

DISCUSSION PAPER

October 2007 ■ RFF DP 07-48

India's Health Initiative

Financing Issues and Options

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Abstract

In response to the challenge of sustaining the health gains achieved in the better-performing states and ensuring that the lagging states catch up with the rest of the country, the Indian government has launched the National Rural Health Mission. A central goal of the effort is to increase public spending on health from the current 1.1 percent of GDP to roughly 2–3 percent of GDP within the next five years. In this paper, we examine the current status of health financing in India, as well as alternatives for realizing maximal health gains for the incremental expenditures.

Key Words: health financing, public spending, India, cost-effectiveness

JEL Classification Numbers: I10, I12, I18

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I. Introduction

In response to the challenge of sustaining the health gains in the better-performing states and ensuring that lagging states catch up with the rest of the country, the Indian government has launched the National Rural Health Mission (NRHM). A central goal of the mission is to increase public expenditure on health from the current 1.1 percent of GDP to roughly 2-3 percent of GDP within the next five years. The NRHM has a clear geographical focus on rural areas, especially in the 18 states that have weak health outcomes and infrastructure, including nine particularly disadvantaged states, which are henceforth referred to (using a modification of Government of India terminology) as the Empowered Action Group plus Assam or EAGA states (see Text Box 1).³

In this paper, we examine the current status and future prospects of health financing in India in light of the NRHM. Much has been written on this issue and our contribution is to synthesize what is known in the context of the NRHM. Our objective is to draw attention to the benefits of public health spending, explore reasons why public spending has been much more effective at improving health outcomes in some regions but not in others, and to apply lessons learnt from the Disease Control Priorities Project-India or DCPPI-India to the question of how best to deploy the new financial resources made available by the NRHM.⁴

Given the large health and institutional disparities between EAG and non-EAG states, the financing challenges are quite different in the two groups. In EAG states such as Bihar, Madhya

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² In revising this paper, the authors benefited considerably from comments by participants at a workshop in New Delhi on January 8, 2007 (chaired by Mr. Rajiv Misra) and from comments by Anna Abreu, Peter Berman, David de Ferranti, Meenakshi Datta Ghosh, Amanda Glassman, Charles Griffin, Prabhat Jha, Satish Jha, Rajiv Misra, William Savedoff, Julian Schweitzer, Paramita Sudharto, and Viroj Tangcharoensathien. Paolo Belli provided detailed input for which we are grateful. Jeffrey Chow and Sarah Darley provided valuable research support.

³ The 18 focus states are Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Himachal Pradesh, Jharkhand, Jammu and Kashmir, Manipur, Mizoram, Meghalaya, Madhya Pradesh, Nagaland, Orissa, Rajasthan, Sikkim, Tripura, Uttaranchal, and Uttar Pradesh. Empowered Action Group states designated by the Government of India are Bihar, Chattisgarh, Jharkhand, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and Uttaranchal. These plus Assam make up the EAGA states

⁴ The DCPPI-India follows on related but more global efforts. See (Jamison, *et al.* 2006; Laxminarayan, Mills *et al.* 2006).

Pradesh, Rajasthan, Uttar Pradesh, and Orissa, which together account for 45 percent of India's population, the health challenge is primarily high levels of infant and child mortality and child malnutrition. In contrast, in non-EAG states such as Kerala, Tamil Nadu and Gujarat, non-communicable diseases are fast replacing infectious diseases and malnutrition as the leading causes of morbidity and mortality. Our paper primarily focuses on the EAG states. It does so, however, from the perspective of long-term implications for India of the financial architecture established for the NRHM.

Figure 1 illustrates the approach we take in this paper. One can consider health systems to have two broad objectives – to improve the level (and distribution) of health outcomes and to provide financial protection to the population, both from unanticipated large health expenditures and from income loss. Similarly, as a first approximation, one can consider health systems to have two types of resources at their disposal – financial and system capacity. DCP-India and related efforts provide a good deal of quantitative information on the control of the shaded box – the financial costs of achieving health gains in different ways.

It is also important to bear in mind the other dimensions of the box. All too often, provision of financial protection is discussed without a sense of either budget constraints or the cost-effectiveness of alternative instruments for acquiring it. And, often, non-financial implementation constraints are ignored.⁵ In this paper, we attempt to address both of these shortcomings.

This paper is organized as follows. Section 1 provides a brief account of India's progress in health and the problems that remain. In section 2, we summarize the current status of state and central government spending on health, and the implications of the NRHM in terms of its ability to displace private expenditure of the poor and to offer financial protection to both the poor and the non-poor. We evaluate the potential benefits of the proposed increased health spending on improving health outcomes and providing financial risk protection against adverse health events. Section 2 also explores the extent to which the failure of EAG states in India to perform at the level of non-EAG states is a matter of insufficient resources as opposed to limited institutional and implementation capacity. We assess the extent to which the additional funding from NRHM will address the financing gap.

Clearly, additional resources will be effective in achieving desired health and financial protection goals only if they are targeted efficiently. In section 3, we discuss criteria for determining an

⁵ Croghan (2006) reports case studies of rapid health improvements in four countries (including Bangladesh) where thoughtful policies were able to achieve success despite weak health systems and broader institutional problems. Two common characteristics of these policies were tight focus on key interventions and continued, effective use of technical support. The DCP-India recommendations are consistent with these policies.

intervention package for NRHM that will achieve these results while being cost-effective and scaleable even in settings of low institutional and service delivery capacity. This section draws on the findings of the DCP-India project, especially its identification of key areas of focus for the NRHM with potentially large gains in health. The main objective and contribution of this paper is to place the recommendations of the DCP-India in the context of a sustainable financial framework.

In section 4, we raise issues of service delivery in low-capacity settings. Issues of improving public-sector performance and leveraging the enormous capacity of the private health sector to successfully deliver health care are central to any health system, but we have devoted relatively less attention to these questions given our focus on health financing. In Section 5, we discuss the mechanics of financing these health interventions and the implications for center-state financial responsibilities. Section 6 explores whether there are useful lessons from the financing of universal elementary education in India and from health financing initiatives in other countries. In section 7, we describe the main messages and conclusions of the paper.

A. Progress and Problems in Health

To most observers of India, the 1990s stood out for economic reforms, unprecedented GDP growth, and significant improvement in living standards for many Indians. However, the gains in health and longevity which were similarly remarkable and economically important are much less appreciated. Over the course of the decade, under-five mortality dropped at an annual rate of 2.2 percent and life expectancy at birth increased from 59 to 64 years. Some have argued that when these improvements in health are taken into consideration, the sharp differences between India and China in economic performance during the 1990s are much less striking (Bloom, Canning *et al.* 2006).

However, as with all stories, there are two sides to this one. The improvements in child health in India, although remarkable, have been modest in comparison to those in some of its neighbors in South Asia. For instance, the 2.2 percent annual rate of decline in infant mortality, while roughly comparable to the decline in most countries at India's level of per capita income, was modest compared to the 5.7 percent decline experienced by Bangladesh and the 4.2 percent decline experienced by Nepal over the same period.⁶ India's record at reducing child malnutrition, maternal mortality, adult mortality, and prevalence of communicable diseases has similarly fallen short of its neighbors.

⁶ In Sri Lanka, infant mortality declined from 18 deaths per 1,000 live births in 1991 to 13 in 2001 – a rate of decline that exceeded the rates experienced by both Bangladesh and Nepal.

Moreover, improvements in health have not been shared equally among all Indians. Rates of decline in infant mortality over the last quarter-century have been uneven across states (Figure 2). Infant mortality rates declined by 68 percent (from 37 to 12) in Kerala, but only by (a still respectable) 52 percent in Uttar Pradesh (150 per 1000 to 72) between 1981 and 2004. Uttar Pradesh alone contributes one-quarter of all infant deaths in the country, and, along with Madhya Pradesh, Bihar and Rajasthan, accounts for slightly more than one-half of all infant deaths in India (Figure 3). Infant deaths are even more concentrated when one considers the lower district level (Figure 4). Only ten percent of the 602 districts in India accounted for nearly 30 percent of all infant deaths in the country during 1994-99, while approximately one-half of all infant deaths in the country during that period occurred in only 23 percent of the districts.⁷

In addition to geographical disparities in health outcomes, there are also large health variations across social groups. Scheduled tribes and scheduled castes typically suffer from the worst health outcomes. For instance, scheduled tribes have an under-five mortality rate of 117 deaths per 1,000 live births and scheduled castes have a rate of 108, compared to an all-India rate of 93.

An important policy question is whether the tremendous growth that the Indian economy has been experiencing lately will, in and of itself, improve health outcomes. After all, there is generally a strong relationship between health outcomes and living standards. However, the evidence we have reviewed in Text Box 2 suggests that the association between health outcomes and per capita GDP, which was relatively strong in the 1980s, has become considerably weaker over time. This implies that economic growth alone is less likely to bring about large health improvements in the future, which in turn points to a continuing – and even greater – need for public action in health.

II. Health Spending in India

How does health spending in India compare to that in other countries? Figure 5 suggests that, at about \$20 (in purchasing power parity terms), India's per capita *public* spending on health – currently about 1.1 percent of GDP - is significantly lower than what would be expected for a country at its level of per capita GDP. However, *total* (private and public) health spending in India is not overly low, because private health spending compensates for the low level of public spending. Indeed, India's *total* health spending – relative to its GDP – is higher than that of almost every other country in South Asia with

⁷ Note that these data are merely indicative, since the NFHS data are not representative at the level of districts.

the exception of Afghanistan (Figure 6) (although this is not true when India is compared to other low-income countries outside South Asia).

What the data suggest is the very high share of private (household) spending in total health spending in India. Indeed, at about 80 percent, India has one of the highest shares of private spending in the entire world. Even though the cross-country association between the public share in health spending and per capita GDP is weak (Figure 7), the ‘norm’ for countries at India’s level of per capita GDP is a private share of only 50 percent in total health spending (Figure 8). The unusually high level of private spending on health in India means that much of the burden of health spending falls on households, a quarter or third of whom have incomes below the poverty line. Increasing public spending is likely to ‘crowd out’ private spending on health,⁸ which would bring important benefits to the large number of India’s poor.

Of course, there is no point in increasing public spending on health if it is likely to yield few health benefits. However, international comparisons do not suggest that India has an unusually low effectiveness of public spending on health. While comparisons of spending effectiveness across countries are notoriously difficult and fraught with methodological difficulties, one simplistic way in which to compare the effectiveness of public health spending is to examine the level of health outcomes that a given amount of government health expenditure is able to ‘purchase’ across countries. Figure 9 suggests that infant mortality in India is significantly lower (by about 50 percent) than would be expected for a country that spends only PPP\$20 per capita in public spending on health, indicating perhaps that spending effectiveness in India is better than average.⁹

The above finding should be tempered by three observations. First, other low-income countries (e.g., Bangladesh) are able to obtain even lower infant mortality rates than India with their even lower (relative to India) levels of public spending on health (Figure 9). Thus, there is likely substantial room for further increasing the effectiveness of government health expenditure in India.

Second, there is likely to be significant heterogeneity in spending effectiveness within India. At first glance, it may appear that the effectiveness of public health spending in the EAG states is likely to be low, given their weak administrative capacity, poor governance structures, and service delivery

⁸ Of course, public spending on health will reduce private spending by the poor only if it actually improves service delivery to the poor. Also, it is assumed that public spending is not financed out of taxes which fall disproportionately on the poor.

⁹ The results could also reflect that India is better endowed than other low-income countries on mortality-reducing factors unrelated to public health spending, such as female education. However, this possibility appears unlikely since levels of female schooling in India are abysmally low.

failures. However, because these states are also the ones with the worst health outcomes, it is possible that the marginal effect of an additional Rupee of public spending on health in these states could be high – even higher in the non-EAG states that have better governance and administrative capacity. This issue is addressed later in this paper (in Section 2C on “Benefits of Increased Availability of Public Resources”).

Third, it goes without saying that what matters ultimately is not how much money the public sector spends on health but how it is spent (e.g., on what types of interventions, to whom it is targeted, and with what degree of technical efficiency). Thus, it is critically important that as the quantity of public resources directed to health is increased, so is the quality of this spending.

A. Financial Implications of NRHM

Achieving the financing targets of the NRHM will depend upon significant cooperation from the state governments. Since health is a state subject, the central government accounts for only one-quarter of public health spending in the country, with state governments responsible for the remaining three-quarters. Many state governments are in a perilous financial situation, with unsustainably high current account deficits and debt ratios. It is not clear how the states will be able to finance large increases in public spending on health. While international financing of health expenditure has been increasing, it cannot possibly constitute more than a very small portion of total health spending in India, given the size of the Indian economy.¹⁰

It is useful to put the discussion of the financial implications of the NRHM in the context of the trend in public health spending in India. Before the economic reforms in the mid-1980s, public spending on health in India had peaked at about 1.6 percent of GDP and 4 percent of the government budget. During the 1990s, government health spending did not keep up with the expanding economy and budget, with the result that by 2001 public spending on health constituted only 0.9 percent of GDP and 2.7 percent of the government budget. These numbers fell further to 0.8 percent and 2.4 percent, respectively, by 2005.

The 2006-07 budget has reversed this trend, and substantially increased allocations to the social sectors (education, health, and women and child development). (Most of the additional allocations in the health sector will be channeled through the NRHM.) In the Common Minimum Program (CMP),

¹⁰ Note that external assistance does constitute a significant and increasing share of national disease-control programs for tuberculosis, HIV/AIDS and malaria.

the present UPA government has committed to spending 3 percent of GDP on the health sector before its term ends in 2008-09. Assuming that the Indian economy continues to grow at its current rates, 3 percent of the projected GDP (of Rs. 52,000 billion in current prices) will constitute Rs. 1,500 billion. The budget estimates for 2006-07 call for the central government to spend Rs. 130 billion (including in central grants to states) and for the states to spend roughly Rs. 285 billion. In other words, the commitment of 3 percent of GDP to health spending would call for a quadrupling or quintupling of what the central and state governments currently spend on health. Given that the share of the central government in public health spending is only 20-35 percent (depending upon whether central grants to states are included or not), even an increase of 30-50 percent per annum in central government health expenditure over the next few years will not allow a realization of the CMP goal. However, as is discussed subsequently in the paper, there is a recent precedent in India's education sector of the central government assuming a much larger share, relative to the states, of public spending to achieve its priorities.

B.State-Level Variations in Health Spending

Data from the *National Health Accounts 2001-02* show wide variations in health spending per capita across states (Figure 10). Kerala has the highest annual per capita spending on health (Rs. 1,858), followed by Haryana, Punjab, and Himachal Pradesh. At the other end, Assam, Orissa, and Rajasthan have the lowest levels of health expenditure per capita. Figure 10 also shows the share of private spending in total health spending across states. With the exception of Sikkim, private spending accounts for the major portion of health spending in every state. In some states, such as Bihar and Uttar Pradesh, private spending accounts for 90 percent or more of total health spending. Surprisingly, even in Kerala, which has excellent health indicators and a wide network of public health facilities, and Haryana, which is one of the most affluent states in the country, private spending accounts for 90 percent of total health spending.

Figure 11 suggests that there is no systematic pattern in the ratio of public expenditure on health to gross state domestic product (GSDP). Public expenditure on health is low in relation to state income (about 0.6-0.8 percent of GSDP) in relatively affluent states like Haryana and Gujarat as well as in a poor state like Uttar Pradesh. On the other hand, public spending on health accounts for as much as 1.6 percent of GSDP in a very poor state like Bihar.

There is some evidence to suggest that private expenditure on health is greater in states that have relatively low public spending on health (Figure 12). While this inverse relationship could be taken as evidence of the traditional displacement or 'crowding-out' effect of public spending, the Indian context is very different and necessitates a different interpretation. As noted earlier, public

spending on health is extremely low in India relative to most other countries. Households have no option but to bear the major burden of health-care expenditure, since the public sector is unable to finance or provide adequate amounts of basic health services and infrastructure. The high out-of-pocket expenditure on health care is an important cause of household impoverishment (see Text Box 3). In such a situation, an increase in public spending on health that would directly reduce household out-of-pocket payments for health care, especially among the poor, would be welfare-enhancing. In addition, we review evidence below suggesting that increased public spending on health is likely to result in significantly improved health outcomes.

C. Benefits of Increased Availability of Public Resources

There are two ways in which increased government expenditure on health can directly improve health outcomes. First, increased public spending provides additional resources to the health sector, thereby enabling it to provide more and better health services. Empirical studies on the link between health spending and health outcomes are inconclusive. Some studies have observed a strong positive association between public spending on health and infant mortality (Anand and Ravallion 1993; Bidani and Ravallion 1995; Gupta, Tiongson *et al.* 1999),¹¹ while others have failed to find an effect (Filmer and Pritchett 1999). Furthermore, this issue has not been addressed in the Indian context. The Appendix contains a preliminary econometric analysis for India, using cross-state data over 20 years. The analysis suggests that, at least in terms of one health indicator (infant mortality), a Rupee of public spending on health is likely to have a larger effect in the EAG states than in the non-EAG states. This may reflect the fact that the high-mortality EAG states have very low coverage – and hence substantial room for expansion – of basic low-cost child survival interventions, such as child immunization and oral rehydration therapy. In the low-mortality non-EAG states, these basic interventions are already widespread, and infant mortality can only be further reduced through more expensive interventions, such as deliveries in medical institutions and post-delivery and emergency hospital-based care.

Second, public spending on health can be more cost-effective than private spending both because it is better directed at interventions that are cost-effective and because of the perverse incentive structure in the (largely-unregulated) private sector. In the unregulated private sector, especially in the rural areas of EAG states, health workers have a strong incentive to prescribe more

¹¹ Gupta *et al.* find that the association between child deaths and public spending on health is twice as strong for the poor as for the non-poor. Rajkumar and Swaroop (2002) find that public spending on health is significantly associated with child and infant mortality reduction, but only for countries with good governance (as measured by a corruption index and a variable reflecting the ‘quality of the bureaucracy’) (Swaroop and Rajkumar 2002).

expensive treatments instead of the standard, recommended drug regimens, since the health worker both prescribes and dispenses drugs. To take one particularly important example, a number of studies in India have documented the inefficiency of private expenditures on tuberculosis treatments (Duggal 1989; Uplekar 1989; Van der Veen 1991; Bhat 1993).

Finally, it is important to note that the benefits of increased public spending on health are not restricted to health outcomes alone. Public health spending protects both poor and non-poor households from the financial impact of unanticipated health shocks and also serves to redistribute incomes to the poor who are most likely to be encumbered by out-of-pocket payments for health. A recent study finds that India has one of the highest incidence of catastrophic health payments among Asian countries (van Doorslaer, O'Donnell *et al.* 2006).¹² Nearly 25 percent of Indian households report spending 5 percent or more of their total annual expenditure on out-of-pocket health payments; for 10 percent of households, out-of-pocket health payments exceed 10 percent of total expenditure.

III. What Services Should The NRHM Purchase?

An important decision for the NRHM is on how to use the additional resources available to effectively improve health in the 18 EAG states. A number of well-tested, cost-effective interventions exist that can address the high burden of maternal, under-five mortality, and infectious disease-related morbidity and mortality (Laxminarayan, Mills *et al.* 2006).

However, it is important to focus on a smaller subset of interventions that can be financed by the government and scaled up effectively for several reasons. First, much of the impact of public spending on health can be attributed to a handful of high-impact interventions, such as childhood immunizations. A similar set of health conditions are responsible for a significant proportion of the burden of disease in both EAG and non-EAG states, although their individual rank in terms of burden may differ between these states (see Table 1 for leading causes of death in India). Second, formulating a simple package can be more effective than paying for a large range of health interventions without regard to joint costs or shared use of inputs (Bobadilla, Cowley *et al.* 1994). These minimum packages have other advantages – simplifying planning of new investments in building and manpower, defining

¹² Catastrophic health expenditure, used as an indicator of the vulnerability of households to large health shocks, is calculated as the proportion of households for whom out-of-pocket health payments exceed some threshold of total household consumption expenditure. The most commonly-used threshold is 10 percent, since beyond this level of out-of-pocket health payments, a household has to borrow, forfeit other basic needs, liquidate valuable assets, or become impoverished.

a minimum set of necessary inputs (such as vaccines, manpower etc), estimating financial needs, and establishing boundaries so that it is clear to citizens exactly what the government will and will not pay for. This last point is particularly important in a situation where bribes are often needed to elicit attention from government health providers when consumers (especially the poor) are not clear on what they are entitled to without payment. An additional benefit is in being able to clearly measure whether or not the minimum package is available in a given area and what the bottlenecks are to expanding access. Finally, only a small set of high-impact interventions can be delivered to scale in a weak health system; a large number of interventions will have the effect of disrupting already-fragile delivery systems, whereas success with a more manageable starting selection of interventions creates the institutional capacity – through ‘learning by doing’ – to expand later.

Minimum packages have been used effectively in Tanzania (Finlay, Law et al. 1995), Mexico and other countries. The cost of a basic package of health services that would address many of these interventions is between \$12 per capita in 1994 dollars (Bobadilla, Cowley et al. 1994) and a more recent estimate of \$30-40 per capita that also includes antiretroviral treatment for HIV/AIDS (Commission on Macroeconomics and Health 2001).

Selecting the minimum set of interventions that should be provided by NRHM may be influenced by political and social considerations, but should also be guided by epidemiological and economic rationale. Here we discuss criteria to guide the choice of interventions to include in a minimum package and propose a minimum set of interventions that should be provided free of charge in all rural areas through the NRHM. While there may be compelling reasons to diverge from this list (such as a desire to help scheduled tribe populations in remote areas, for instance), our purpose is to sensitize policy makers to the opportunity cost of choosing less cost-effective interventions.

NRHM should focus on interventions that generate maximum levels of health gain and financial protection. Target interventions should address disease conditions that are major sources of under-five mortality and burden from infectious diseases, especially among the poor. Currently, most government spending tends to benefit the relatively well-off (see Figure 13). This pattern is reflected in actual levels of service delivery as shown in Panel A of Figures 14 (for immunization) and 15 (for births in health facilities).

A benefit incidence analysis for India found that wealthier sections of the population had better access to high-quality care (Mahal, Singh et al. 2002). This is because the wealthy typically have both greater bargaining power as well as easier geographical access to medical facilities. Since health-care is a normal good, the rich typically consume more of it, which is another reason why the distribution of public subsidies for health is generally skewed towards them (Gumber 1997).

A more equitable distribution of subsidies would have to both (i) increase spending on primary health-care facilities that tend to be predominantly utilized by lower income groups, and (ii) ensure greater geographical access.¹³ This more equitable distribution of outcomes would result from a policy of explicit universalization of services important to the poor. Panel B in Figures 14 and 15 illustrate the favorable distributional consequences of not targeting the poor per se but rather of universally providing services important to the poor (and primarily used by the poor). India's ongoing and apparently-successful universalization of elementary education provides an example.

The basic set of interventions that have the potential to address the greatest burden of illness at lowest cost in EAGA and non-EAGA states is described in Tables 2 and 3. It includes institutionalization of births to prevent maternal mortality (largely caused by hemorrhaging); expansion of immunization coverage for new-borns; access to oral rehydration salts, rotavirus vaccination, and vitamin A supplementation; case management of acute respiratory infections for children under five; expanded coverage of DOTS strategy for detection and treatment of tuberculosis; condom use promotion and expanded access to voluntary counseling and testing to prevent transmission of HIV use of HPV vaccine and cervical cancer screening; and spraying and vector control for vector-borne diseases such as malaria, dengue, and chikungunya. Our preliminary estimate of the cost of this intervention package is \$5-6 per capita excluding the cost interventions to prevent and treat cardiovascular disease.

IV. How Should Services Be Provided In Low-Capacity Settings?

Thus far, we have addressed the issue of financing health and said little about the issue of provision of service. Most, if not all, of the interventions discussed here are within the scope of basic health service facilities but even these may be missing in the most remote parts of Bihar, Jharkhand or Chattisgarh. Poor service delivery at government facilities is the main reason why most patients seeking care turn to the private sector. While these are issues discussed at greater length in DCPPI-India, it is worth a brief treatment here.

Figure 16 shows that only 22 percent of all outpatient treatments in the rural areas were obtained from public providers in 2004, with hardly any change in this share since 1995-96 (19 percent). In Bihar and Uttar Pradesh, the public share in outpatient health contacts was merely 5-10

¹³ The related issue of providing incentives to health-care workers to work in remote areas is addressed in another paper in this series.

percent, with Bihar actually experiencing a decline in the share of outpatient treatments obtained from public providers. Interestingly, the dominance of the private sector in outpatient treatments does not appear to be correlated with state income per capita. Nor, as previously noted for the example of tuberculosis, is private care associated with quality (as opposed to convenience). In Orissa and Rajasthan, which also are relatively poor states, nearly one-half of all outpatient contacts were with the public sector. The share of public providers in inpatient care is much greater than in outpatient care. However, nationally, private hospitals and nursing homes still account for the majority (58 percent) of all hospitalizations.

Given the often poor performance of both the public and the private sectors, especially in EAG states, one faces two choices, not necessarily mutually exclusive. One is to improve public-sector performance and the other is to leverage the private sector that is already providing a significant share of outpatient services.

A. Improving Public-Sector Performance

It is beyond the scope of this paper to address the issue of how to improve the service-delivery performance of the public sector. In any case, much has been written on this topic already. What is important to bear in mind, however, is that (i) seldom will additional financial resources suffice by themselves in achieving the desired health outcomes, and (ii) the nature of the financial instruments employed in the health sector can affect the incentives for better performance within the public sector. In this paper, we merely point to several financial approaches for improving public-sector performance that have been discussed in the literature.

First is the question of what the public sector should finance. This paper advocates going beyond the public financing of activities that have significant positive externalities. It supports the idea of universal public financing for an initially-limited set of clinical interventions. DCPPI-India's main purpose has been to help inform decision-makers on the selection of interventions by (i) delineating what mixes of incremental services are feasible within alternative budget scenarios, and (ii) assessing how much health care can be purchased for different elements of the mix. Section 3 of this paper has already summarized DCPPI-India's relevant finding from the perspective of finance.

The second question relates to the cross-sectoral issues associated with public-sector management and service delivery (World Bank, 2005). Local accountability and voice are important themes. Another related theme concerns the importance of demand-side finance, particularly for reaching the poor. One can think of this approach as involving negative user fees, and there has been much successful experience with the use of 'conditional cash [or non-cash] transfers' to provide

incentives for the poor to invest more in education or health than they would otherwise be inclined to do. This can lead to fuller and more efficient use of inputs. Sarva Shiksha Abhiyan (SSA), for example, includes midday meals explicitly to generate incentives for school attendance. An important lesson from this line of writing is to identify ways to increase the range of choice and the range of control exercised by service users. Another general lesson concerns the importance of protecting budgets for supplies. Still another is the importance of investing and disseminating information on outcomes so that both providers and consumers of service have benchmarks to judge performance. Finally, the World Bank has argued [since at least the time of its World Development Report 1993 on health (World Bank 1993)] that introducing competition to and among public-sector providers can improve responsiveness and efficiency in delivering health services. This can be viewed as one approach to empowering consumers. Obviously, its applicability is limited in areas of low population density and/or few service providers.

Third, one of the most important ways for improving public-sector performance in health service delivery is to generate and distribute timely, locally-specific information on financial transfers, on the effective coverage of interventions, and on selected health outcomes. The Registrar-General of India is already developing capacity for this. Panchayati raj institutions and service providers should be encouraged to use this information to increase accountability for performance and to monitor progress in improving performance.

There are yet other lessons for improving health service delivery that have been discussed in the literature. Peabody et al. (2006) summarize these in the context of low- and middle-income countries:

- Generate and encourage the use of specific clinical algorithms based on evidence of best practice.
- Have service providers acquire skill and speed by doing a few things frequently rather than many things occasionally. Learning by doing is key to improving performance. This lesson is very relevant for India given the hard reality that, at least initially, the NRHM mission will have resources only for a limited set of high-priority items.
- Improve provider incentives by creating a legal and ethical environment where-care providers do not profit personally from the sale of drugs, diagnostic procedures, or provision or referral of care. Overuse and misuse of resources typically flourish in such unethical environments.

It goes without saying that the instruments for facilitating better quality of private health care require significant and sophisticated regulatory capacity on part of the government.

B. Leveraging the Private Sector

The large reliance on the private sector for health services, particularly by the poor, should be viewed in the context of the largely unregulated nature of the market for health services in India. Although there are numerous laws governing private practice, there is little enforcement of these laws. As a result, private health providers are not held to any minimum quality-of-care standards, and there is a great deal of unevenness in the quality of health services offered. As a rule, the less educated and informed the potential patient base, the more likely it is for private health providers of dubious quality and qualifications to enter and operate in the market. Of course, many public providers are equally negligent in offering any semblance of quality care. Indeed, the widespread reliance on the private sector for health care ultimately reflects the failure of the public sector in India to finance and provide adequate and quality health services.

The challenge of transforming the current private market for health care into a regulated market where there is better assurance of quality is significant, and there are no easy solutions. Experiences from other low and middle income countries in this regard are summarized elsewhere (see Laxminarayan et al 2006) but one arrangement – contracting out management of government health services to non-governmental organizations with specified targets for service quality – is worth mentioning here.

A study of contracting in Cambodia found that outcomes improved significantly in performance indicators such as availability of 24-hour service, reduced provider absence, and increased supervisory visits in districts where services were contracted relative to control districts (Bloom, King et al. 2006). The program involved greater levels of government expenditures but some of these increases were offset by a decrease in private spending for health. While this approach may be relatively demanding of institutional capacity, successes elsewhere and within India point to the potential for India to benefit from contracting-out some services.¹⁴ In general, the more explicit and well-defined the service package to be contracted out, the greater is the accountability among contractors.

¹⁴ For instance, the Karuna Health Trust (www.karunatrust.org) runs 25 PHC's in all the districts of the state of Karnataka and 9 primary health centres in Arunachal Pradesh under a public-private partnership arrangement.

V. The Mechanics of Financing Health

A. Center-State Issues in Public Spending on Health

Since health is a 'state subject' in India, most of the responsibility for health interventions and expenditure rests with state governments. At the same time, the central government is an important player in certain types of health programs, especially those of a preventive nature. To complicate matters further, the government has emphasized the devolution of health service delivery to elected local governments, called the *panchayati raj* institutions (PRI), although this has proceeded very unevenly across states.¹⁵ Thus, it is important to consider the nexus of health financing arrangements between different levels of government when analyzing public spending on health in India.

Overall, the central government accounts for about a quarter of all public spending on health in the country. The bulk of the remainder is spent by state governments, with negligible financing by local governments. However, there are large variations across states in the central-state split in expenditure. As observed in Figure 17 (which is based on data from six states for which reliable data are available), central government grants accounted for as little as 14 percent of total government health (revenue) expenditure in West Bengal but as much as 23 percent in Andhra Pradesh in 1999-2000. Further, there was virtually no change in the central share of government health expenditure between 1991-92 and 1999-2000.

Figure 17 demonstrates another important characteristic of the central-state divide in public spending on health in India: even though the central government's role in overall health spending is modest, it plays a dominant role in financing public health and family welfare (viz., family planning and reproductive health) activities. Much of this expenditure is on vertical centrally-sponsored communicable disease programs (such as the National Vector-Borne Disease Program, Leprosy Eradication Program, Tuberculosis Control Program, and AIDS/STD Control Program) and the Family Welfare Program. In Rajasthan, for example, the central grants accounted for 70 percent of total government health expenditure in 1999-2000. Even in West Bengal, the central share in public health

¹⁵ Karnataka and Kerala are two states where there has been considerable devolution of health service delivery and health expenditure to PRIs. Indeed, in Kerala, local health workers are not only employed by local governments, but also accountable to them. In other states, even though PRIs receive funds to pay district- and lower-level health worker salaries, they have very little control in the hiring, firing or transfer of these workers.

and family welfare expenditure was 55 percent. Even more worrisome is the fact that the state government's role in financing public health activities has declined over time.¹⁶

B. Outcome-Oriented Financing

Much of the state-level spending on health is on the provision of medical services, typically curative services in hospitals. The functional distribution of state government health expenditure in 1999-2000, shown in Figure 18, shows that between one-half and three-quarters of state government expenditure went toward medical services. With the sole exception of Karnataka, the share spent on public health activities ranged between 6 and 15 percent. Some of the poorest states, like Bihar, Rajasthan and Uttar Pradesh, devoted 10 percent or less of their expenditure to public health activities.

This is unfortunate since the DCPPI suggests that health outcomes, especially infant mortality outcomes, are much more responsive to public health and local clinical interventions than to the provision of curative services in hospitals. In addition, evidence from several countries, including India, indicates that public spending on immunizations and preventive care is much more pro-poor than that on hospital-based curative services. For instance, Mahal *et al.* find that the bottom two consumption quintiles received 47 percent of the public subsidy for immunizations in India but less than 20 percent of the public subsidy for hospitals (Mahal, Singh *et al.* 2002; Mahal, Yazbeck *et al.* 2002).

Thus, an important public policy challenge is to increasingly shift the responsibility of public health and family welfare funding from the central government to the state governments. One way in which this could be accomplished would be for central grants to be made as matching grants, so that the states spending more of their own resources on public health and family welfare activities could qualify for larger central grants.¹⁷ The SSA program for universalization of elementary education in India provides an example that we discuss further in the next section.

Another example is offered by the Local Government Performance Program (LGPP) implemented since 1999 in the Philippines. Under this program, the federal Department of Health

¹⁶ As noted in the note to Figure 17, these data should be treated as broadly indicative, since the 'public health and family welfare' category includes several expenditures (e.g., health education, drug control) that have little to do with public health, and excludes expenditures on water and sanitation by the Panchayati Raj institutions. In addition, in some states, health-worker salaries account for nearly 90 percent of government health expenditure.

¹⁷ Some of the disease control programs are partially funded on matching grant basis, but most of the others are fully funded by the central government.

encourages local governments to increase allocation and expenditures on preventive health programs through a “match” or counterpart funding. The matching grants are accompanied by technical assistance, and are designed to improve the capability of local governments to expand service delivery and to achieve significant increases in rates of immunized children, vitamin A supplementation, tetanus toxoid immunization for women as well as in the use of modern contraceptive methods (Palabrica-Costello *et al.* 2003).

While matching grants could create the right incentives for states to increase their absolute and relative spending on communicable disease control and preventive health activities, they could also place a large burden on the poor, high-mortality states that do not have the fiscal wherewithal to significantly increase their public spending on health.

Another way to motivate states to alter the functional composition of their spending on health might be through greater use of ‘outcome budgeting’ in the country. For the first time ever in India’s history, the Finance Minister, Mr. P. Chidambaram, presented an ‘outcome budget’ in India’s Parliament on Aug 25, 2005. As its name implies, the outcome budget introduces outcome- or performance-orientation in the budget process, seeking to convert financial outlays into physical outcomes, with measurable and monitorable targets. The idea – revolutionary by Government of India standards – is that ministries and state governments will be held accountable for their budget allocations and will have to deliver performance (i.e., attainment of targeted outcomes) to justify their budgetary allocations. If central health grants to the states are made contingent on improvement in measurable health outcome indicators, there would be a strong incentive for state governments to adjust the functional composition of their health spending so as to bring about rapid improvements in health outcomes. The Registrar-General of India already has substantial capacity for objective measurement of health outcomes, and this could be built on.

VI. Potential Lessons from Other Sectors and Other Countries

The institutional arrangements being established under the NRHM will influence the nature of health finance in India for decades to come. Do the experiences of other sectors in India, and of other countries, provide potential lessons for health finance in India? Certainly, the circumstances of these other experiences differ substantially from the issues facing health finance in India today. Yet, there may be some relevance from other experiences and we describe three: India’s National Program of Universal Elementary Education (*Sarva Shiksha Abhiyan* or SSA), launched in 2001; India’s Public Distribution System for Food (PDS); and China’s successfully implemented health finance reform of the early 1980s. Some of the most important lessons may be about what *not* to do.

A. Sarva Shiksha Abhiyan (SSA) – India’s Universalization of Elementary Education

In 2001, the GOI initiated a program to universalize elementary education – primary schooling by 2007 and upper primary by 2010. These goals exceed the MDG for primary education both in terms of timing and of amount of education for each child. For a more complete discussion of the *Sarva Shiksha Abhiyan (SSA)* see (World Bank 2004; Wu, Kaul *et al.* 2005).

SSA began in 2001 from a base of substantial previous experimentation and investment, beginning with the landmark 1986 National Policy on Education. Prior to this, public expenditures had (successfully) focused on creation of elite tertiary institutions. Budgetary allocations reflected the 1986 policy change: public expenditures on primary education grew by 0.4 percent of GDP between 1993 and 2001 (from 1.7 to 2.1 percent), whereas expenditures on other levels increased by only 0.1 percent of GDP (from 1.9 percent to 2.0 percent).

SSA will, in its initial phase, increase public spending on elementary education by an additional 0.2 percent per year. Extending universalization to upper primary will cost more. A substantial portion of incremental spending on SSA is budgeted through a so-called \$3.5 billion sector-wide approach (SWAP) operation involving external partners (IDA, DfID and the EU), state governments, and the Union government. The financing shares are as follows: union government 45 percent, state governments 25 percent, and external partners 30 percent. It is noteworthy that, in the push for universalization, the Union government’s financial share, relative to the states, far exceeds its overall share in education finance.

Originally planned as a three-year effort beginning in 2004, this SWAP disbursed most of its commitment in two years. Rapid disbursement resulted in part through the financial intermediation of ‘State Implementation Societies’ as fund holders. These Societies were staffed in part by seconded and retired IRS officers and served as a mechanism for strengthening implementation and disbursement capacity at the local level. While evaluation results are not yet available, it appears likely that substantial enrollment increases occurred in hitherto excluded subgroups of the population – girls, scheduled castes and scheduled tribes.

Several lessons for health finance in general and the NRHM in particular seem plausible:

- Public sector expenditures on elementary education increased, through deliberate policy, by about 0.6 percent of GDP in about 12 years. While 0.6 percent is less ambitious than what is planned for health, the education experience does suggest the probable feasibility.

- The effect of a policy of universalization is to differentially benefit disadvantaged groups. Implementation probably will require a much more substantial GOI financial role relative to the States than is true for other health-sector operations.
- External finance can be arranged on terms that are much more under GOI control than had typically been the case.

B. PDS – India’s Public Distribution System for Food

Until June, 1997, the Indian government had a public distribution system (PDS) for selected foods that provided universal coverage for its intended benefits. At that time, the government changed the program to (partially) target the poor, and in 2000 the subsidy element for the non-poor was completely removed. Kochar (2005) provides a clear overview of the evolution of the program and an evaluation of the consequences of moving away from universal provision of benefits. The theoretical rationale for targeting is straightforward: in view of tight fiscal constraints, targeting benefits allows some combination of lower fiscal burden and higher unit benefits to those most in need. However, Kochar’s evaluation found the political economy to differ from the theory: village elites lost interest in making the PDS work and leakages undermined attempts to target the poor. These findings accord clearly with those of Lindert (2004) for programs in high-income countries.

It is debatable whether public subsidies of basic foodstuffs serve a useful function. What the PDS experience suggests is that if the government decides in favor of such subsidies, there are strong practical arguments for universalizing the benefits. Although the specific circumstances of the NRHM differ from those of the PDS, and targeting to the rural areas of EAG states is likely to prove feasible, the PDS experiences provides an additional argument for universalization of benefits within states.

C. China’s Health Finance Reform of the Early 1980s

By the late 1970s, China had succeeded in providing some degree of health insurance to an estimated 71 percent of its population and was spending about 3 percent of GDP on health overall (World Bank, 1997). About 0.6 percent of the 3 percent was out-of-pocket payment and the remaining 2.4 percent was a mix of government and government-mandated finance. Included in the government-mandated portion, but only a small part of it, was the ‘rural cooperative medical system’ (RCMS) which provided real but minimal health insurance to almost 50 percent of China’s population. Almost all the finance for the RCMS was locally generated and the level of coverage correspondingly varied with the great variation in local income levels. Health indicators in China in 1980 greatly exceeded those of countries at similar levels of income.

Beginning in 1978, China introduced major changes in economic policy to decrease the role of central planning and increase the role of market forces. In rural areas, the accompanying transition from agricultural collectives to household control greatly increased rural incomes but weakened the financial base for the RCMS by, essentially, making participation no longer mandatory. Peasants were encouraged to take responsibility for financing their own health care. Facilities and providers, in both rural and urban areas, were encouraged to rely on user fees to support their operations. These reforms were successfully implemented – in the sense that out-of-pocket payment for services rose dramatically and the RCMS declined in importance. By 1993 RCMS coverage had dropped from 48 percent of the population to 7 percent, and by 2003 out-of-pocket payments had risen to 56 percent of total expenditures. Total expenditures as a percent of GDP had themselves almost doubled (to 5.6 percent) in a period in which GDP had itself approximately quadrupled. While health indicators in China improved slightly over this period, they improved at a less rapid pace than in most other countries. (For example while India’s life expectancy increased by 5 years between 1990 and 2002, China’s increased by only 2 – World Bank, 2004.)

Although China’s reform was successfully implemented, its consequences were unfortunate – rapid cost growth, dramatic declines in insurance coverage, and a slowed rate of improvement in health outcomes. A likely key policy direction of China’s current movement toward a ‘harmonious society’ will be to attempt to reverse important elements of previous reforms. Are there potential lessons for India in this experience? We draw the following two conclusions from China’s experience:

- reliance on private finance risks excluding large proportions of the population and leads to potential for rapid cost growth.
- Fee-for-service mechanisms for provided payment have led to well-documented abuses in China and have also contributed to cost growth.

China’s experience lends support to the current direction of health finance policy in India – that of increased government responsibility.

VII. Conclusions and Main Messages

A number of important findings have appeared throughout this paper and, in this concluding section, we draw them together.

1. Focus on a few select interventions.

The NRHM should focus on a small set of highly cost-effective interventions. This facilitates scaling up and it facilitates learning by doing and hence quality and effectiveness of care. Focusing on priority

interventions permits universal financial access to those services in targeted states or districts, with important political economy benefits. The DCP-India provides a rigorous assessment of what interventions might best be included in an ‘Initial Health Entitlement Program,’ and the analysis in this paper suggests the cost to be on the order of US\$7 per capita per year or, for an all-India program, about 1 percent of GDP. While substantial, this is less than envisioned for the NRHM.

2. The dominant source of finance for rural health in the EAG states in the immediate future will be public.

Although worthy of further assessment and experimentation, community finance appears unlikely to play a significant role, especially in the EAG states (see Text Box 4). User fees have generally been incapable of raising more than a modest share (10-15 percent) of total finance and would require administratively unworkable targeting of exemptions for poor households. [Indeed the World Bank’s World Development Report on delivering services to the poor (World Bank, 2005) makes (at some points) strong arguments for cash transfers to service users – i.e., conditional cash transfers or negative user fees – in regions with large populations in poverty in order to draw the poor into utilizing services.] A partial exception might be modest fees for drugs to facilitate supply. External aid (IDA, EU, DfID, Norway, foundations) could play a supportive role and, if the NRHM were carefully presented, could have the effect of increasing the overall availability of concessional external finance to India. Although potentially worth pursuing, the fraction of required finance that could be generated externally would be modest. So, by exclusion, public finance will play the central role. Financing a 1 percent, and ultimately 2 percent, of GDP increase in public finance of health will require careful attention to generating the requisite fiscal space (Hemming and Ter-Minassian 2004; Heller 2005).

3. Focus more sharply on states and districts of greatest need.

Although the NRHM proposes to focus on 18 states, this may be too many and some states may not belong in this list. For instance, Himachal Pradesh has one of the highest state GDP per capita in the country (Rs. 24,209 in 2001-02, as compared to Rs. 5,592 in Bihar), has relatively good health indicators in comparison to most states, and has the highest public expenditure on health as a share of its GSDP (2 percent). As such, there is little reason to include Himachal Pradesh in the initial phase of the NRHM. This initial phase could be targeted to the four states (UP, MP, Bihar and Rajasthan) that together account for more than one-half of all the infant deaths in the country. Likewise, it is not necessary to target NRHM interventions to all the districts in these states. If the results from the National Family Health Survey can be extrapolated nationally, an intervention program that initially focuses on just 100 of the districts having the largest absolute number of infant deaths in the country

(out of a total of 602 districts) would be more effective than one that is spread thinly over all the 602 districts.

4. Introduce incentive-based structures to motivate state governments to achieve desired financial and health outcomes.

Given the dominant role of the states in financing health in India, it is critical for the states, particularly the EAG states, to increase their health spending concomitantly with the NRHM. This will require creative incentives, not only in the form of matching grants but also in the form of performance- and outcome-based grants from the central government. This is particularly relevant in the context of the government's stated shift toward 'outcome budgeting.' The education sector's SSA provides valuable precedent for increasing state budgetary commitments. The incentive came from increased GOI (and external) financial commitments and, hence, a substantial increase in GOI's share in finance of elementary education. A similar increase will probably be necessary in health.

5. Utilize centrally-sponsored schemes where they are now working.

Although the funding for many of NRHM's interventions, particularly clinical interventions, will come from states (or flow through states from federal matching grants), there already exist a number of national programs for delivering key interventions (such as immunizations, TB treatment, and AIDS prevention). The existing organizational and financial structures should, in these cases, be provided with expanded funding and be the key vehicles for NRHM implementation.

6. Improve information availability and local oversight.

One of the most important ways for improving public-sector performance in service delivery will be to generate and distribute timely, locally-specific information on financial transfers, on the effective coverage of interventions, and on selected health outcomes. The Registrar-General of India is already developing capacity for this. Panchayat raj institutions and service providers should be encouraged to use this information to increase accountability for performance and to monitor progress in improving it.

7. A significant challenge in EAG states is how the government spends its money.

While the evidence presented in this paper presents a strong case for ramping up public-sector spending on health in India, it is critically important that serious attention be paid to improving the quality of this additional spending. The NRHM should focus on the reason for the low level of utilization of primary health facilities in the EAG states – viz., the lack of availability of medicines and other inputs as well as poor incentives for health-care personnel to report for work and to be held accountable for their performance. While some of these problems can respond to increased levels of

finance, some need to be addressed by specific capacity-building efforts, including, initially, through greater GOI involvement in implementation in weaker states. In this context, it is important to bear in mind that public finance of services need not entail public delivery and that the private and NGO sector may have an important role in the delivery of some NRHM-financed services.

Likewise, it is important that the ASHA program be designed differently from the various health functionary programs tried out at the village level over the last three or four decades (e.g., Auxiliary Nurse Midwives, Lady Health Visitors, Village Health Guides, anganwadi worker, etc.). Many of these schemes have failed to make much of a dent in rural health outcomes, in some part because they did not have the right incentives in place to make the village health workers accountable to the community. Currently, the plan is for ASHAs to be accountable to the village panchayats and for their compensation to be linked to their performance. How these employment contract details are operationalized will have an important bearing on the eventual success of the ASHA program.

To conclude, the vision presented in this paper is one of focusing resources tightly on interventions of importance to the health and financial protection of the poor. Within states or districts, there would be public finance for all for these services. There is a pragmatic reason for this: selecting the poor for fee exemptions is difficult or very costly, and political support follows from broad access.

Text Box 1: The National Rural Health Mission

The goals of the NRHM are as follows:

- Reduction in IMR to 30 per 1,000 live births by 2012
- Reduction of maternal mortality rate to 100/100,000 by 2012. Universal access to public health services, including women's health, child health, water, sanitation and hygiene, immunization, and nutrition.
- Reduction in mortality due to malaria, dengue and Kalazar; Filaria elimination 2015.
- 46 lakh cataract operations by 2012.
- Access to integrated comprehensive primary health care.
- Population stabilization, gender and demographic balance.

- Revitalize local health traditions and mainstream AYUSH.
- Promotion of healthy life styles.
- 85 percent cure rate under TB DOTs.
- TFR reduced to 2.1 by 2012.
- Upgrading CHCs to IPHS; Increased utilization of FRUs from 20 percent to 75 percent;
- Engaging 250,000 ASHAs in 10 states.

Text Box 2: Will Economic Growth Lead to Mortality Decline in India?

An important policy question is the extent to which health indicators are likely to improve with income growth. Based on cross-country evidence, Pritchett and Summers (1996) argued that infant and child mortality are strongly responsive to income, with infant and child mortality declining by 2-4 percent for every 10 percent increase in income per capita. Much earlier, Preston (1975) had plotted the cross-country relationship between average life expectancy at birth and GDP per capita for three different time periods: 1900s, 1930s, and 1960s. He, too, had found a strong relationship between life expectancy and national income per capita but one that was changing over time.

If health outcomes in India are similarly responsive to income changes, health conditions in India could be expected to improve independently of large public investments in health, given the rapid growth (7-9 percent annually) of the Indian economy. The ‘Preston’ curves for India – i.e., the association between infant mortality and per capita income – are shown in Figure 20 with cross-state data for three time periods: 1981, 1991, and 2003. Like Preston, we find that the relationship between infant mortality and state GDP per capita has shifted down over time, reflecting the importance of mortality reductions unrelated to income (e.g., advances in medical technology, expansion of female adult literacy, and large public health campaigns). A state with a per capita GDP of Rs. 6,000 (in constant 1993-94 Rupees) would have seen its infant mortality decline from a level of 100 deaths per 1,000 live births in 1981 to 70 deaths *without any increase in its per capita income*.

But unlike Preston, we find that the infant mortality-per capita state GDP curve has become flatter over time, suggesting that infant mortality is considerably less responsive to income in 2003 than it was in 1981. Our conclusion is broadly consistent with that of Measham, *et al.* (1999). This means that economic growth alone is less likely to bring about large declines in infant mortality in the future, which in turn points to a continuing – even greater – need for public child survival interventions.

Text Box 3: Effects of Out-of-Pocket Health Care Payments

Health care, especially for catastrophic illnesses, is very expensive. Uninsured households cope with the large unexpected expenses associated with catastrophic illnesses by cutting back on other consumption, drawing down assets, and or by borrowing. Indeed, many qualitative studies in developing countries have identified health shocks as a leading cause of impoverishment of households.

The vulnerability of households to poverty due to a health shock is naturally greater when households are uninsured and finance most health-care expenditures themselves. Reliance on out-of-pocket payments for funding health care generally declines with per capita GDP, although there are large differences across countries at roughly comparable levels of income. The concept of catastrophic health expenditure has been proposed as a means of estimating the vulnerability of households to large health shocks. The measure is calculated as the percent of households for whom out-of-pocket health payments exceed some threshold of household total expenditure (Berki 1986; Pradhan and Prescott 2002; Wagstaff and van Doorslaer 2003).¹⁸ Figure 21 shows India as having one of the highest incidence of catastrophic health payments among Asian countries (van Doorslaer, O'Donnell et al. 2006). Nearly 25 percent of all households report spending 5 percent or more of their total annual expenditure on out-of-pocket health payments; for 10 percent of households, out-of-pocket health payments exceed 10 percent of total expenditure.

Another way to gauge the effect of large out-of-pocket health payments on household well-being is to examine the increase in the incidence of poverty when such payments are excluded from the calculation of household consumption expenditure. The standard measure of consumption poverty assumes that all household health expenditure is discretionary. This means that a household facing a large and unanticipated out-of-pocket payment for health care is considered non-poor simply because that payment pushes its total consumption expenditure above the poverty line. Using household survey data from 11 countries, Van Doorslaer et al. (2006) have calculated the increase in the poverty headcount as a result of excluding out-of-pocket payments for health care (van Doorslaer, O'Donnell et al. 2006). Their results, shown in Figure 22, indicate that India and Bangladesh experience some of the

¹⁸ The most commonly-used threshold is 10 percent; it is assumed in the literature that beyond this threshold of out-of-pocket payments, a household has to borrow, forfeit other basic needs, liquidate valuable assets, or become impoverished (Russell 2004).

largest increases in absolute poverty (using the \$1 a day international poverty line) when out-of-pocket health-care payments are excluded from total consumption expenditure. India's poverty head-count rises from 31 percent to 35 percent, pushing an additional 4 percent of the population into poverty when health expenditure is excluded from total expenditure.¹⁹ Not surprisingly, Figure 21 also suggests a positive association between the increase in poverty due to out-of-pocket payments and the out-of-pocket share in total health expenditure in a country.

¹⁹ Of course, all of the estimates shown in Figure 21 are likely to be overestimates, since not all household health expenditure is non-discretionary.

Text Box 4: Risk-Pooling and Community-Financing Mechanisms

There has been a great deal of interest in recent years, both in India and in other developing countries, in community risk-pooling and social insurance schemes. Community-based health insurance schemes have emerged in a number of settings as a way of spreading catastrophic health risks by transferring funds from high- to low-income groups and from low- to high-risk individuals within a community. Such schemes work best when the individuals to be covered are members of a closely-defined community (e.g., members of a cooperative or union). A number of health professionals and policy makers have advocated community-based health insurance schemes as a solution to the health-care financing problems of low-income countries.

There are a large number of community-based health insurance schemes that operate in India. Most of these schemes are organized by NGOs and community organizations, and are relatively small in terms of their coverage. Some of the better-known ones include SEWA, Karuna Trust (Karnataka), Mayapur (West Bengal), and KKVS (Theni district, Tamil Nadu) (Dave 1997; Ransom 2002; ILO 2005). One of the most successful and publicized community-based health insurance schemes is the one established since 1992 by the Self-Employed Women's Association (SEWA) in Gujarat. SEWA offers an integrated social security scheme to its members and their husbands and children (the cover for husbands and children was added in 2002), providing coverage for life, asset loss, widowhood, personal accident, sickness, and maternity benefits. As of 2006, approximately 150,000 individuals are covered by the scheme, virtually all of them in Gujarat.

The success of community risk-pooling health insurance schemes depends critically on defining the benefits that insured individuals will receive. These benefits obviously are closely tied to the availability of viable health providers in the community. If defined health benefits are too small (as is often the case) or health providers offering quality health services simply do not exist in a community, there will be little demand for health insurance and prepayment schemes in the population, as individuals will not see any value in paying premiums for services of dubious quality.

Successful schemes also try to enroll as many members as they can, so that there is greater risk pooling. Often, community-based health insurance schemes limit coverage to the poor, since their purpose is to protect the poor from catastrophic health shocks. However, the low degree of risk pooling inherent in limited membership amplifies the risk of adverse selection into the scheme and reduces the financial viability of the scheme. To be financially viable, the schemes need to enroll the poor as well as the non-poor, the healthy as well as the not-so-healthy.

While many of the individual micro-insurance schemes in India have been successful, their success can often be traced to the leadership of a community leader or the strong organizational and management capacity of an NGO. Thus, it is not at all clear whether these schemes are replicable and can be scaled-up. A careful study of several community-based health insurance schemes in Asia and Africa concludes that “...even if individual schemes achieve their own objectives (in terms of equity, efficiency etc.), this does not necessarily imply that such objectives will be achieved at the system level” (Bennett 2004). Bennett argues that to date there is very limited understanding of how community-based health insurance schemes interact with other elements of a health-care financing system. Until more evidence is available on this topic, it is premature to view these schemes as a cure-all for the health financing problems of developing countries.

In 2003, the Government of India announced a Universal Insurance Scheme (UIS) targeted at the poor. The UIS provides hospitalization benefits, but excludes conditions related to pregnancy and delivery. It charges a premium of Rs. 365 per year (“a rupee a day”) per individual, with discounts offered for groups and large families. Despite the fact that fairly attractive premium subsidies are offered to low-income individuals (e.g., subsidy of up to Rs. 200 for persons below the poverty line), the scheme has suffered from very low enrollment. The inability to generate sufficient demand for this scheme probably reflects the general paucity of health facilities offering reasonable-quality services in rural India and the consequent lack of confidence of consumers that they will receive good value for their premiums.

The experience of Thailand is useful in this regard. Thailand is one of the few low- or middle-income countries in the world that has a successful universal health coverage scheme that it introduced in 2001 (known as the “30 Baht Scheme” since the co-payment for any visit or hospital admission is Baht 30). While there are many reasons for the success of the Thai scheme, the scheme would not have been possible if successive governments in Thailand had not established comprehensive health infrastructure in the rural areas of the country, where two-thirds of the Thai population live. Over the last 40 years, the country has built an impressive network of functioning primary care health centers in all the sub-districts of the country and community hospitals in more than 90 percent of districts. In addition, an effective administrative system allowed the enrollment of 45 million people in the universal coverage scheme within months (Towse, Mills et al. 2004). Given India’s lack of a comprehensive network of rural health facilities that can actually deliver quality services, the odds of a universal health coverage scheme being successful at this stage of the country’s development are very low.

Appendix: Health Outcomes And Public Spending

Figure 23, which is based on 19 years of data for 13 major states in the country, shows the association between infant mortality rates and real public expenditure on health per capita. A strong inverse relationship is observed between the two variables, with the slope of the curve becoming less steep at higher levels of public spending on health.

To explore this association further, we have estimated a more formal model of infant mortality – a regression of infant mortality on real public expenditure on health per capita with control for gross state domestic product per capita (GSDP), time trends, and unobserved state-specific (but time-invariant) effects. The regression results are shown in Appendix Table 1.^{20,21}

To summarize the regression results, we find a strong association between infant mortality and government health expenditure per capita even after controlling for the other variables. Interestingly, the estimated effect on infant mortality of public spending on health is much stronger in the low-income than in the high-income states. Figure 24 plots the estimated effect of per capita public expenditure on infant mortality reduction at differing levels of GSDP per capita. The results indicate that beyond a level of Rs. 11,000 (in constant 1993-94 Rupees) in GSDP per capita, additional public expenditure on health has a negligible effect on infant mortality.

The empirical results are intuitive.²² The larger decline in infant mortality associated with an additional Rupee of public expenditure on health in the poor states reflects the fact that these states,

²⁰ Data on government health expenditure were obtained from detailed budget demand documents of individual states. Expenditure on health includes spending on public health; urban and rural health services; medical education, training and research; general administration; and family welfare (i.e., population programs, including maternal and child health). It includes expenditure incurred by a state out of its own revenues as well as central government health allocations to that state.

²¹ A state-level regression of infant mortality on public health spending is predicated on the assumption that public spending is not endogenously distributed across states (Rosenzweig and Wolpin 1986). Such an assumption may not always hold, especially if government health expenditures are allocated across states based on health conditions. However, the inclusion of state fixed effects in the regression effectively controls for endogenous program placement. We allow for a central planner to distribute public spending on health across states according to an unobserved health attribute; in other words, states that have innately high mortality may spend more on health than those having innately low mortality. Since the fixed-effects model purges the unobserved (time-invariant) health attribute from the model, it effectively addresses the endogenous program placement problem.

²² There is some evidence in the existing literature to indicate that public spending on health matters more to health outcomes of the poor than of the non-poor. For instance, Bidani and Ravallion (1997) find an impact of public spending on health outcomes of the poor but not those of the non-poor. Likewise, Gupta *et al.* (1999) find a stronger inverse association between child deaths and public spending among the poor than among the non-poor.

which also happen to have high rates of infant mortality, have very low coverage – and hence substantial room for expansion – of basic low-cost child survival interventions, such as child immunization and oral rehydration therapy. In the better-off, low-mortality states, these basic interventions are already widespread, and infant mortality can only be further reduced through more expensive interventions, such as deliveries in medical institutions and post-delivery and emergency hospital-based care. Hence, a Rupee of public spending on health will typically have a greater effect on reducing infant mortality in the (poorer) high-mortality states than in the (richer) low-mortality states.

The smaller health impact of public expenditure on health in the better-off states may also reflect the increasing role of the private sector in providing health inputs at higher income levels. In the poor states, not only is the private sector in health more limited in scope, but complementary household inputs into health production, such as nutrition and good hygiene, are also typically lacking. As a result, the public sector and public spending on health assume far more important roles in determining health outcomes than in the non-poor states. However, as per capita incomes in a state increase, nutrition and hygiene improve, as does the supply of better-quality private health providers, all of which diminish the relative importance of government health expenditure.

These results should be treated as exploratory and subject to the following caveats. The correlation between IMR and public expenditure could be spurious if a third variable that was correlated with public expenditures in poorer states also had an effect on IMR. Identifying the effect of public expenditures on health would require much more detailed data on other factors influencing IMR. Further, there are potentially problems with the quality of the SRS IMR time series data and there is discrepancy between these data and other datasets such as the National Family Health Survey (NFHS).

If validated in other studies, the implication of these results for health policy would be two-fold: first, in order to maximize the effectiveness of health spending, it will be necessary to target additional public spending on health to the poor, high-mortality states of the country. Second, there is need for a state-stratified approach to health interventions. In states, such as Orissa, Bihar and Uttar Pradesh, additional spending needs to be directed toward basic child survival interventions, such as safe motherhood and child immunization. States such as Tamil Nadu and Kerala, which have already experienced significant reduction in infant mortality, will need to experiment with more creative policies that go beyond the basic child survival interventions.

The importance of basic child survival interventions in the poor states can be highlighted by examining immunization coverage across states. Figure 25, which reports the measles vaccination rate among 12-23 month olds in 1992-93 and 1998-99 (from the first and second rounds of the National

Family Health Survey), indicates that in states, such as Bihar, Madhya Pradesh, Uttar Pradesh and Rajasthan, fewer than a third of children aged 12-23 months were immunized against measles. Further, many of these states experienced a decline in measles immunization coverage between 1992-93 and 1998-99. In Bihar, a mere 17 percent of children were immunized against measles in 1998-99. Thus, there is plenty of room for increasing immunization coverage in the poor states. On the other hand, in states such as Tamil Nadu, Himachal Pradesh, and Kerala, measles immunization coverage is above 80 percent.

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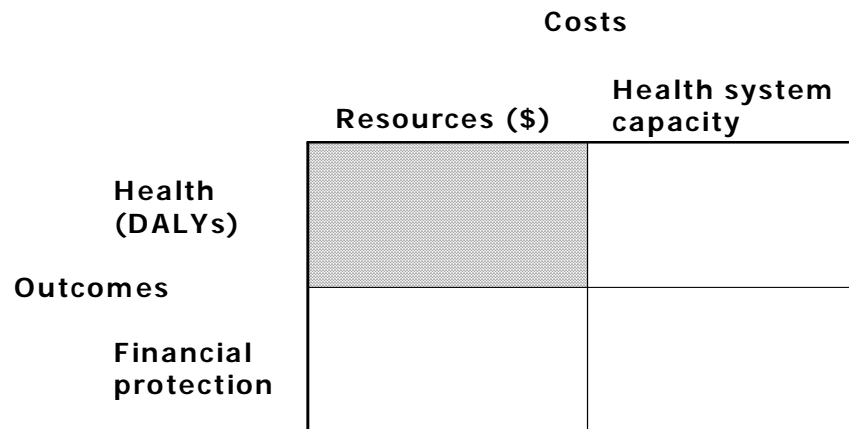
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Figures and Tables

Figure 1: Intervention Costs and Effects – A More General View



Note: The shaded box represents the domain of traditional cost-effectiveness analysis.

Figure 2: Infant mortality rate by state, 1981 and 2004

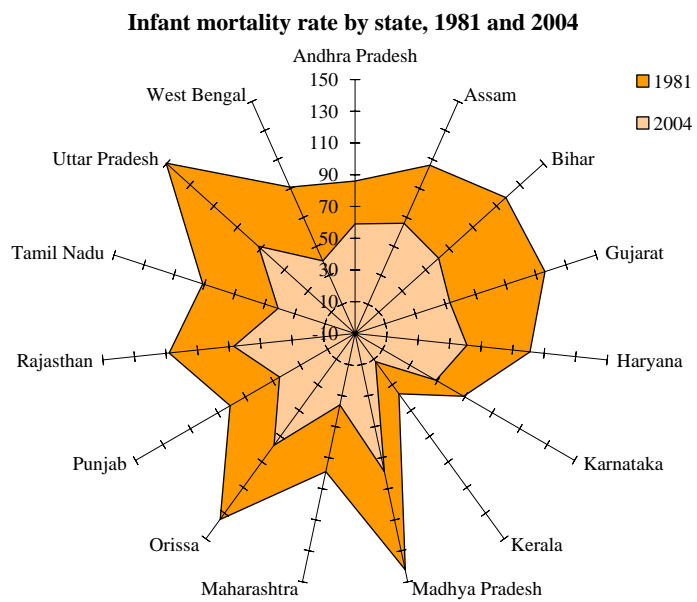


Figure 3: Contribution of the 21 larger states to national infant deaths, 2000

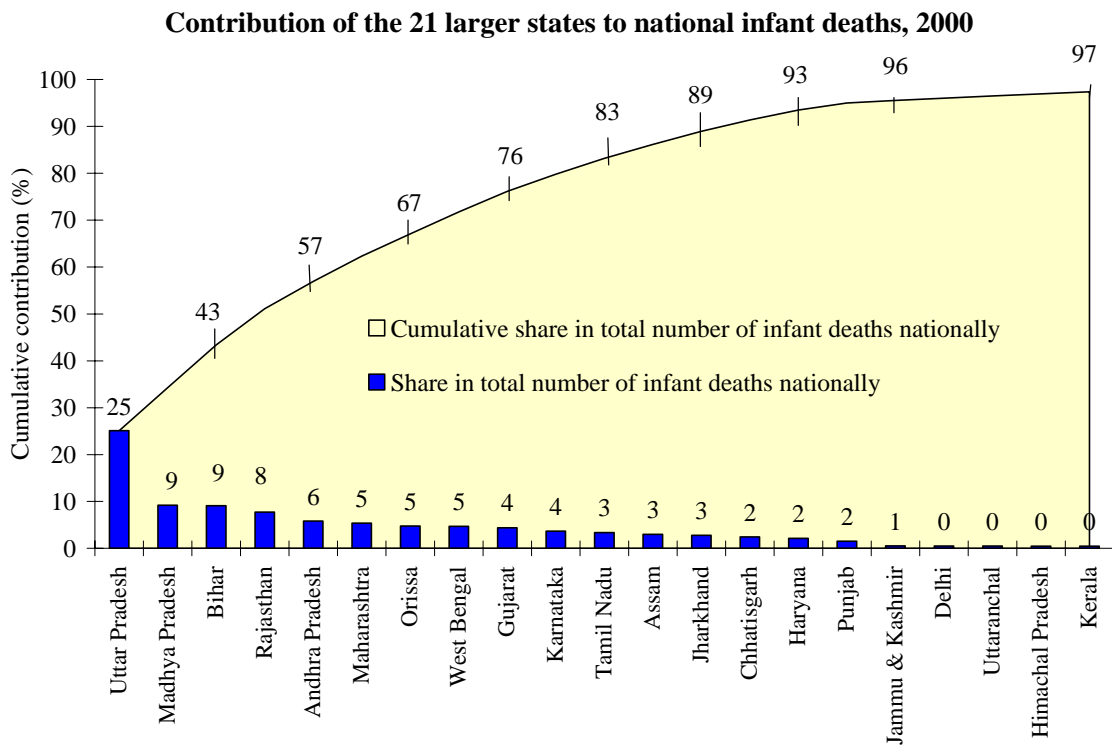


Figure 4: Cumulative distribution of infant deaths in India across districts, 1994-98

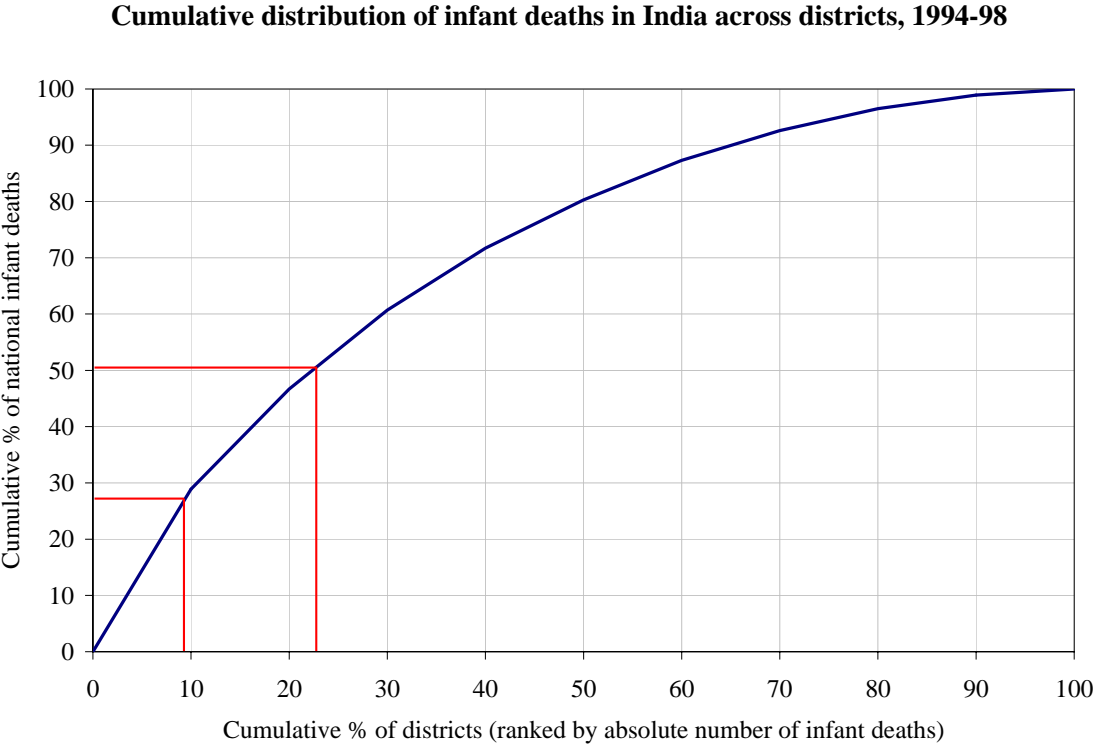


Figure 5: Public expenditure on health per capita in relation to per capita income, all low and medium human development countries, 2003

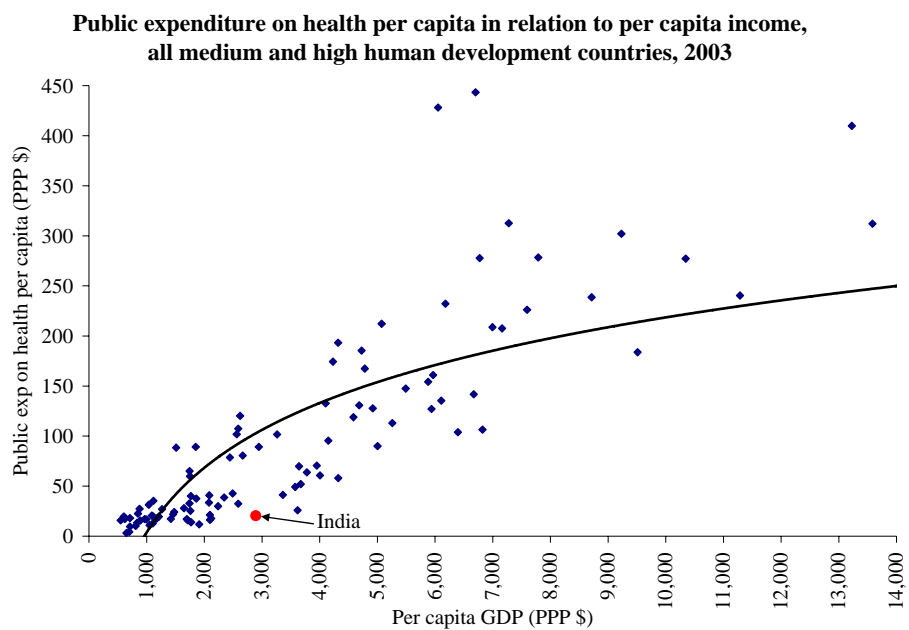
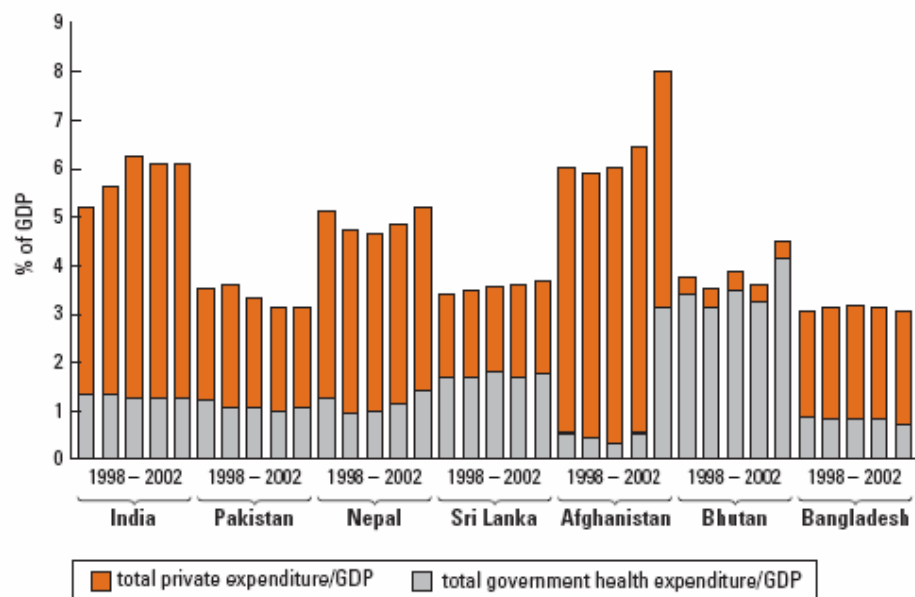


Figure 6: Public and private health spending in South Asia, 1990s



Source: WHO 2001.

Figure 7: Percent public share in total health expenditure in relation to per capita income, all low and medium human development countries, 2003

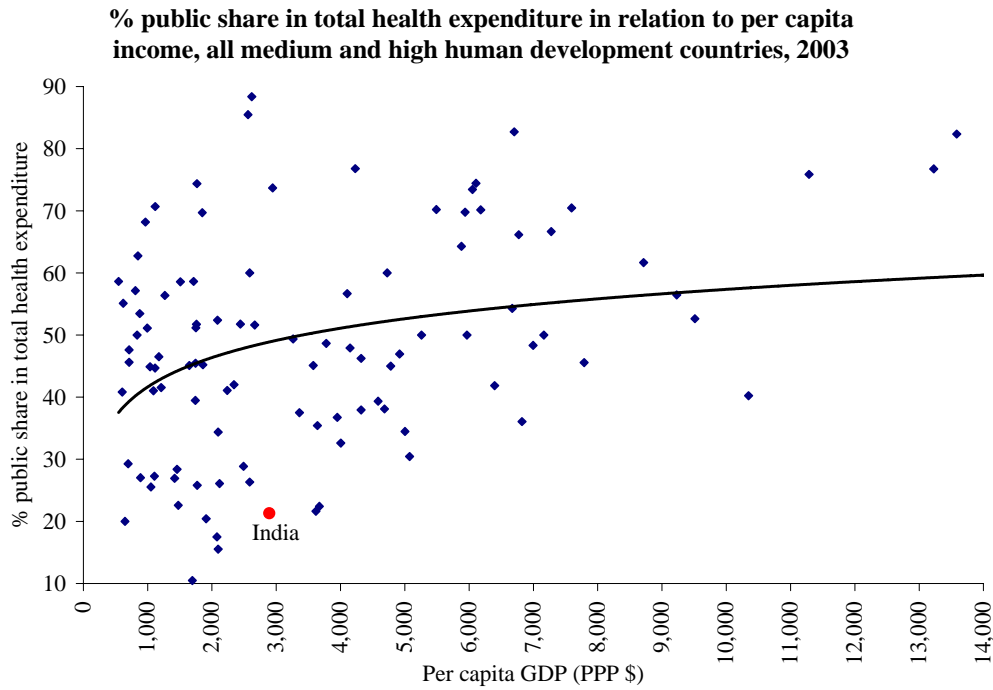


Figure 8: Percent private share in total health expenditure, all low and medium development countries, 2003

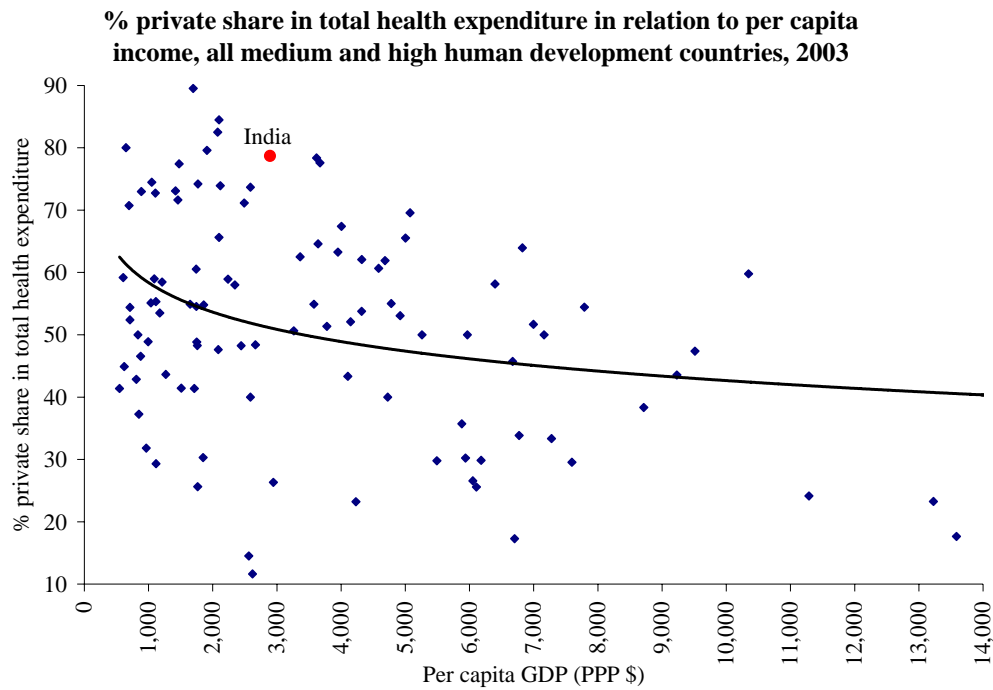


Figure 9: Infant mortality rate in relation to public expenditure on health per capita, all low and medium development countries, 2003

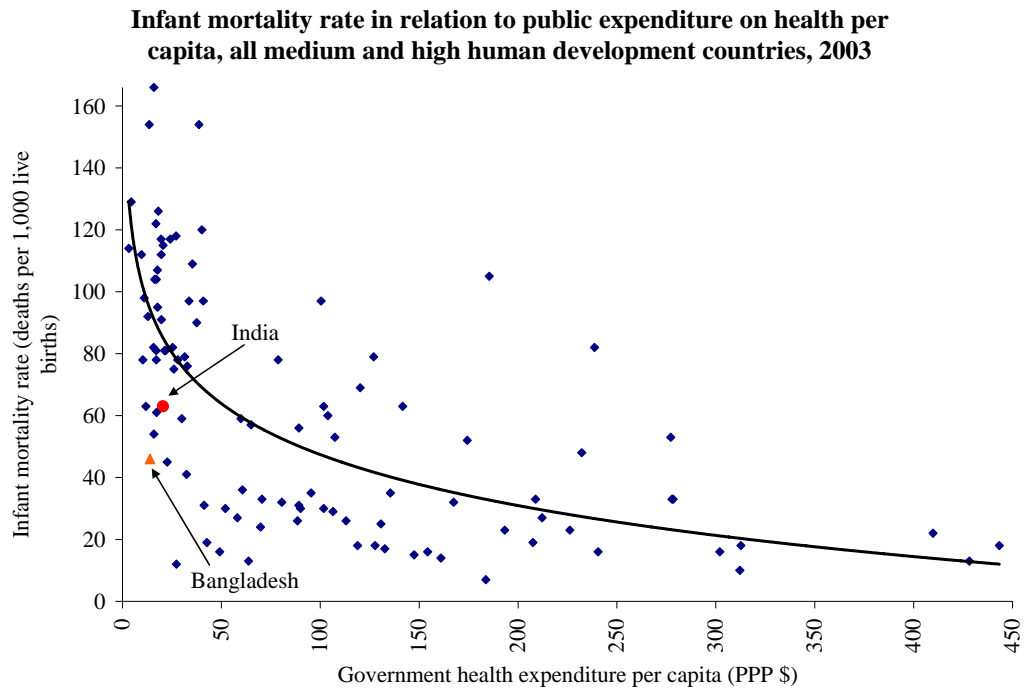


Figure 10: Total (public plus private) expenditure on health per capita and private share (%) of health spending, by state, 2001-02

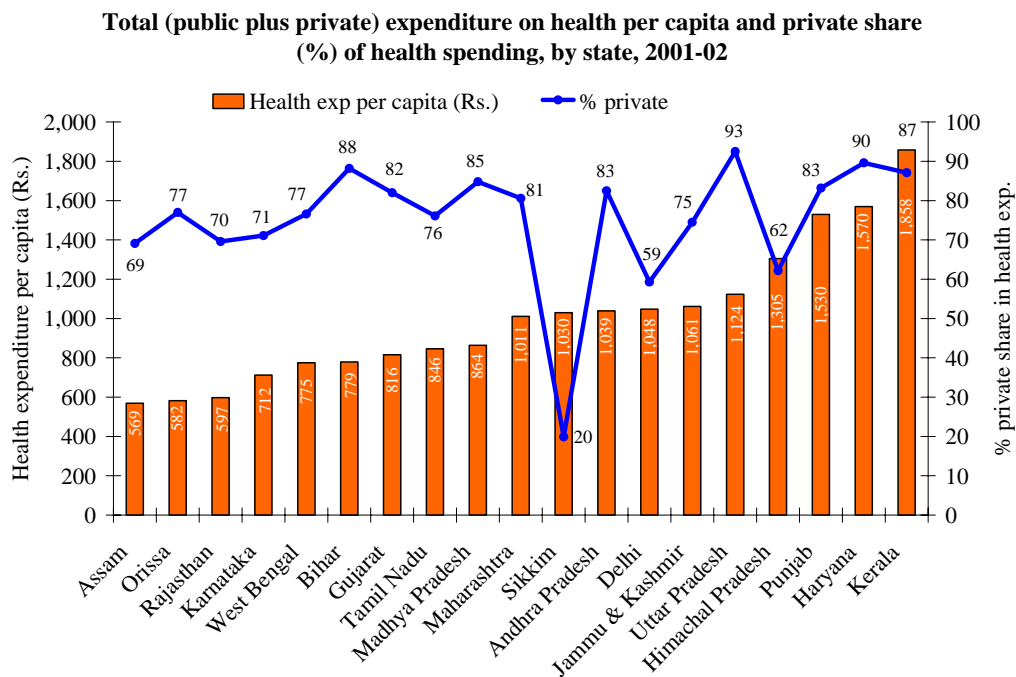


Figure 11: Public spending on health as % of state gross domestic product, 2001-02

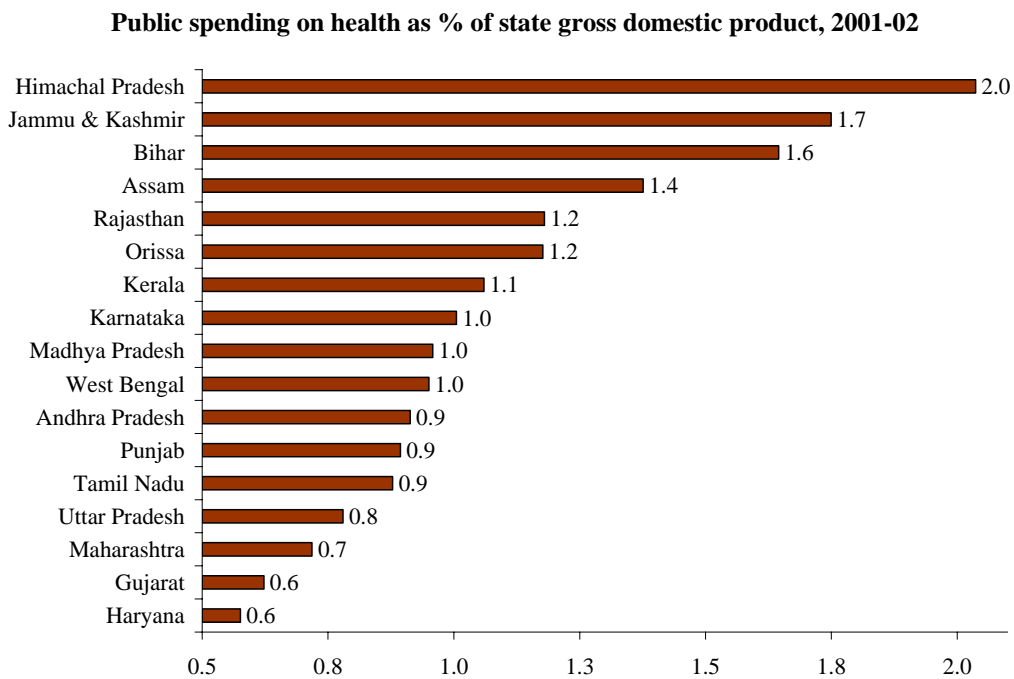


Figure 12: Relationship between public and private health expenditure per capita, across states, 2001-02

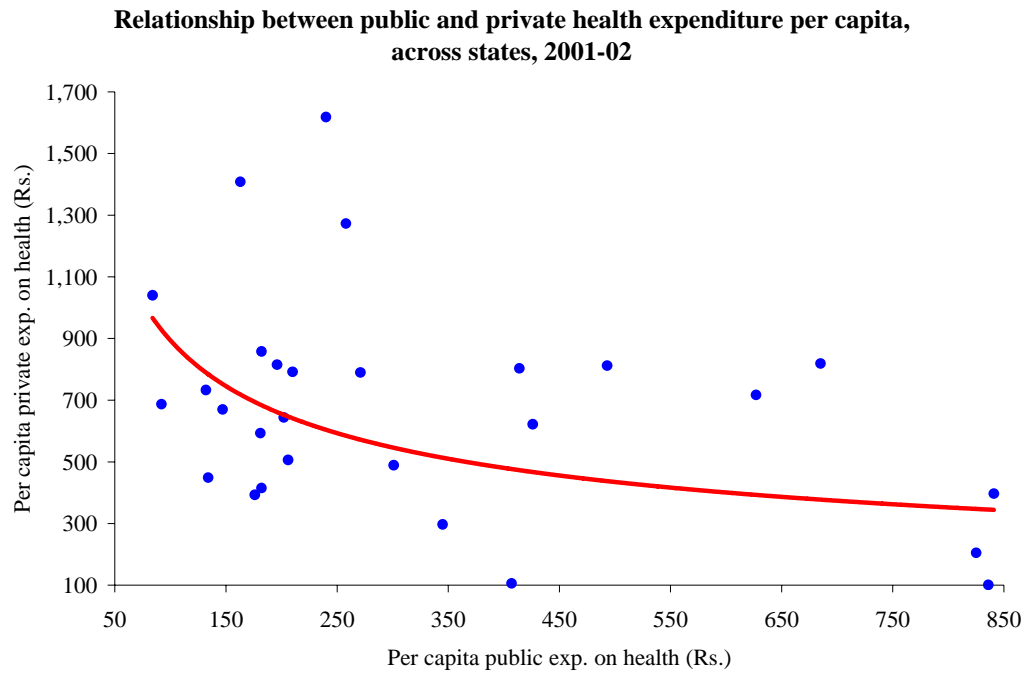


Figure 13: Benefit incidence of public spending on hospitals and primary care facilities, India, 1998-99

BIG DISPARITIES EXIST IN PUBLIC SPENDING ON BEHALF OF THE RICH AND POOR.

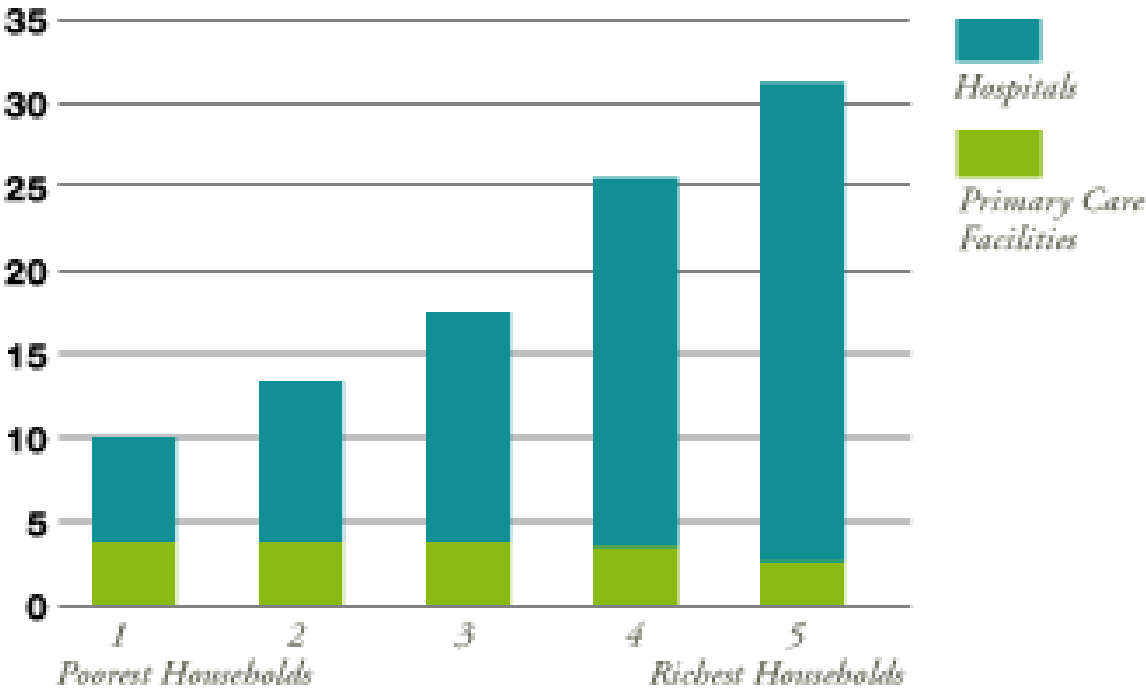
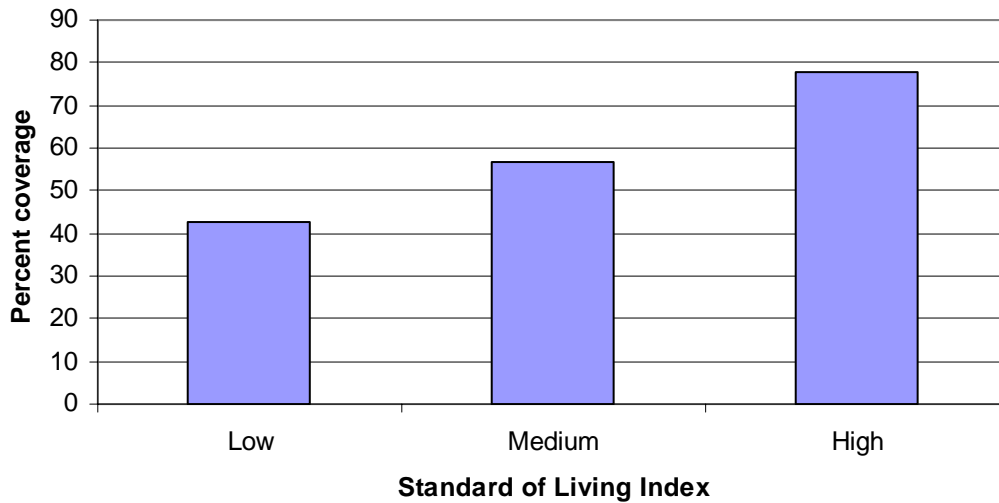
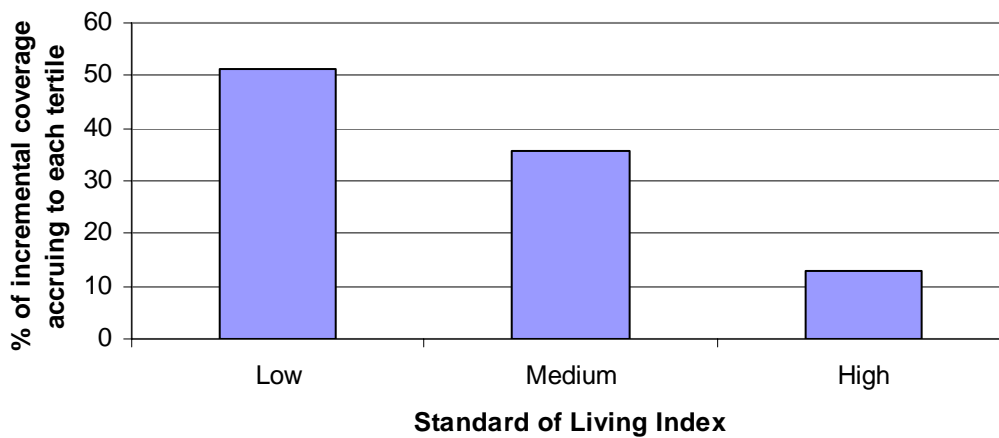


Figure 14. Beneficiaries of immunization in India

Panel A. Current beneficiaries: DPT-3 coverage in India, 1998-99



Panel B. Equity implications of universalizing immunization coverage (90% coverage in each tertile)



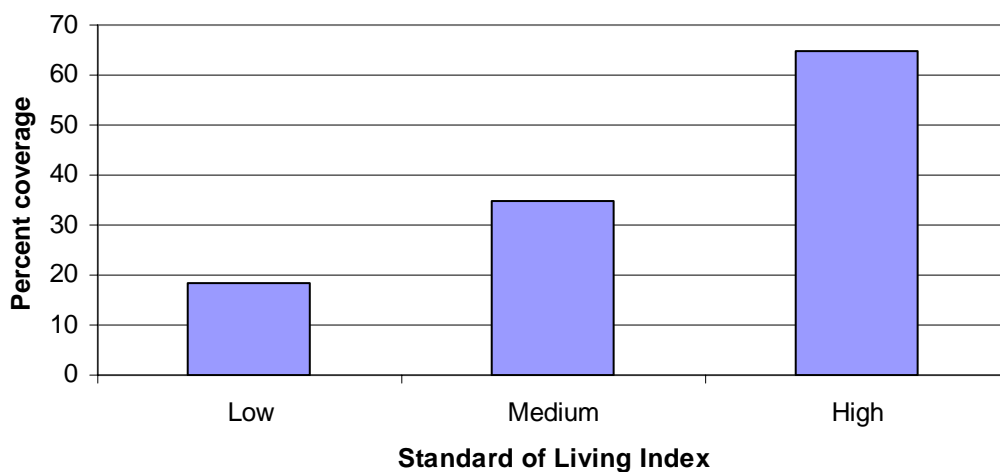
Sources:

Panel A: International Institute for Population Sciences and ORC Macro. 2000. National Family Health Survey (NFHS-2), 1998-99: India. Mumbai: IIPS.

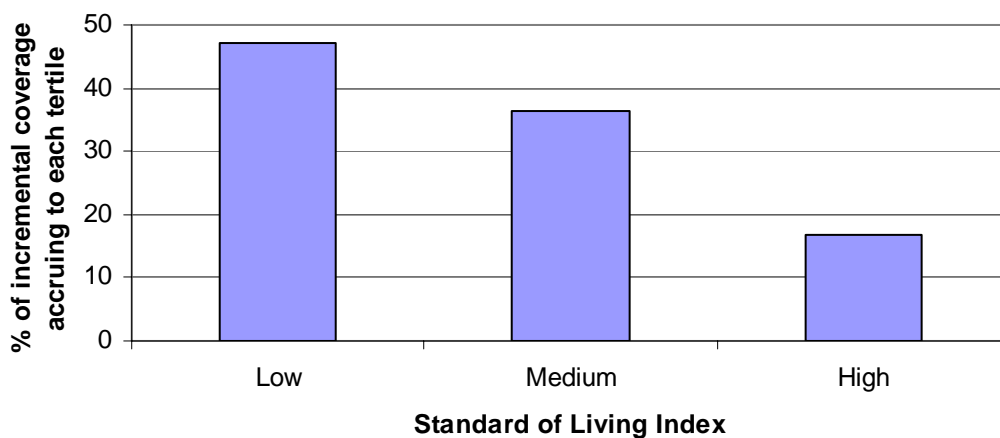
Panel B: Authors' calculations

Figure 15. Beneficiaries of births in health facilities

Panel A. Current beneficiaries: Births in health facilities in India, 1998-99



Panel B. Equity implications of universalizing births in health facilities (90% coverage in each tertile)



Sources:

Panel A: International Institute for Population Sciences and ORC Macro. 2000. National Family Health Survey (NFHS-2), 1998-99: India. Mumbai: IIPS.

Panel B: Author's calculations

Figure 16: Percent of outpatient treatments in past 15 days obtained from a public (as opposed to private) provider, by state (rural only), 1995-96 and 2004

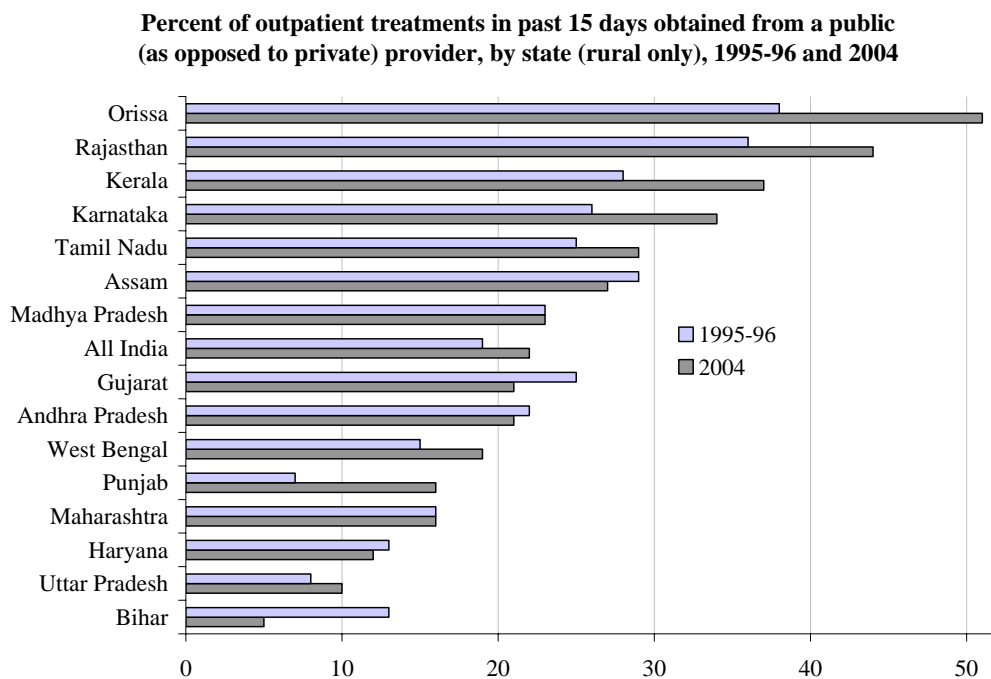
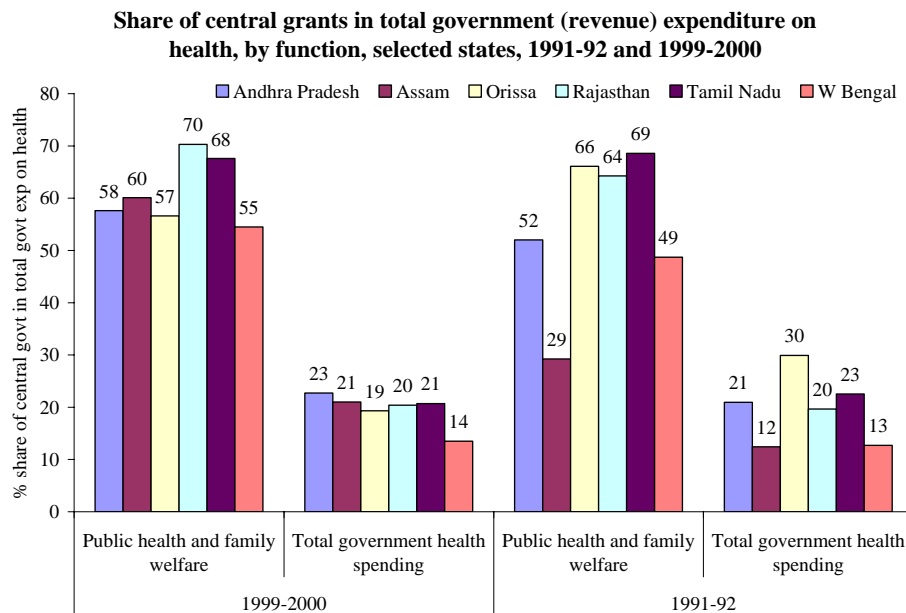


Figure 17: Share of central grants in total government (revenue) expenditure on health, by function, selected states, 1991-92 and 1999-2000



Note: These data should be treated with care, as the ‘public health and family welfare’ category includes several expenditures (e.g., health education, drug control) that have little to do with public health, and excludes expenditures on water and sanitation by the *Panchayati Raj* institutions.

Figure 18: Functional composition of state government health expenditures, 1999-2000

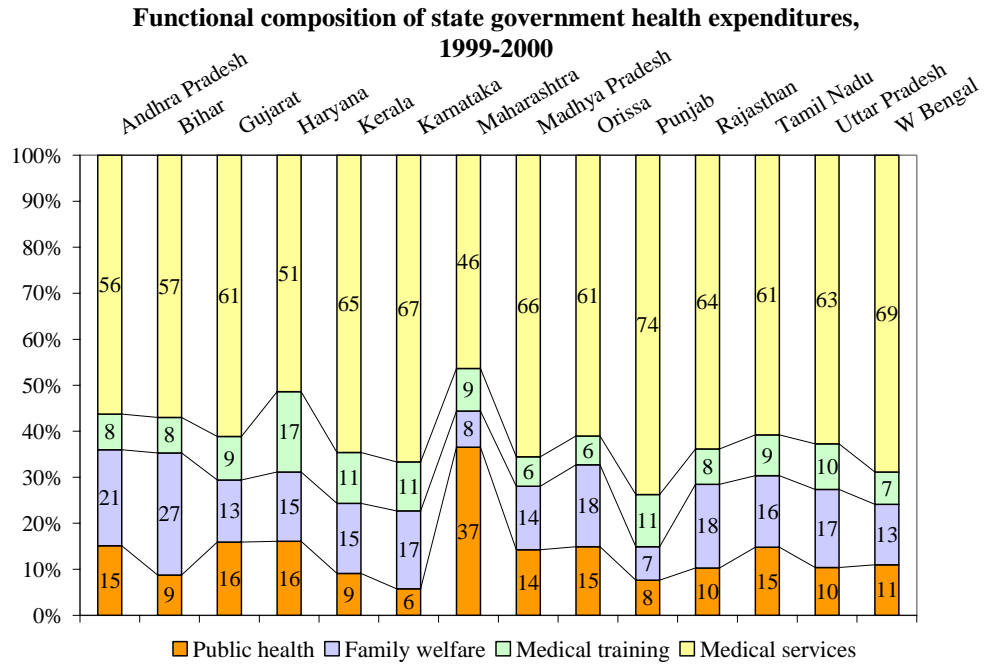


Figure 19: Public expenditures as % of GDP for OECD

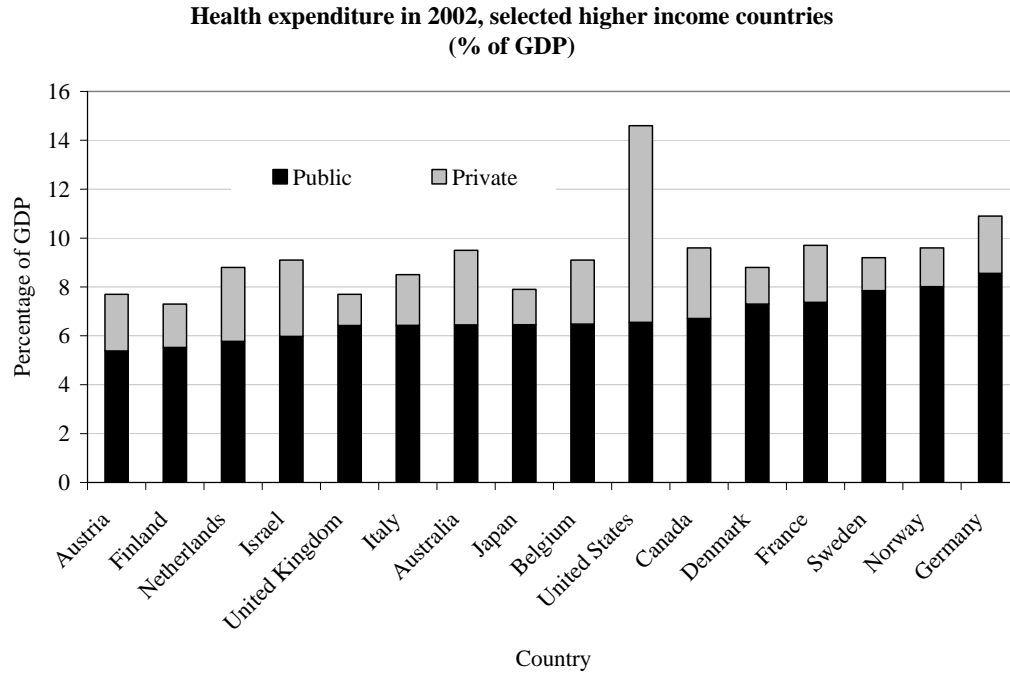


Figure 20: Relationship between infant mortality and GDP per capita across Indian states, 1981, 1991 and 2003

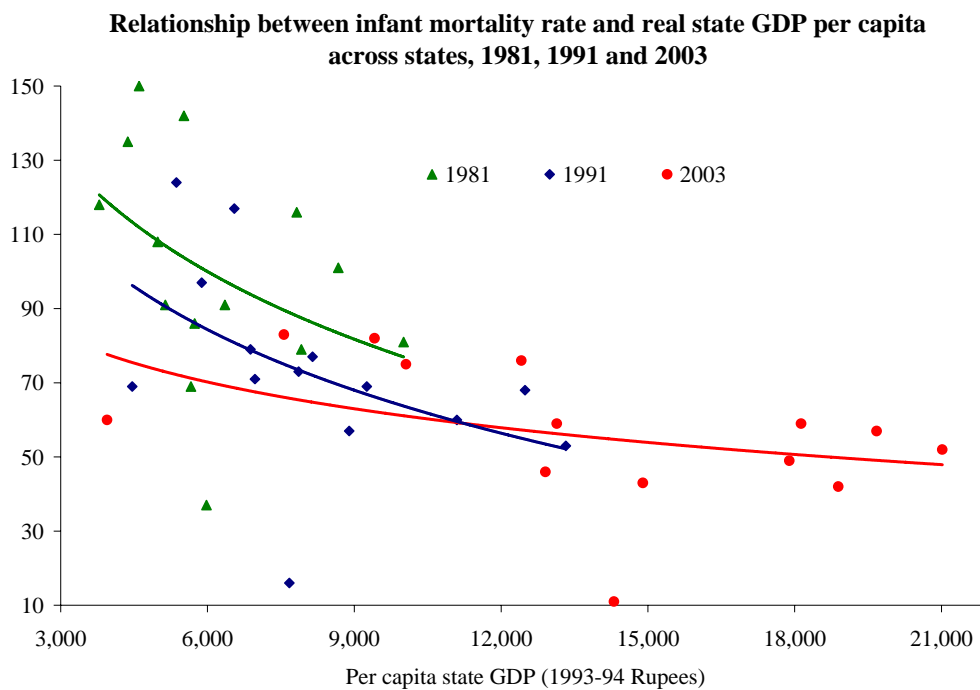


Figure 21: Percent of households in selected Asian countries with health expenditures exceeding 5, 10, 15 and 25 per cent of total consumption expenditure, circa 2000

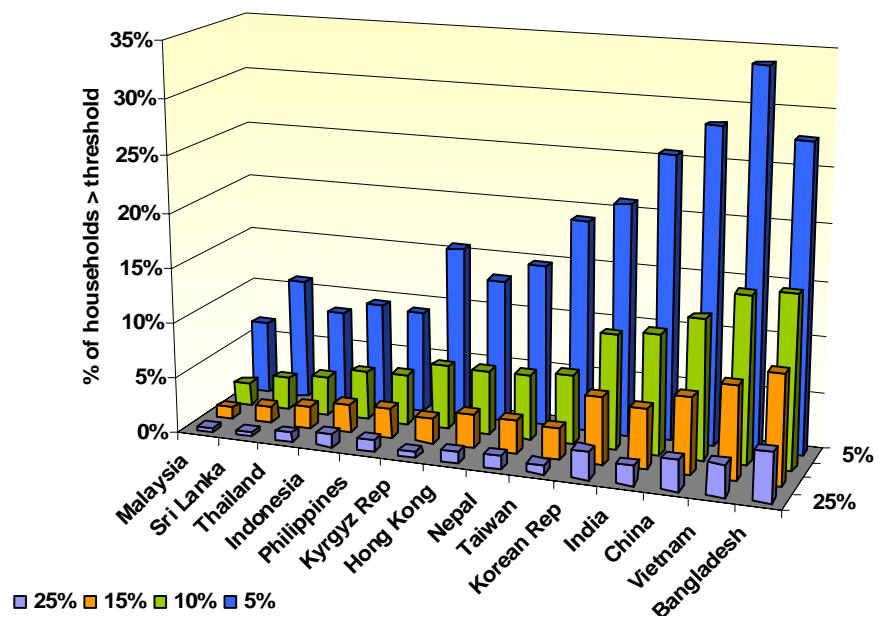


Figure 22: Increase in poverty head-count due to excluding out-of-pocket payments for health care from consumption

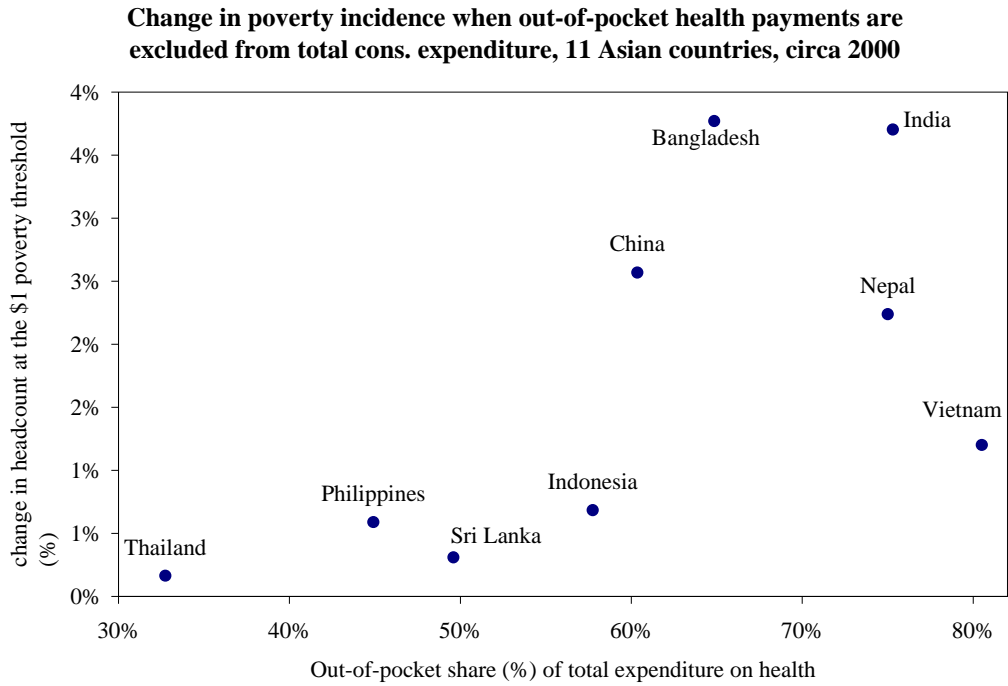


Figure 23: Estimated effects of real public expenditure on health per capita on infant mortality rate (IMR) reduction, by real gross state domestic product per capita

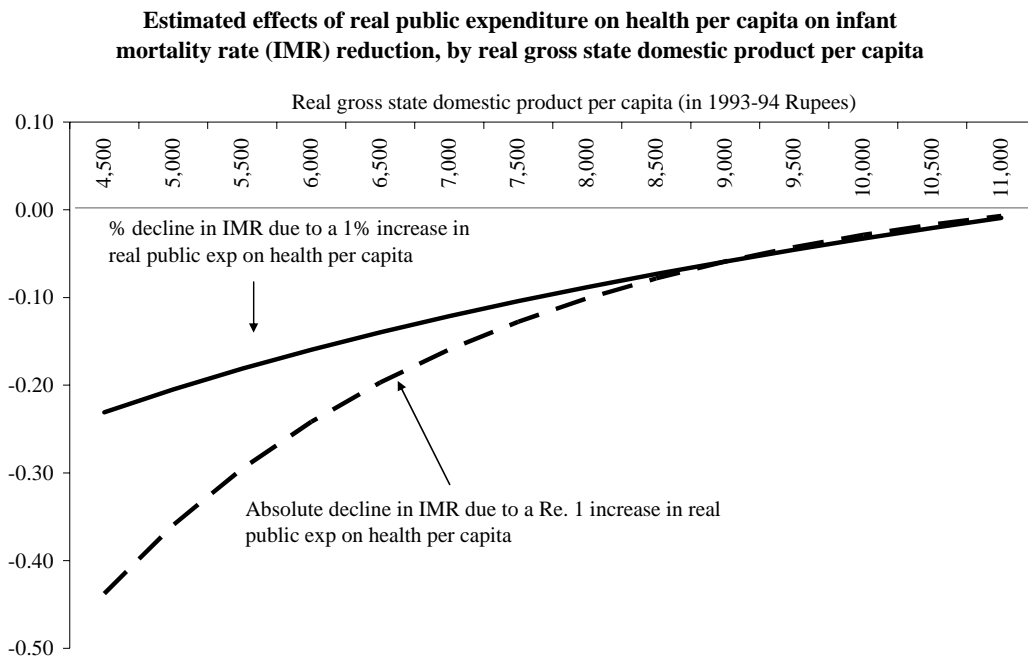


Figure 24: Measles vaccination rate (%) among 12-23 month olds, by state, 1992-93 and 1998-99

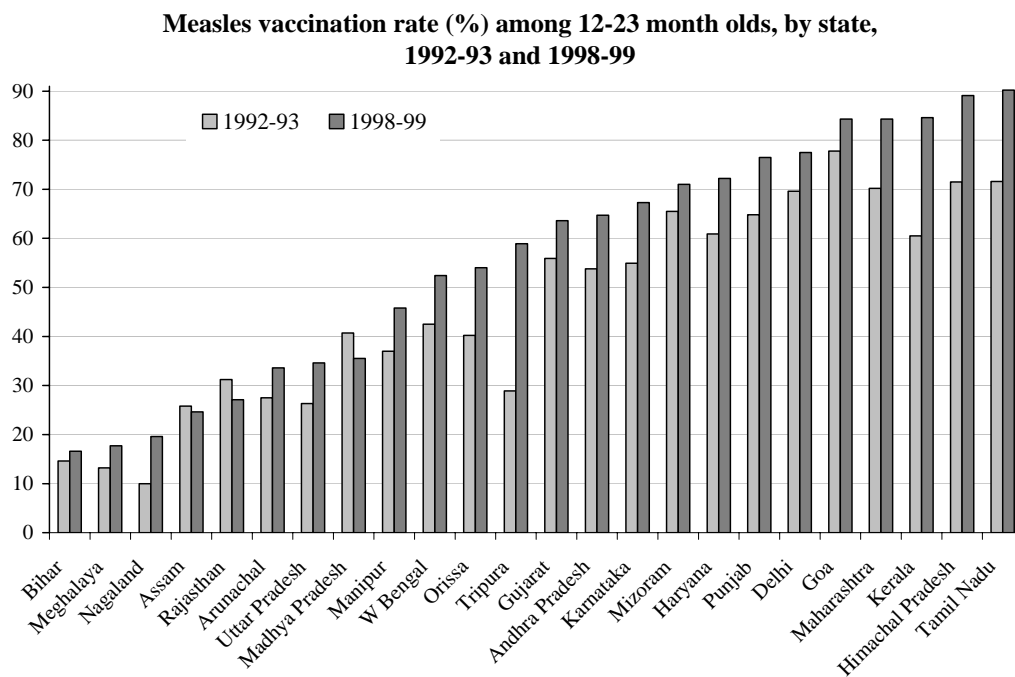


Table 1. Deaths by causes in EAG states and Assam, 2006

Rank	Cause	Deaths (% of total)
1	Diarrhoeal diseases	11.20%
2	Lower respiratory infections	8.69%
3	Tuberculosis	7.55%
4	Ischaemic heart disease	6.04%
5	Asthma	5.94%
6	Low birth weight	4.95%
7	Malaria	4.83%
8	Cerebrovascular disease	4.07%
9	Other perinatal conditions	3.93%
10	Chronic obstructive pulmonary disease	3.56%

Source: Authors' estimates.

Table 2. Cost, cost-effectiveness and avertable burden of a minimum Health Entitlement Program in the EAG states and Assam

Condition	Total current burden of disease	Intervention	Cost per capita per year (Rs.)	Cost per capita per year (US\$)	Total averted disease burden (DALYs or YLS)	Cost per DALY or YLS averted (Rs.)
<i>Communicable Diseases, Reproductive Health, & Nutritional Deficiencies</i>						
Maternal mortality	14 million births per year; 133 thousand maternal deaths per year	Expansion of institutionalized birth coverage to all mothers at the CHC level	13	0.28	900,000	6,800
Neonatal mortality	0.6 million neonatal deaths per year	Expansion of institutionalized birth coverage to all births (perinatal care incremental to maternal care)	22	0.48	6,700,000	160
		Expansion of coverage of postnatal care by health attendant to all births	2	0.04	3,100,000	450
Childhood diseases	0.1 million childhood and adolescent deaths per year attributable to TB meningitis, polio, diphtheria, tetanus, and measles	Expansion of Universal Immunization Program coverage to all children	4	0.08	11,200,000	160

Measles	41 thousand measles deaths per year	Addition of second measles dose in the UIP schedule at current coverage rates	1	0.03	300,000	1,800
Hepatitis B (HepB)	10 thousand liver cancer deaths and 13 thousand liver cirrhosis deaths caused by HepB per year	Inclusion of HepB vaccine in the UIP schedule at current coverage rates	2	0.04	400,000	2,200
Haemophilus influenzae type B (Hib)	57 thousand deaths caused by Hib per year	Inclusion of Hib vaccine in the UIP schedule at current coverage rates	7	0.15	1,900,000	1,700
Rotavirus	51 thousand childhood diarrhea deaths caused by rotavirus per year	Inclusion of rotavirus vaccine in the UIP schedule at current coverage rates	6	0.14	59,700,000	52
Streptococcus pneumoniae	179 thousand deaths caused by Streptococcus per year	Inclusion of Streptococcus vaccine in the UIP schedule at current coverage rates	3	0.07	12,500,000	170
Malaria	1.1 million cases per year; 193.3 thousand deaths per year	Chloroquine for all Pv cases; artemisinin-based combination treatment for all Pf cases at 80% coverage	0.46	0.01	6,100,000	36
		Indoor residual spraying with deltamethrin at 80% coverage	40	0.89	2,000,000	10,000
		Insecticide-treated bednets at 80% coverage	44	0.97	3,800,000	6,000
HIV/AIDS	0.7 million people currently infected; 5 thousand deaths per year	Condom promotion targeted at 80% of sex workers from 33% at baseline, over five	1	0.02	21,000,000	120

		years				
		Voluntary counseling and testing delivered to a third of the sexually active population of India, resulting in a 50% reduction in risky behavior sustained over five years	3	0.06	15,000,000	450
		Mother to child transmission intervention via AZT, formula feeding, and no breastfeeding, over five years	3	0.07	1,300,000	5,800
		STI management, over five years	3	0.06	63,000,000	110
		Structured antiretroviral therapy for all symptomatic patients, over 35 years	17	0.37	25,200,000	13,000
Tuberculosis	0.6 million detected cases per year; 302 thousand deaths per year	Directly observed short-course chemotherapy for ss+ patients	46	1.02	30,000,000	740
		Directly observed short-course chemotherapy for ss- patients	29	0.64	5,000,000	2,900
Diarrhea	202 thousand deaths per year among children under 5ya	Oral rehydration therapy (facility or hospital based) for every diarrhea episode during the first five years of life	34	0.74	3,990,000	20,000

		Maternity services-based breastfeeding promotion	0.49	0.01	494,000	2,400
Acute lower respiratory infection	290 thousand deaths per year among children under 5ya	Case management of non-severe cases at the community level over the first five years of life	1	0.03	1,121,000	3,100
Under 5 mortality	1.3 million deaths per year	Vitamin A supplementation with syrup	0.23	0.01	2,900,000	180
Iodine deficiency	3.1 million with mild neurological disorders; 1 million with cretinism	Salt iodization for 10 years	9	0.20	110,000,000	396

Non-Communicable Diseases

Cardiovascular disease	0.4 million deaths per year	Pharmaceutical management of acute myocardial infarction with aspirin and beta-blocker (annual)	0.01	0.00	56,000	500
		Legislation to limit trans fats in processed food (Assuming 7% reduction in IHD from reducing 2% of energy from Trans fat over 10 years)	1	0.02	6,800,000	1,700
Cervical cancer	5.4 thousand deaths per year	Visual screening with ascetic acid, 1-visit, 1x per lifetime at age 35	2	0.05	2000 (deaths)	150
Epilepsy	26.7 thousand deaths per year	Treatment with phenobarbital	16	0.35	810,000	9,500

Blindness	n.a.	Extracapsular cataract extraction with implantation of posterior chamber intraocular lens	8	0.18	4,700,000	830
Tobacco attributable death	340 thousand deaths attributable to tobacco per year	10% price increase	8	0.17	28,000,000	320
		Nicotine replacement therapy at 5% effectiveness	130	2.80	9,200,000	6,700
		Other non-price interventions	93	2.05	14,000,000	11,000

Table 3. Cost, cost-effectiveness and avertable burden of a minimum Health Entitlement Program in the non-EAGA states

Condition	Total current burden of disease	Intervention	Cost per capita per year (Rs.)	Cost per capita per year (US\$)	Total averted disease burden (DALYs or YLS)	Cost per DALY or YLS averted (Rs.)
Communicable Diseases, Reproductive Health, & Nutritional Deficiencies						
Maternal mortality	11 million births per year; 64 thousand maternal deaths per year	Expansion of institutionalized birth coverage to all mothers at the CHC level	5	0.11	490,000	5,700
Neonatal mortality	0.3 million neonatal deaths per year	Expansion of institutionalized birth coverage to all births (perinatal care incremental to maternal care)	11	0.25	2,100,000	300
		Expansion of coverage of postnatal care by health attendant to all births	1	0.03	1,600,000	650
Childhood diseases	0.1 million childhood and adolescent deaths per year attributable to TB meningitis, polio, diphtheria, tetanus, and measles	Expansion of Universal Immunization Program coverage to all children	1	0.02	4,700,000	100

Measles	26 thousand measles deaths per year	Addition of second measles dose in the UIP schedule at current coverage rates	2	0.03	900,000	1,000
Hepatitis B (HepB)	15 thousand liver cancer deaths and 22 thousand liver cirrhosis deaths caused by hepatitis B per year	Inclusion of hepatitis B vaccine in the UIP schedule at current coverage rates	2	0.05	1,200,000	900
Haemophilus influenzae type B (Hib)	47 thousand deaths caused by Hib per year	Inclusion of Hib vaccine in the UIP schedule at current coverage rates	9	0.19	3,100,000	1,500
Rotavirus	46 thousand childhood diarrhea deaths caused by rotavirus per year	Inclusion of rotavirus vaccine in the UIP schedule at current coverage rates	8	0.18	105,600,000	43
Streptococcus pneumoniae	141 thousand deaths caused by Streptococcus per year	Inclusion of Streptococcus vaccine in the UIP schedule at current coverage rates	4	0.09	10,100,000	310
Malaria	0.7 million cases per year; 59.8 thousand deaths per year	Chloroquine for all Pv cases; artemisinin-based combination treatment for all Pf cases at 80% coverage	0.20	0.00	2,200,000	51
		Indoor residual spraying with deltamethrin at 80% coverage	40	0.89	700,000	31,000
		Insecticide-treated bednets at 80% coverage	44	0.97	1,300,000	18,000
HIV/AIDS	3 million people currently infected; 18 thousand deaths per year	Condom promotion targeted at 80% of sex workers from 33% at baseline, over five	4	0.05	91,000,000	120

		years				
		Voluntary counseling and testing delivered to a third of the sexually active population of India, resulting in a 50% reduction in risky behavior sustained over five years	11	0.12	64,000,000	450
		Mother to child transmission intervention via AZT, formula feeding, and no breastfeeding, over five years	12	0.14	5,700,000	5,800
		STI management, over five years	11	0.12	269,000,000	110
		Structured antiretroviral therapy for all symptomatic patients	64	1.40	0	13,000
Tuberculosis	0.8 million detected cases per year; 206 thousand deaths per year	Directly observed short-course chemotherapy for ss+ patients	50	1.10	37,000,000	740
		Directly observed short-course chemotherapy for ss- patients	34	0.74	6,400,000	2,900
Diarrhea	180 thousand deaths per year among children under 5ya	Oral rehydration therapy (facility or hospital based) for every diarrhea episode during the first five years of life	18	0.41	3,618,000	14,000

		Maternity services-based breastfeeding promotion	0.33	0.01	456,000	2,000
Acute lower respiratory infection	221 thousand deaths per year among children under 5ya	Case management of non-severe cases at the community level over the first five years of life	1	0.02	714,000	3,300
Under 5 mortality	0.6 million deaths per year	Vitamin A supplementation with syrup	0.18	0.00	500,000	780
Iodine deficiency	3.5 million with mild neurological disorders; 1.2 million with cretinism	Salt iodization for 10 years	9	0.20	120,000,000	396

Non-Communicable Diseases

Cardiovascular disease	0.6 million deaths per year	Pharmaceutical management of acute myocardial infarction with aspirin and beta-blocker (annual)	0.02	0.00	87,000	500
		Legislation to limit trans fats in processed food (Assuming 7% reduction in IHD from reducing 2% of energy from Trans fat over 10 years)	1	0.02	10,500,000	1,700
Cervical cancer	5.5 thousand deaths per year	Visual screening with ascetic acid, 1-visit, 1x per lifetime at age 35	3	0.06	1800 (deaths)	150
Epilepsy	20.9 thousand deaths per year	Treatment with phenobarbital	11	0.25	640,000	9,500

Blindness	n.a.	Extracapsular cataract extraction with implantation of posterior chamber intraocular lens	8	0.18	5,200,000	830
Tobacco	360 thousand deaths attributable to tobacco per year	10% price increase	7	0.16	30,000,000	320
		Nicotine replacement therapy at 5% effectiveness	120	2.67	9,800,000	6,700
		Other non-price interventions	89	1.96	15,000,000	11,000

Appendix Table 1: Fixed-effects, log-linear regression of infant mortality rate, pooled data for 1980-1999 across Indian states

Independent variable	OLS		Fixed effects			Fixed effects with female adult literacy*		
	Coeff. (t-ratio)	Coeff. (t-ratio)	Coeff. (t-ratio)	Coeff. (t-ratio)	Coeff. (t-ratio)	Coeff. (t-ratio)	Coeff. (t-ratio)	Coeff. (t-ratio)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln real gov't health & family welfare expenditure. per capita (G)	-1.042 (-7.45)	-1.014 (-7.33)	-0.138 (-1.91)	-2.317 (-3.12)	0.437 (0.61)	-0.020 (-0.10)	-5.657 (-2.26)	-5.685 (-2.30)
Ln real gross state domestic product per capita (Y)	0.164 (1.44)	0.248 (2.14)	-0.673 (-11.34)	-1.782 (4.68)	0.128 (0.33)	-0.550 (-3.09)	-1.487 (-0.92)	-1.006 (-0.95)
Ln G x Ln Y				0.248 (2.95)	-0.037 (-0.47)		0.707 (2.30)	0.653 (2.39)
Ln adult female literacy (F)						-0.259 (-1.59)	4.891 (2.63)	5.011 (2.76)
Ln F x Ln Y							-0.460 (-1.56)	-0.541 (-2.57)
Ln F x Ln G							-0.152 (-0.40)	
Time trend (t)		-0.013 (-2.90)			-0.031 (-9.24)	-0.029 (-2.77)	-0.036 (-2.77)	-0.036 (-2.85)
Intercept	7.242 (11.90)	6.505 (9.98)	10.904 (32.71)	20.631 (6.22)	3.043 (0.88)	10.174 (11.11)	14.704 (1.32)	12.415 (1.31)
Number of observations	278	278	278	278	278	56	56	56
F-test for model	68.31	44.41	249.32	173.98	194.00	29.05	19.76	23.58
R-squared	0.33	0.35	0.94	0.94	0.95	0.94	0.96	0.96
F-test for state effects			193.15	198.89	261.63	15.19	13.89	18.61

Notes: All regressions (with the exception of those marked *) use pooled data across 14 states and 20 years. Dependent variable is log of infant mortality rate. Data are obtained from various issues of the *Sample Registration Surveys* (SRS), state government budget demand documents, and CSO statistics on GSDP of states. All values are in constant 1993-94 Rupees (using state-specific GSDP deflators). Standard errors are corrected for heteroscedasticity using the Huber-white method. **Figures in bold are statistically significant at the 10% or lower level.**

*Data on female literacy are available only for 1983-84, 1987-88, 1993-94 and 1999-2000, so these regressions are restricted to these four years.