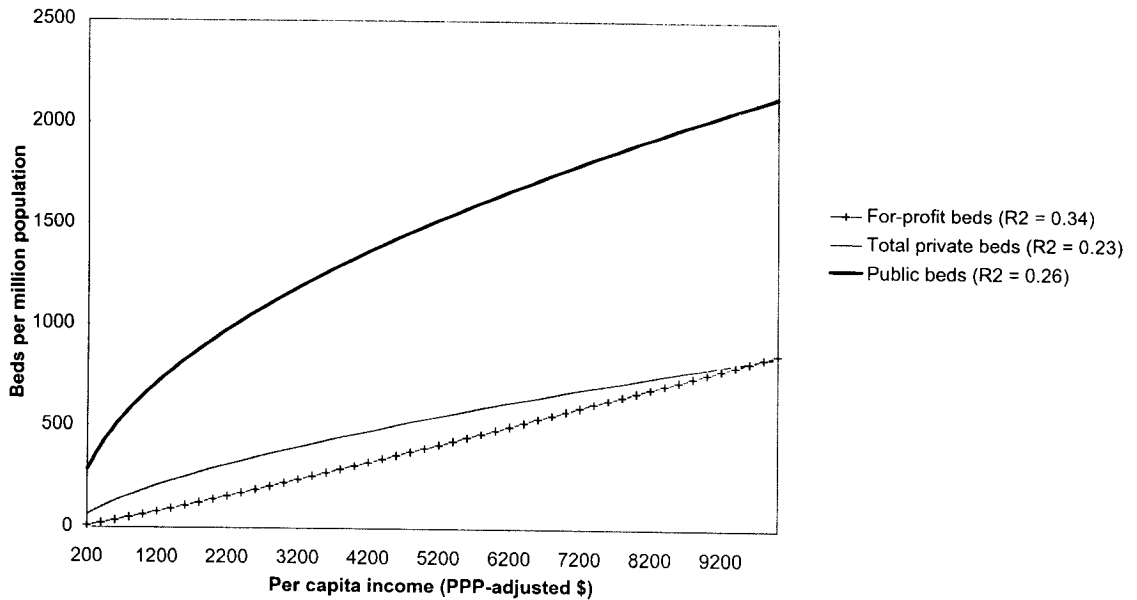


Figure 2. Hospital beds and income (fitted values)

Table 4. Estimated relationships between the size of the private sector and other socioeconomic variables

| Variables | Private physicians per million | For-profit beds per million | Total private beds per million |
|---|--------------------------------|-----------------------------|--------------------------------|
| Urban | +*** | +*** | +*** |
| Urban population growth rate | -** | | |
| Secondary school enrolment | +** | +** | |
| Illiteracy rate | | | -*** |
| % pop. <15 years | | -** | |
| IMR | | | -** |
| Life expectancy at birth | +* | | +** |
| Public per capita health expenditure | | +*** | +*** |
| Private per capita health expenditure | | +*** | +* |
| Total per capita health expenditure | | +*** | +*** |
| Public share of total health expenditure | | +* | +** |
| Private share of total health expenditure | | | -*** |

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. The sign of the estimated coefficient is given.

The equation being estimated is of the form: $\text{Providers} = \alpha_0 + \alpha_1 Y + \alpha_2 \text{var}$ where $Y = \text{income}$ and var is the individual socioeconomic variables. Each socioeconomic variable is used once with income in a single regression. Both levels and double-log functional forms were used.

as Canada and the UK). Our findings suggest that, while spending may become more socialized with rising income, provision becomes more privatized. This is significant, in that most developing countries devote a lot of policy attention to government roles in health care financing but little to the development of private provision in health sector planning.

Other socioeconomic variables

Berman and Rannan-Eliya (1993) review a number of supply and demand factors which are believed to affect the development of the private health sector. On the demand side these include health needs, prices, quality, the presence of risk-sharing mechanisms such as private and social insurance, and the nature of the medical referral system. The data required to model the effect of most of these influences on the supply of private providers is not available. Exceptions are summary indicators of health needs such as life expectancy and infant mortality rates. Similarly, supply-side influences such as characteristics of capital and labour markets are difficult to quantify with available data. Nonetheless,

some hypotheses which relate socioeconomic variables to the size of the private health sector have been explored. Table 4 shows the direction and statistical significance of the relationship between different measures of the size of the private sector and socioeconomic influences. In this table, regressions are estimated for each socioeconomic variable separately, controlling for income.³

The level of urbanization and secondary school enrolment are both significantly and positively related to the number of private physicians. The rate of urban population growth is, however, negatively related to the number of private physicians. Urban areas are likely to contain a higher concentration of high income individuals, and are more densely populated, both of which would be important demand-side influences. Urban, formal sector employees are also more likely to be covered by social or private health insurance. Where rates of urban population growth are high, it may be relatively low income people who are moving to the cities with the consequence that demand for private services may not be very high.

Table 5. Estimated relationship between the public-private mix in provision and other socioeconomic variables

| Dependent variable | Estimated coefficient on income | t-statistic | F-test of the significance of the regression (p-value) | R ² |
|---|---------------------------------|-------------|--|----------------|
| Percentage of total physicians in the private sector | 0.0000432 | 1.98 | 0.06 | 0.15 |
| Percentage of total beds in the private (for-profit) sector | 0.0000434 | 3.10 | 0.0043 | 0.26 |
| Percentage of total beds in the private (total) sector | -0.00000004 | 0.024 | 0.98 | 0 |

Education is positively related to the demand for health services in general, and may increase the demand for higher (perceived) quality private health services. The positive relationship between secondary school enrolment and the number of private physicians and for-profit beds is consistent with this story. The fact that total private beds includes non-profit beds, which may be more likely to operate in poor rural areas and charge lower fees than for-profit facilities, may explain why the education effect is diluted for this measure of the size of the private sector.

The health and demographic transitions are likely to have an important effect on the growth of the private health sector through the effect of changing patterns of morbidity and demand for different types of care. Overall, an increase in the adult and elderly population may lead to an increased demand for curative health services, especially those associated with chronic adult health problems and interventions. If this demand is satisfied through a relatively greater use of private providers, we would expect to observe larger private health sectors in countries with longer life expectancy and lower proportions of children. In this data, longer life expectancy is associated with a larger number of private physicians and of private hospital beds; so is an 'older' population as captured by a smaller proportion of the population being under 15 years.

A number of the health financing variables are associated with the private hospital bed variables. Generally, a higher *level* of health spending is associated with a larger number of private beds. An

extra dollar of health expenditure seems to have a similar positive effect on the supply of private beds, regardless of whether the money comes from public or from private sources (implying that the public sector must pay for private beds). The *composition* of financing also seems to be related to the total supply of private beds: other things equal, increasing the share of public expenditure is associated with an increase in private beds, while increasing the private share is associated with a decrease. Since these relationships are weak or nonexistent for for-profit beds, this finding suggests that the main influence of these financing variables is on the non-profit hospital sector.

4. What factors affect the public-private composition of the health sector?

Income

There is little consistent evidence that the private sector share of the supply of either doctors or hospital beds is systematically related to income. As Table 5 shows, the evidence is strongest for the number of private for-profit hospital beds, which is positively and significantly related to income. Although the estimated coefficient for the physicians' regression is statistically significant, the overall regression is not. It seems that other factors must be more important in determining the relative size of the private provision sector.

Other variables

Table 6 shows the results of the analysis of the effect of different socioeconomic factors in determining the share of provision that is private.

Table 6. Estimated relationship between the public-private mix and other socioeconomic variables

| Independent variables | Percentage of total physicians in the private sector | Percentage of total beds in the private (for-profit) sector | Percentage of total beds in the private sector* |
|---------------------------------------|--|---|---|
| Secondary school enrolment | +** | +** | +*** |
| Adult illiteracy | | | -** |
| Population density | +** | +*** | |
| Population < 15 years | | -* | |
| Public per capita health expenditure | | +*** | +*** |
| Private per capita health expenditure | | +*** | +*** |
| Total per capita health expenditure | | +*** | +*** |

*Note: regressions are quadratic in income

As in the case of the level analysis, the public-private mix of physicians and beds is positively related to secondary school enrolment. The total private bed measure is negatively related to the adult illiteracy rate. In countries where the average population density is higher, a greater proportion of physicians and beds is found in the private sector. There appears to be a negative relationship between the private share of for-profit hospital beds and the population below 15 years. Different patterns of morbidity and treatment seeking for adult illness may explain why this relationship exists for hospital beds and not for physicians. The financing variables are positively and significantly related to the share of beds in the private sector, and once more the effect on the private sector's share of total hospital beds is quite similar for a marginal dollar of public or private financing.⁴

The factors which do not seem to be related to the private sector's share of health care providers are almost as interesting as those which are related. Health needs as measured by the infant mortality rate and life expectancy at birth are uncorrelated with the private sector share variables.

More importantly, we can identify no relationship between the public-private composition of *financing* and the mix in provision. In the traditional, segmented model of health care systems, the public sector is primarily financed through public sector revenues and social insurance contributions, and the private sector receives most of its funds from private out-of-

pocket and private insurance sources. We believe this model seriously misrepresents the reality of health care systems.

Several factors can explain the lack of correspondence between the private sector's share in provision and its share of financing. The first is prices: private doctors may earn more than public ones or the costs of services delivered by a social security system may be much higher than those in the private sector. If prices are different in the public and private sectors, the ratios of financing to provision may differ across sectors, and in ways that vary across countries.

A second factor is private spending for public services. A key finding of recent household health expenditure surveys in developing countries has been the magnitude of private health spending, even in systems where the government is the dominant provider. Private funds may be being spent on official user fees for public services. Public providers may be engaged in private practice in the evenings and on weekends, or indeed, unofficially within public sector institutions so that the public sector effectively subsidizes their private practice.

Thirdly, institutional or regulatory linkages may lie behind the spending of public resources on private services through contracting, subsidies to non-governmental organizations, or arrangements within a social insurance system for private providers to be reimbursed for care.

Table 7. Robust regression results: public-private composition and levels of public investment*

| Dependent variable | Independent variables | Estimated coefficients (t-statistic in parenthesis) |
|---|----------------------------|--|
| Percentage of physicians that is private | Per capita income | 0.00006 (2.6) |
| | Public doctors per million | -0.0005 (2.3) |
| Percentage of beds that is private (for-profit) | Per capita income | 0.00003 (1.9) |
| | Public doctors per million | -0.00001 (.32) |
| Percentage of beds that is private (total) | Per capita income | -0.00002 (.91) |
| | Public doctors per million | -0.00003 (.62) |

* For the hospital bed regressions, OLS gives a negative and significant regression coefficient, but these results seem to be driven by outliers. When the robust regression estimator is used, which gives less weight to outlier observations, the significance of the estimated coefficients on public supply vanishes. In the physician regression the residuals are slightly heteroscedastic, however if the physician share variable is regressed on the logs of income and public beds the residuals are better behaved and the estimated coefficients remain highly significant and of the same sign.

Fourthly, public expenditure may provide a threshold level of investment to enable even greater private expenditure, as when a public clinic in a rural area creates the initial opportunity for the development of private providers. This will also cause the private share of financing to differ from the private share of provision in some countries.

Thus the relationship between sources of financing and service provision may be much more complex than is suggested by the simple segmented model that is often assumed. The policy implications of such complexity are unknown, and a more careful specification of the range of possible relationships between government and the private sector is needed. As noted in our introduction, available data on private provision do not capture these linkages.

5. Are the public and private sectors complements or substitutes?

What are the dynamics of the relationship that underpins the observed relative shares of the public and private sectors in the health care system? One model of this relationship has the public sector acting as the first-mover and choosing its level of investment in the health sector. The private sector then observes the level of public investment and invests to meet the residual demand, which may be a function both of the quantity of services supplied in the public sector and the quality of those services.

One test of this hypothesis is to look at the following question: if the level of public investment is relatively high, is the private sector share of supply consequently higher or lower? If it is lower, then we can describe the public and private sectors as substitutes; if it is also higher, then the two sectors can be thought of as complements. This hypothesis has been evaluated in the education economics literature, in which the size of the private schooling sector is found to be influenced by the availability and perceived quality of public education (James 1993).

The empirical evidence supports the substitutes story for public and private doctors, but is inconclusive for public and private hospital beds. Two empirical tests of this model have been undertaken. In the first, the private sector share of supply is regressed against the level of public sector supply, controlling for the level of income. We find a significant and negative coefficient on public sector supply of physicians, suggesting that the public and private sectors are substitutes in the physician market. No consistent result is found for hospital beds (see Table 7). A second test, which uses the residuals from a regression of the number of public providers on income to predict the private sector share of total physicians (and beds) produces very similar results. As noted earlier, to understand these relationships we need a more nuanced notion of a health care provider. Physicians practice individually and also work in hospitals. There could also be formal and informal linkages between these sectors.

6. Resource mixes in the public and private sectors

Another interesting question that can be asked with this data concerns the resource mixes in the public and private sectors. Our data allow us to construct an index of beds per doctor for the public and private sectors, and for the health sector as a whole, which is one way of measuring the resource mix (Table 8).

Another interpretation of this index is that it captures the relative mix of ambulatory and hospital services in the public and private sectors.⁵ Accumulating case study evidence suggests a pattern in which the ambulatory sector is (relatively) dominated by private providers and the hospital sector is biased towards public providers (e.g. Berman 1998b; Berman et al. 1995; Berman et al. 1994; Bhat 1997; Dung 1997; Mongkolsmai 1997). The data in our sample also provide support for this pattern. For the majority of countries the private sector index of beds per doctor is lower than the public sector index. The relatively high cost of investing in inpatient facilities compared with ambulatory facilities (due to, for example, lending constraints and the specificity of hospital capital), or crowding out of private investment by public provision, are possible explanations for this pattern.

Conclusions

This analysis is an initial effort to study the determinants of the size of the private provision sector. While models have been developed for total health expenditure, relatively less attention has been paid to the growth and structure of public and private provision. For example, although higher levels of education are associated with higher aggregate numbers of health care providers, the extent to which this higher total supply includes a relatively larger share of private providers will depend on a number of health system-specific features: What is the quality of the services provided in the public sector? Is private practice allowed? Can private physicians admit their patients to public hospitals? Do social insurance mechanisms allow for reimbursement of private providers? Institutional features such as the regulatory environment, financing arrangements, and national cultural and political attitudes towards private practice may be the most important predictors of the number of private health care providers and the public-private composition of care. Unfortunately, these factors are difficult to evaluate either because

they are not easily captured in a summary variable which can be used for quantitative analysis (e.g. public sector quality), or because the data simply are not widely available (Berman and Rannan-Eliya 1993).

Lacking data on many of these qualitative health system descriptors, and in the absence of a structural model, this analysis should be considered descriptive and preliminary rather than causal. Our goal in this paper is the more modest task of describing some of the key features of the sector and identifying associations between socioeconomic variables and the numbers of providers. A more complete analysis requires more accurate data about the size of the private sector for a larger sample of countries, and better information about the health system-specific variables which affect the size and growth of the private sector. We have been working in a number of countries to develop such data (Berman et al. 1994; Berman et al. 1995).

A number of data limitations make the conclusions tentative: these include the small sample size, the potential inaccuracy in measuring the size of the private sector using the variables which are available, and also whether we are capturing the most important influences on the size and composition of the sector.

Nonetheless, the analysis has revealed a number of interesting preliminary findings:

- There is considerable variation in the levels of private provision and composition of the physician and hospital bed components of the private sector.
- Private physicians' supply is highly income elastic, with a rate of increase significantly exceeding that of income. The income elasticity of public physician supply is around unity. Private beds also have unit elasticity with respect to income but public beds appear to be an 'inferior' good with their share diminishing as income increases.
- There is only weak evidence of a relationship between income and the public-private mix of physicians. The share of for-profit beds is positively associated with income while other measures seem to be uncorrelated with income

Table 8. Resource mix indices: beds/physicians

| | Public index | Private for-profit index | Total private index | Total sector index |
|--------------|--------------|--------------------------|-----------------------------|--------------------|
| Turkey | 5.66 | 0.19 | 0.33 | 3.38 |
| Jordan | 4.71 | 0.71 | 0.71 | 1.94 |
| Pakistan | 2.69 | 1.17 | | 2.21 |
| Malaysia | 12.81 | 1.51 | 1.51 | 6.05 |
| India | 5.33 | 0.43 | 0.74 | 1.73 |
| Korea | 5.24 | 3.50 | 3.50 | 3.75 |
| Indonesia | 4.71 | 20.97 | 29.74 | 5.67 |
| Thailand | | | 5.65 | |
| Chile | 6.08 | 1.21 | 1.21 | 3.07 |
| Panama | 2.51 | 3.76 | | 2.64 |
| Paraguay | 1.75 | 3.02 | 3.02 | 1.81 |
| Colombia | | | | 1.44 |
| Kenya | 20.8 | 3.58 | 11.08 | 13.98 |
| Malawi | | | 81.86 | |
| Madagascar | | 14.92 | 14.92 | |
| South Africa | 12.89 | 4.18 | 4.18 | 8.01 |
| Senegal | 9.74 | 2.69 | 3.08 | 7.06 |
| Mean | 7.3 | 4.41 | 13.45 (8.2 excl. Malawi) | 4.48 |

- The public-private mix in financing is unrelated to the mix in provision: this suggests that a simple segmented model of public and private health care may be very misleading. There are a number of official and unofficial structures that lead to breaks between financing and provision, for example, user fees for public services and unofficial private practice by civil servants.
- There is some evidence that public and private physicians are substitutes; no conclusive result can be reached for hospital beds.
- The resource mix index confirms accumulating case study evidence that in many countries the ambulatory sector is relatively dominated by private providers, and the hospital sector by the public sector.

Further analysis requires more data about the size of the private sector, including the extent of dual practice by government-employed physicians. Other useful measures of the private sector contribution to health services would include rates of utilization of different types of provider (e.g. hospital occupancy rates). Evidence from different countries suggests very different levels of productivity for public and private providers (World Bank 1994). Future analysis should also include an assessment of the role of other providers, such as nurses, pharmacies, traditional healers, etc.

A key area for further analysis is how specific features of the institutional and regulatory environment affect both the level and growth of the private sector. These should include more detail about the health care financing system, inter alia, whether

private providers can be reimbursed by social insurance funds; the level and quality of public sector services; the total production of physicians, numbers employed by government and comparative wage differentials; the regulatory structure; government and social attitudes towards the private sector; and capital market structures facilitating private investment in health care infrastructure. These variables are not easy to quantify, and will require special data collection efforts.

Finally, we should perhaps be most concerned to answer questions about the impact of differences in levels, composition, and development of private provision on key social welfare outcomes, such as equity in access and health status. Answers to these questions will ultimately motivate more serious policy attention to the government role in stimulating and regulating the private sector.

Endnotes

¹ There is no internationally accepted framework for classifying health care provision generally. Inpatient facilities are generally described according to bed size and scope of services (Barnum and Kutzin 1993). Ambulatory care provision is less well defined. In this paper we are limited to the use of secondary data. As a result, we have measures which combine elements of individual providers (physicians), facilities (beds) and inputs to providers (physicians).

² For example, in Tunisia the key characteristic distinguishing a 'clinic' from a 'hospital' is the way in which the medical staff is organized. Regulations specify that a hospital must be staffed by full-time, salaried physicians. Clinics can offer most of the same services at a very high technical level, with the key difference being that physicians have no contractual relationship with the facility at all, and are paid a separate fee by the patient. At present there are no private hospitals in Tunisia, but a number of clinics have in excess of 100 beds.

³ This procedure is followed because of the multicollinearity introduced by the correlations between income and the various socioeconomic variables, and between the socioeconomic variables themselves. When all variables are included, very few are statistically significant, and the coefficients themselves are unstable.

⁴ The direction of causation in this relationship is a matter for debate. Increased spending on health is linked to higher income, and hence can be treated as a 'demand' effect which increases private provision. However, one could also plausibly argue that private providers are more likely to induce demand which, other things equal, leads to higher spending.

⁵ Of course, this interpretation assumes that private doctors perform no role in the hospitals, which is clearly not the case. Alternatively, the index could reflect the technology mix in the two sectors: the more intensive use of doctors (i.e. where the value of the index is lower) could then be related to technical quality. Adequate controls for casemix would be needed for this hypothesis to hold.

References

- Abel-Smith B. 1963. *Paying for Health Services*. Public Health Paper no. 17. Geneva: World Health Organization.
- Abel-Smith B. 1967. *An International Study of Health Expenditure*. Geneva: World Health Organization.
- Baker JL and van der Gaag J. 1993. Equity in health care and health care financing: evidence from five developing countries. In: van Doorslaer E, Wagstaff A and Rutten F (eds.) *Equity in the Finance and Delivery of Health Care: An International Perspective*. Oxford: Oxford University Press.
- Barnum H and Kutzin J. 1993. *Public Hospitals in Developing Countries: Resource Use, Cost, Financing*. Baltimore: Johns Hopkins University Press for the World Bank.
- Bennett S. 1992. Promoting the Private Sector: a review of developing country trends. *Health Policy and Planning* 7(2): 97-110.
- Berman P. 1998a. Patterns of Private Health Care Development in Low and Middle Income Nations. Boston: Harvard School of Public Health. mimeo.
- Berman P. 1998b. Rethinking Health Care Systems: Private Health Care Provision in India. *World Development* 26(8), August.
- Berman P, Nwuke K, Rannan-Eliya R and Mwanza A. 1995. *Zambia: Non-governmental health care provision*. Boston: Data for Decision Making Project, Harvard School of Public Health.
- Berman P, Nwuke K, Hanson K et al. 1994. *Kenya: Non-governmental health care provision*. Boston: Data for Decision Making Project, Harvard School of Public Health.
- Berman P and Rannan-Eliya R. 1993. *Factors affecting the development of private health care provision in developing countries*. Health Financing and Sustainability Project. Major Applied Research Paper No. 2. Abt Associates: Bethesda, MD.
- Berman P and Rose L. 1996. The Role of Private Providers in Maternal and Child Health and Family Planning Services in Developing Countries. *Health Policy and Planning* 11(2): 142-55.
- Bhat R. 1997. Regulation of the Private Health Sector in India. In: Newbrander W (ed.) *Private Health Sector Growth in Asia: Issues and Implications*. Chichester: John Wiley and Sons.
- Dung PH. 1997. The Political Process to Increase the Private Health Sector's Role in Vietnam. In: Newbrander W (ed.) *Private Health Sector Growth in Asia: Issues and Implications*. Chichester: John Wiley and Sons.
- Ellis R and Chawla M. 1993. *Public and Private Interactions in the Health Sector in Developing Countries*. Health Financing and Sustainability Project. Major Applied Research Paper No. 5 Draft Report. Abt Associates, Bethesda, MD.
- Getzen TE and Poullier J-P. 1991. An Income-Weighted International Average for Comparative Analysis of Health Expenditures. *International Journal of Health Planning and Management* 6: 3-22.
- Griffin C. 1992. *Health care in Asia: A comparative study of cost and financing*. Washington, DC: The World Bank.
- James E. 1993. *Why is there proportionately more enrollment in private schools in some countries?* Policy Research Working Paper WPS 1069. Washington, DC: The World Bank.
- Maxwell RJ. 1981. *Health and Wealth*. Lexington, MA: Lexington Books.
- McPake BM. 1997. The role of the private sector in health service provision. In: Bennett S, McPake B and Mills A (eds.) *Private Health Providers in Developing Countries*. London: Zed Books.
- Mongkolsmai D. 1997. Private Health Sector Growth and Social Security Insurance in Thailand. In: Newbrander W (ed.) *Private Health Sector Growth in Asia: Issues and Implications*. Chichester: John Wiley and Sons.

- Murray CJL, Govindaraj R and Musgrove P. 1994. National Health Expenditures: a global analysis. In: WHO. *Global Comparative Assessments in the Health Sector: Disease Burden, Expenditures and Intervention Packages*. Geneva: World Health Organization.
- Newhouse JP. 1976. Medical-Care Expenditure: A Cross-National Survey. *Journal of Human Resources* 12: 115–25.
- Musgrove P. 1996. *Public and Private Roles in Health*. World Bank Discussion Paper No. 339. Washington DC: The World Bank.
- World Bank. 1993. *World Development Report 1993: Investing in Health*. New York: Oxford University Press for the World Bank.
- World Bank. 1994. *Indonesia's Health Work Force: Issues and Options*. Rept 12835-IND. Washington, DC: The World Bank.
- World Bank. 1995. *India: Policy and Finance Strategies for Strengthening Primary Health Care Services*. Report No. 13042-IN. Washington, DC: The World Bank.
- World Health Organization. 1988. The Health Professions in the 1980s. *World Health Statistics Annual*.
- Argentina
Data are for 1985. Source: World Bank Report, June 1988; PAHO – *Health Conditions in the Americas*, Vol II, 1990.
- Bangladesh
Data are from Griffin (1992); no date given (are for 'most recent year').
- Bolivia
Data are for 1988. Source: PAHO – *Health Conditions in the Americas*, 1990.
- Brazil
Data are for 1987. Source: PAHO – *Health Conditions in the Americas*, 1990.
- Burundi
Data are for 1982. Source: World Bank Population and Health Sector Review, Population, Health and Nutrition, July 15, 1983.

Central African Republic
Data are for 1988. Source: HFS Assessment Report, November 1990; by James Setzer and Marcia Weaver.

Chile
Data are for 1989. Source: World Bank Staff Appraisal Report, Chile Health Sector Reform Project, August 1992; Latin America and Caribbean Region, Country Department IV, Human Resources Operations Division.

Colombia
Data are for 1986 and 1988. Source: PAHO – *Health Conditions in the Americas*, 1990.

Costa Rica
Data are for 1987. Source: PAHO – *Health Conditions in the Americas*, 1990.

Dominican Republic
Data are for 1988. Source: PAHO – *Health Conditions in the Americas*, 1990.

Ecuador
Data are for 1983. Source: World Bank PHN Sector Review, 1986.

Egypt
Data are for 1987. Sources: Dutta A, Edison P, Hooper E, Wahmann S (International Science and Technology Institute, Inc) Cost Recovery for Health Programme in Egypt: Phase 1 Design Report. June 1987; Memo AID to HFS re: Egypt Cost Recovery Project Background, 12/2/92.

India
Data are for 1987 and 1989. Sources: Griffin (1992); Bhat R. 1993. The public-private mix in India. *Health Policy and Planning* 8(1): 43–56.

Indonesia
Data are for 1985 and 'most recent'. Sources: Griffin (1992); World Bank: Indonesia Health Planning and Budgeting Study.

Jamaica
Data are for 1983 and 1986. Source: Maureen Lewis. 1988. Financing Health Care in Jamaica, Urban Institute, paper prepared for REACH.

Acknowledgements

Financial support for this work was provided by the U.S. Agency for International Development through the Data for Decision Making Project at Harvard University, Cooperative Agreement #DPE-5991-A-00-1052-00.

Kara Hanson now works with the Health Economics and Financing Programme which is funded by the Department for International Development of the United Kingdom and based at the London School of Hygiene and Tropical Medicine.

Biographies

Kara Hanson is a Research Fellow with the Health Economics and Financing Programme at the London School of Hygiene and Tropical Medicine. While this work was undertaken she was a doctoral candidate at the Harvard School of Public Health, where she has been studying the relationships between public and private sector providers in Cyprus and Sri Lanka. Her main research interests are in the areas of health sector reform, health financing, and the role of the private sector in national health systems.

Peter Berman is Associate Professor of International Health Economics at Harvard University School of Public Health. He directs the Data for Decision Making Project and Harvard's role in the Partnerships for Health Reform Project. He recently edited *Health Sector Reform in Developing Countries: Making Health Development Sustainable* (Harvard, 1995) and has written several recent articles on the private health sector in developing countries.

Correspondence: Kara Hanson, Health Policy Unit, London School of Hygiene and Tropical Medicine, Keppel Street, London, WC1E 7HT, UK.

Appendix 1. Countries included in analysis and sources of data
Algeria
Data are for 1984. Source: *World Health Statistics*, 1988.

Jordan

Data are for 1984 and 1986. Source: World Bank Country Review: Quality, organization and financing issues in the health sector (1989).

Kenya

Data are for 1982, 1984. Sources: World Bank Kenya: Review of Expenditure Issues and Options in Health Financing, 1988; *World Health Statistics* 1988.

Korea

Data are for 1985 and 'most recent'. Sources: Griffin (1992); BM Bang. Issues in Health Care Delivery: the case of Korea. World Bank Insurance Meeting, 1990.

Liberia

Data are for 1983. Source: *World Health Statistics*, 1988.

Madagascar

Data are for 1982 and 1987. Source: World Bank Madagascar Population and Health Sector Review.

Malawi

Data are for 1985 and 1987. Source: Ngalande-Banda and Simukonda. 1992. The Public-Private Mix in Malawi (London: Discussion paper presented at the Public-Private Mix Workshop at the London School of Hygiene and Tropical Medicine).

Malaysia

Data are for 1988 and 'most recent'. Sources: Griffin (1992); Ministry of Health Annual Report, 1988.

Mexico

Data are for 1980s. Source: PAHO - *Health Conditions in the Americas*, 1990.

Morocco

Data are for 1987. Source: Vogel and Stinson. The Health Services Market in Morocco - Structure and Performance.

Nepal

Data are for 1991 and 'most recent'. Sources: Griffin (1992); Gurung and Olsen. The Public-Private Mix in Health Care in Nepal. (London: Discussion paper presented at the Public-Private Mix Workshop at the London School of Hygiene and Tropical Medicine).

Oman

Data are for 1982. Source: World Bank, Oman Population, Health and Nutrition Sector Memorandum, 1984.

Pakistan

Data are for 1983 and 1992. Sources: World Bank Population and Health Sector Report, 1988; Department of Community Health Sciences, Aga Khan University, 1992 (London: Discussion paper presented at the Public-Private Mix Workshop at the London School of Hygiene and Tropical Medicine).

Panama

Data are for 1987. Source: PAHO - *Health Conditions in the Americas*, 1990.

Papua New Guinea

Data are for 'most recent', 1989 and 1992. Sources: Griffin (1992); J Thomason. PNG Country Paper (London: Discussion paper presented at the Public-Private Mix Workshop at the London School of Hygiene and Tropical Medicine).

Paraguay

Data are for 1982. Source: World Bank, Paraguay Health Sector Memorandum, 1984.

Peru

Data are for 1983. Source: Gertler and van der Gaag. WTP for Medical Care; PAHO - *Health Conditions in the Americas*.

Philippines

Data are for 'most recent' and 1989. Sources: Griffin (1992); RTI/UPSE Health Sector Financing in the Philippines, 1991.

Senegal

Data are for 1990 and 1992. Source: PHR Operations Division Sahelian Department, Republic of Senegal: Issues in Health Care Financing (October 1992).

South Africa

Data are for 1989 and 1990. Source: Booyesen M. 1992. Report on the public/private sector health care mix in South Africa (London: Discussion paper presented at the Public-Private Mix Workshop at the London School of Hygiene and Tropical Medicine).

Sri Lanka

Data are for 'most recent'. Source: Griffin (1992).

Tanzania

Data are for 1985. Source: Mujinja et al. Public-Private Mix in Tanzania (London: Discussion paper presented at the Public-Private Mix Workshop at the London School of Hygiene and Tropical Medicine).

Thailand

Data are for 'most recent' and 1989. Sources: Griffin (1992); Tangcharoensathian and Nittayaramphong 1992 (London: Discussion paper presented at the Public-Private Mix Workshop at the London School of Hygiene and Tropical Medicine).

Tunisia

Data are for 1986. Source: World Health Organization (1988).

Turkey

Data are for 1984 and 1985. Source: World Bank Turkey Health Sector Review, 1986.

Zambia

Data are for 1990. Source: MOH 1991. National Health Policies and Strategies (Health Reforms).

Zimbabwe

Data are for 1990. Source: World Bank. 1992. Zimbabwe: Financing health services - World Bank country study.